PSYCHOMETRIC PROPERTIES OF UNIVERSITIES STUDENTS' ATTITUDES SCALE TOWARDS BLENDED LEARNING

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ABSTRACT

Student attitudes are one of the fundamental factors that influence their achievement in the educational context. This study aimed to investigate the psychometric properties of Jordanian university students' attitudes towards blended learning. The sample for the study consisted of 843 Jordanian university students who were enrolled in blended learning experiences during the academic year 2022-2023. We validated the Blended Learning Attitude Scale that, in its initial form, consisted of 38 items. Based on a factor analysis of the study findings, the results indicated that one dimension explained the performance of the scale. The validity indicators such as factor analysis, discernment validity, and content validity all showed acceptable values, which demonstrated the scale's robust psychometric properties. Using this scale, we determined that Jordanian university students exhibit moderate attitudes towards blended learning. Given the students' moderate attitudes toward blended learning, institutions should conduct awareness campaigns and training sessions to enhance students' understanding and perception of blended learning.

Keywords: *psychometric properties, Jordanian universities students, attitudes scale, blended learning*

INTRODUCTION

During the 21st century, technology has become a dominant force in all sectors of society, particularly in education and in industrialized countries (Abdelmalak, 2015; Birbal et al., 2018; Novikova et al., 2022). During the recent COVID-19 pandemic, the world was forced to switch entirely to eLearning due to the widespread lockdown of citizens. Hence, many problems were created for countries all over the world, especially those who relied on traditional education that centered around the teacher (Adams et al., 2021; Ayasrah et al., 2022; Unger & Meiran, 2020).

As a result of the total transition to elearning, a number of issues have been highlighted, particularly when implementing the elearning process with its various components, including those related to the student, instructor, curriculum, and infrastructure. According to Hofmann (2014), people with technological challenges may abandon learning altogether. Research has shown that there is a widespread lack of communication skills among students, teachers, and students (Harris et al., 2022; López Hernández & Silva Pérez, 2016; Rasmitadila et al., 2020; Zarzycka et al., 2021).

The absence of computer literacy skills and the lack of advanced scientific curricula are additional factors. Furthermore, some students find it difficult to adjust to virtual classrooms due to a lack of ambition and computer literacy skills. In addition, the technology infrastructure in most countries is inadequate, whether at the university

or individual level (Adams et al., 2021; Dweikat & Amer, 2017; Garrison & Anderson, 2003; Pellas & Kazanidis, 2015; Rovai & Jordan, 2004). In spite of this, elearning offers a number of advantages and benefits in its various forms, include the ability to save time and money, its ease of access and flexibility, the capability to develop it rapidly, and many others (Alsarayreh, 2020; Cortez, 2020; Isda et al., 2021). Moreover, as one of the best-known elearning formats, blended learning has grown and spread quickly in recent years, especially in developing and emerging countries.

With blended learning, both teachers and students can meet the many demands of modern life by using information technology as a supplement and a supportive component of traditional education. By establishing direct communication and interaction between the elements of education, blended learning is distinguished by its extensive capabilities and is more efficient, thorough, and adaptable. Also, blended learning provides a continuous interactive environment that transcends the boundaries of time and location. As a result of departing from the conventional classroom routine, students and teachers are encouraged to take advantage of technology and the options available to them. Moreover, blended learning provides sufficient flexibility to accommodate the needs and learning styles of learners of all levels and ages (Aladwan et al., 2018; Birbal et al., 2018; Gecer, 2013; Khan et al., 2022).

In blended learning, traditional classroom instruction is combined with online instruction to create a multimodal learning environment that combines both in-person and online instruction for educational purposes. Several different delivery methods are employed in blended learning to provide learners with an engaging and motivating learning experience. Moreover, teachers can incorporate online opportunities into their blended learning programs by using live chat rooms, self-paced learning, instant messaging, social networking, blogs, forums, applications, wikis, journals, and webinars (Fenech et al., 2021; Graham, 2006; Hrastinski, 2019).

As a developing country, Jordan strives to achieve prosperity and progress in all areas of life, including education. With its ability to form creative individuals with the skills of the twenty-first century, education has a great deal to offer. Consequently, government agencies have sought to consider elearning in line with the global trend, and elearning is now an integral part of the educational process in lower schools and universities alike (Aladwan et al., 2018; Alnasraween et al.,2022).

ATTITUDES

Attitudes encompass a variety of topics and fields that include scientific studies. In social psychology, directions are highlighted as a means of understanding an individual's behavior and how they interact with society and others. Directions also include the concept of culture and how it shapes and individual's values and beliefs and guides their behavior. Attitudes represent an important part of scientific research and analysis in various fields, and it contributes to directing decisions, developing policy, and enhancing our understanding of a complex world and its interactions (Svenningsson et al., 2022).

An attitude is also seen as a state of psychological and nervous readiness or preparedness, through which a person's experience is organized and has a directive or dynamic influence on the individual's response to all topics and situations that elicit this response(Elliott et al., 2015)

Cognitive Component

The first stage in the formation of the attitude is the cognitive component, and it includes the knowledge and beliefs of the individual regarding the subject of the attitude, which is acquired through the environment of the individual. This is the extent of their culture and education and is the sum of their experiences, knowledge, and information that are related to the direction of the individual and passed to the individual through transmission, indoctrination, or direct practice. Thus, the opinions and viewpoints that an individual believes regarding a specific topic that they acquired from previous experiences with the stimuli of this topic contribute to preparing them to respond to the topic and evaluate it in similar situations and circumstances using the same stereotypical thinking based on their prior knowledge of the topic (Ajzen et al., 2019).

Affective Component

This emotional component of attitudes is demonstrated by the sentimental or emotional aspect related with an individual's feelings toward a specific issue or scenario. This component

communicates an individual's good or negative thoughts toward the thing, idea, or person that the attitude is about. This emotional component comprises personal feelings like love, hate, happiness, fear, and fury, which may differ from person to person depending on their unique experiences and values. The emotional component's feelings are often rather stable, but they might change over time or as a result of new experiences. Emotional feelings can be an effective motivator for behavior(Svenningsson etal., 2022).

Behavioral Component

The behavioral component represents the external aspect of attitudes and is a reflection of the individual's values, attitudes, and the expectations of others. It includes the procedural steps that are linked to the person's actions regarding the subject of the attitude, indicating their acceptance or rejection of it based on their stereotypical thinking and emotional feeling about it. The attitude is related to behavior in that it is considered a seedbed for the individual's future behavior. Attitudes are powerful predictors of behavior when individuals have direct experience with their subjects. Further, when individuals express their attitudes repeatedly, this creates stability in the attitude (Elliott et al., 2015).

BLENDED LEARNING: A REVIEW OF KEY STUDIES

A study conducted by Ali (2021) investigated the attitudes of students toward blended teaching at the University of Calcutta. The study was conducted using a quantitative research methodology, and according to the results, the students at Calcutta University have similar attitudes toward blended learning regardless of their gender. Additionally, there were no significant differences between rural and urban students regarding their perceptions of blended learning. Moreover, most students believed that college and university students benefit from blended learning where some courses are taught online and some offline. Adams et al. (2021) evaluated students' readiness for blended learning at a prestigious private, higher education institution in Malaysia. Based on the results, they concluded that the pupils were prepared for blended learning, and they found that the students' levels of preparation for blended learning varied depending on their gender, age, ethnicity, and field of study.

As reported by Archibald et al. (2021), blended learning is the most rapidly growing method of teaching in North America and around the world. Despite this, the use of blended learning far outpaces research and training in this area. Therefore, they developed a Blended Teaching Readiness Instrument (BTRI) and a competency framework to assist teachers and researchers in assessing teachers' readiness for blended learning environments. During their study, a blended learning preparedness model and the BTRI were used to assess teacher candidates both before and after course completion for the model's validity in preparing teachers for teaching mixed courses. A good fit was also found between the results and the model. Based on the analysis of the elements, they concluded that the survey is a valid and reliable instrument for evaluating the abilities of blended teachers. The model can be used to model pre-post growth once it has been verified for measurement invariance.

Lazar et al. (2020) set out to develop and validate a new version of the Technology Acceptance Model (TAM) to understand how students intend to use digital tools a blended learning environment in higher education. The TAM has been extended to include and evaluate the external, dimensional component of familiarity with digital technologies. With a seven-dimensional, 25-item survey, familiarity with high-tech digital tools and familiarity with traditional digital tools were two externally correlated variables. Using a four-stage scale development technique, two mediator variables were created—computer anxiety and perceived barriers—as well as three response variables—perceived usefulness, perceived ease of use, and intention to use. In its initial iteration, 250 undergraduate students were surveyed. A second sample of 206 students was then examined using exploratory factor analysis to determine the latent dimensions of the survey. After the survey's format had been verified in two more phases, 262 undergraduate responses and 310 master's student responses from two different universities were analyzed. Based on psychometric analyses, the instrument was found to be reliable, consistent, and invariant. According to the data collected, the survey's multifactorial structure appears to be appropriate, reliable, and consistent across degree levels.

A study conducted by Aladwan et al. (2018) investigated students' perceptions of blended

learning at the University of Jordan. Approximately 250 students who had taken blended courses were asked to complete an online questionnaire that assessed their knowledge of, attitudes toward, and preference for blended learning. They found that students benefit from blended learning, and that most of them comprehend the objectives of elearning in their entirety. There was a favorable attitude toward blended learning among the students, and they demonstrated adequate knowledge of blended learning and the ability to choose when and how to utilize the resources made available to them through blended learning. What is more, the study also demonstrated that blended learning should be used rather than traditional teaching methods for students to gain knowledge and skills and enhance both. Additionally, using the electronic resources of blended learning significantly improved students' ability to take responsibility for their own education.

In order to meet the demand for an instrument evaluating self-regulation in the online learning environment, Barnard et al. (2009) developed the Online Self-regulated Learning Questionnaire (OSLQ). This study gave evidence of the reliability and validity of the instrument through data gathered from two student samples. The first sample of students completed their coursework online, whereas the second group completed their curriculum in a mixed or hybrid manner. For both populations of students, Cronbach's alpha and confirmatory factor analyses were used to evaluate the psychometric qualities of the OSLQ, showing that it is a valid indicator of self-regulation in online and mixed learning environments.

Akkoyunlu and Yılmaz-Soylu (2008) developed an impartial assessment tool to evaluate learners' perceptions of blended learning and its implementation process. In this study, Cronbach's alpha, principal component analysis, item discrimination indices, item analysis, varimax rotation, and discriminant validity were utilized as the underlying methods for the assessment. The reliability and validity of the scale were evaluated using 50 items as part of the improved version of the scale, and it was found to be both extremely reliable and manageable. Further refinement was carried out based on principal component analysis, and by using this approach, it is possible to elicit learners' opinions about blended learning and how it should be implemented as a function of the level of complexity of the learning process. In order to facilitate a better blended learning environment for students, the scale is proposed to assist people in expressing their opinions about blended learning and its implementation.

STUDY PROBLEM STATEMENT

Students work in diverse educational environments where they interact with different educational methods and technologies used in the learning process. The process of understanding students' attitudes towards blended learning is necessary to design educational programs that meet their needs and enhance the effectiveness of their learning. Students' attitudes towards blended learning are also an important and vital aspect of research, as the success of blended educational programs depends largely on students' acceptance of this modern educational method. As the use of technology in education increases, it becomes increasingly important to understand the characteristics and attitudes of students towards its use. While there is uncertainty about the validity and reliability of student attitude scales, there remains an urgent need to conduct comprehensive studies to analyze the psychometric properties of the student attitude scale toward blended learning, which helps to develop reliable and applicable tools for application in various educational contexts. Therefore, this research is essential to provide an effective and accurate assessment instrument that enhances the understanding of student responses to blended learning and contributes to the development of future learning and teaching policies.

This study contributes fundamentally to understanding the factors that govern students' attitudes toward blended learning and to identifying measurement tools based on sound foundations to accurately and reliably evaluate these attitudes in various educational contexts. Therefore, this study aimed to provide an attitude scale with acceptable psychometric properties that researchers can use for this purpose.

Study Significance

This study derives its importance from its topic, which is the study of the psychometric properties of university students' attitudes toward blended learning. Therefore, understanding and measuring these trends contributes greatly to analyzing

educational behavior and understanding students' learning mechanisms. Knowing how to evaluate and analyze these trends contributes to improving the learning environment and developing teaching strategies that suit students' needs and educational preferences. In addition, understanding the psychometric properties of these trends can contribute to the development and improvement of the tools and measures used in educational research, which enhances the accuracy of the results and deepens the understanding of the factors of success and failure in the field of blended learning.

Research Questions

The first question is: What are the validity and reliability indicators of the attitudes scale towards blended learning?

The second question asks: What are the Jordanian university student's attitudes towards blended learning?

Terminology

Below are the technical definitions of blended learning and attitudes, two key concepts included in this study. *Blended learning* is an approach to education that combines a variety of teaching and learning methods to achieve specific educational goals. This approach includes the use of a range of tools and techniques such as active learning, experiential learning, project-based learning, and collaborative learning, as well as educational technology such as multimedia and online learning. Blended learning is based on the foundations of constructivist learning theory, which emphasizes students' interaction with educational content and building their knowledge through actual and practical experiences, rather than relying solely on listening and theoretical comprehension. Blended learning enhances interaction between students and the learning environment and increases their understanding of subjects in multiple and diverse ways.

Attitudes in psychology refers to behaviors or intentions that lead an individual toward a specific goal or behavior. An attitude is represented by personal characteristics that influence an individual's choice of activities, actions, or decisions. Attitudes consist of multiple factors including beliefs, values, feelings, past experiences, culture, and social environment. They play an important role in determining an individual's behavior and directing them towards their goals and aspirations in life. In psychology, attitudes are studied through a range of research approaches such as opinion polls, behavioral studies, and statistical analysis of data to understand their formation and impact on an individual's behavior and psychosocial development.

Attitudes depend on a range of factors that include genetics, environment, culture, and personal experiences. For example, genetics can play a role in determining some tendencies, such as the tendency toward extremism or the pursuit of adventure, while environment, personal experiences, and interactions between individuals influence the formation of tendencies such as religious values or political beliefs. Attitudes also show developments across life stages, where they can change over time because of new expertise and experiences and the impact of social and cultural changes.

METHODOLOGY

This study followed the descriptive analytical approach. The number of university students who participated in the blended learning experience reached 230,000 for the academic year 2022-2023, according to the ministry of higher education and scientific research. A total of 840 university students were selected using the availability sampling method by sending the Blended Learning Attitude Scale in electronic form using Google Drive to the targeted participants via social media.

The Blended Learning Attitude Scale was developed after reviewing the previous literature and studies such as Ali (2021) and Lazar et al. (2020). The scale consisted in its initial form of 36 items. Various faculty members from the Faculties of Education, Evaluation and Measurement, and Educational Psychology evaluated the scale of attitudes towards blended learning. As a result of their revisions, many modifications were made and the scale was trimmed to 32 items. After applying Cronbach's alpha to a pilot sample consisting of 40 students from both the study population and outside the primary sample, a measure of scale reliability was extracted. Cronbach's Alpha reached 0.81, which was considered suitable for the study.

RESULTS AND DISCUSSION

The first research question was: What are the validity and reliability indicators of the attitudes scale towards blended learning? To answer this question, the following indicators were extracted.

Assessing Discriminatory Validity of the Study Instrument

A descending order of the total scores was employed to determine the discriminatory validity of the study instrument. As a result, the highest 27% and the lowest 27% of the data were taken, and a *t*-test was performed on two independent samples. Table 1 summarizes the results.

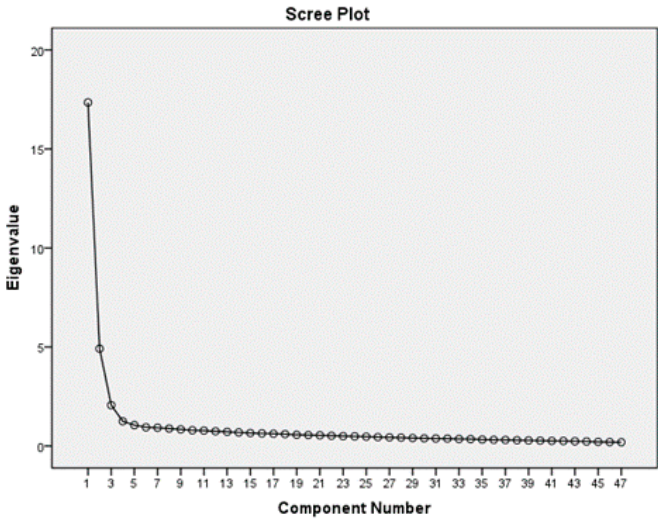
Table 1.
Results of t-test Comparing Arithmetic Means of Two Independent Samples

Group (Total Degree)	*N*	*Mean*	*Std. Deviation*	Std. Error Mean	*t*	sig
High level	178	4.6120	0.20780	0.016	56.660	0.000
Lower level	178	3.1913	0.26216	0.100		

As shown in Table 1, the *t*-value was 56.660, which is statistically significant at the 0.05 level, favoring the high-level group. This demonstrates that the study instrument possessed a valid discriminatory effect. Furthermore, the factor analysis results are detailed in Table 2.

Based on the analysis in Table 2, there were five factors with eigenvalues exceeding one. We estimated that the first factor accounts for 36.913% of the variance, with a value of 17.349. In addition, the second factor had a value of 4.914, explaining 10.456% of the variance. As can be seen from Table 2, the division of the first factor by the second exceeds 1, indicating that the scale is one-dimensional, Moreover the following graphical representation indicates the one dimensionality of the scale (Figure 1).

Figure 1.
Eigenvalues by Component Number



In Figure 1, it is evident that three factors have Eigenvalues greater than the integer one, while the remaining factors are closely related. Additionally, the axes were rotated orthogonally using Varimax with Kaiser Normalization.

Study Instrument Reliability

To verify the reliability of the study scale, the following indicators were extracted:

a. Reliability was calculated using Cronbach's alpha and the internal consistency values in terms of for the total degree amounted (0.81).
b. We believed that the study tool had adequate reliability based on the standard error, which ranged from 0.021 to 0.039.

Table 2.
Total Variance Explained for Student Performance on the Attitudes Scale towards Blended Learning

Component	Initial Eigenvalues			Extraction Sums of Square Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.349	36.913	36.913	17.349	36.913	36.913	9.945	21.159	21.159
2	4.914	10.456	47.368	4.914	10.456	47.368	9.221	19.620	40.779
3	2.063	4.389	51.757	2.063	4.389	51.757	4.658	9.911	50.691
4	1.250	2.659	54.417	1.250	2.659	54.417	1.518	3.229	53.919
5	1.054	2.244	56.660	1.054	2.244	56.660	1.288	2.741	56.660

Note. The extraction method is principal component analysis.

c. Half-segmentation reliability: Using Spearman-Brown and Guttman half-segmentation, the half-segmentation reliability coefficients for the scale items were extracted and its value reached 0.845.

These findings may be attributed to the soundness of the procedures of building, the scale items, and the measures taken in applying the scale to the study sample. These findings are aligned with the Lazar et al. (2020) study, which demonstrated the acceptable psychometric properties of the study scale. Also, the findings are consistent with Akkoyunlu & Yılmaz-Soylu (2008), which used Cronbach's alpha and item discrimination to assess validity and reliability of the study scale and came up with a scale to help people express their opinions on toward learning.

The second research question was: What are the Jordanian university student's attitudes towards blended learning? To answer this question, we calculated the means and standard deviation of the Jordanian university student's attitudes towards blended learning, as shown in Table 3.

The results shown in Table 3 indicate that Jordanian university students have a moderate attitude toward blended learning, as the arithmetic mean reached 3.52 with a standard deviation of 0.51. Item 29, "I make sure to attend face-to-face lectures on time," has the highest score of 3.93, which is related to the fact that there is no doubt that face-to-face interactions contribute significantly to the learning process and are highly valued by many students. Moreover, Item 10, "I feel that teaching through blended learning increases my level of achievement," was the item with the lowest score, which is likely related to the fact that it can be challenging to transition from traditional learning to blended learning. Unless executed well, the transition can lead to confusion, making students feel that their academic performance is being hindered. As well, Item 10, "I feel that teaching through blended learning increases my level of achievement," showed a low score of 3.18, which may be related to the fact that blended learning may present some challenges for students who are unfamiliar with the assessment methods used in traditional learning. Such results are similar to the results of a study by Al Bataineh et al. (2019), which indicated that there was a positive impact of blended learning on the performance and attitudes of Jordanian EFL learners in grammar. In addition, these findings are aligned with the findings of Ali (2021), which indicated that students believe that college and university students can adopt the blended learning approach, and the majority of students believed that teaching some of the curriculum online and some offline will benefit them. Finally, these results agreed with what Archibald et al. (2021) pointed out, that blended learning is the most rapidly growing method of teaching in North America and around the world.

CONCLUSION

Attitudes are one of the fundamental factors that greatly influence student achievement in the educational context. For example, research indicates that university students who show positive attitudes toward learning and studying tend to achieve better results on exams and tests than their peers who show negative or careless attitudes toward studying. These differences in achievement are due to several factors, including the student's level of commitment and dedication to study, their ability to concentrate and comprehend, and the teacher's use of appropriate educational strategies. Therefore, understanding and evaluating student attitudes presents a vital part of educational and psychological analyses, as this understanding can guide the teaching and learning process towards achieving better results and enhancing the learning experience for students.

By validating the Blended Learning Attitude Scale among Jordanian university students, this study demonstrated the scale's robust psychometric properties. As evidenced by the satisfactory Cronbach's alpha values, the scale's single dimension is supported by a variety of validity indicators such as the factor analysis. Using this scale, we determined that Jordanian university students exhibit moderate attitudes towards blended learning. What is more, given students' moderate attitudes toward blended learning, institutions may find it beneficial to conduct awareness campaigns and training sessions to enhance students' understanding and perception of blended learning. Future research could also examine the factors influencing these moderate attitudes, which may lead to more targeted interventions that enhance the learning experience for blended learners in the future.

Table 3.
Means and Standard Deviation of Students' Attitudes towards Blended Learning

No	Item	*Mean*	*SD*
29	I make sure to attend face-to-face lectures on time.	3.93	0.95
9	I feel my comprehension of lectures in blended learning exceeds that of regular lectures.	3.92	0.95
24	Blended learning promoted the principle of teamwork and communication with others.	3.85	0.91
28	I believe that blended learning helps faculty members to give their best to students.	3.83	0.90
30	I feel pleasure during my face-to-face lectures.	3.82	0.94
32	I am pleased that the teacher organizes his integrated lectures effectively in achieving their objectives.	3.81	0.91
20	I can access the study material easily and smoothly with blended learning.	3.76	1.00
23	I feel satisfied with achieving the educational goals through the blended learning system.	3.76	1.01
8	I feel comfortable when the teacher assigns me to do any task in the integrated lecture.	3.71	1.18
21	Blended learning has provided me with additional skills.	3.69	1.00
11	I enjoy blended lectures because they expose nontraditional learning situations.	3.65	1.11
4	I enjoy attending face-to-face lectures.	3.64	1.07
18	I believe that blended learning leads to raising the quality of education and improving its level.	3.64	0.92
27	I believe that blended learning enables the student to learn a lot of information in a short time.	3.62	0.94
25	The university provides the necessary technological infrastructure for elearning.	3.52	1.00
19	I believe that blended learning gives me many opportunities to think and draw conclusions.	3.51	1.11
26	I can send and receive materials and activities without hindrance through blended learning.	3.51	1.08
17	Blended learning helps develop students' scientific thinking.	3.47	1.10
16	Blended learning helps take into account individual differences among students.	3.44	1.05
15	It bothers me that some devices crash during blended learning lectures.	3.42	1.06
13	It comforts me to provide student feedback during the integrated lectures.	3.38	1.13
31	I am satisfied with the clarity and diversity of the aims of the merged lecture.	3.36	1.09
3	I always ensure I attend face-to-face lectures punctually.	3.33	1.17
5	I am satisfied with the clarity and diversity of the aims of the merged lecture.	3.32	1.08
12	Blended learning helps me to learn on my own.	3.32	1.19
22	Get adequate answers to any questions and inquiries during blended learning.	3.30	1.11
1	I believe that blended learning enables the student to learn a lot of information in a short time.	3.26	1.25
7	I value the teacher's use of multiple methods in the integrated lecture.	3.26	1.18
2	I believe that blended learning enables faculty members to deliver their best to students.	3.25	1.19
6	I'm pleased with how the teacher effectively structures their integrated lectures to meet their objectives.	3.22	1.21
14	I am comfortable with the variety of assessment methods used in blended learning.	3.18	1.13
10	I feel that teaching through blended learning increases my level of achievement.	2.94	1.15
Total		3.52	0.51

RECOMMENDATION

We recommend that the following actions be undertaken:

- Use the Blended Learning Attitude Scale of this study because it showed an acceptable validity and reliability indicators.
- Conduct more studies addressing the students' attitudes taking into account other variables.
- Direct faculty members to use different assessment tools during distance learning.
- Provide students and faculty members with the necessary skills for blended learning.

LIMITATIONS

The findings of this research are limited to its population, which is Jordanian universities students.

ACKNOWLEDGMENTS

We thank all the participants in this study for their effort and time. We received no funding for conducting this research and declare there are no competing interests. Ethics approval was not required for this study. The data can be obtained by contacting the first author.

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