

# The Effect of Using Blended Learning on Students' Achievement and Motivation toward Learning during the COVID-19 Pandemic

By

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## Abstract

**Purpose** - This study at the University of Jordan looked at how blended learning affected undergraduate students' academic performance and learning motivation.

**Design/ methodology/ approach** - The study's design was quasi-experimental. To meet the study's goals, a motivational scale for learning and an achievement exam were created. In the summer semester of 2019/2020, the University of Jordan had 55 undergraduate students. Two groups of these students were created: a control group of 27 students and an experimental group of 28 students. The experimental group employed blended learning, which included online synchronous engagement with the course material, teacher, and peers, while the control group learned the identical material through traditional learning.

**Findings** - The results of the investigation revealed a considerable improvement in pupils' academic performance and motivation. As a result, blended learning has proven to be a successful teaching and learning technique for raising students' academic achievement and motivation.

**Originality/ Value** – Due to the COVID-19 pandemic laws, the experiment was only conducted after the students had returned to face-to-face instruction after six months of online instruction. This gave the study its novelty. Blended learning has been used in the context of this study as a way to maintain the advantages of e-learning while still facilitating valuable human connections throughout that time.

**Keywords:** Blended learning, achievement, Motivation toward learning, Undergraduate students, Jordan

## 1. Introduction

Education has found itself a part of this global race toward never-ending improvement and experimentation to enhance the educational process, constantly seeking change and enhancement. As a result of the explosion of e-learning platforms and material and communication technologies, many courses have switched to using these technologies to deliver information and involve students in online and remote learning activities (ICTs). One of the most controversial terms regarding understanding and defining is “blended learning.” Early mentions of blended learning in the literature came from the corporate world of training, but since then, it has been widely adopted in higher and K-12 education (Macdonald, 2008).

Blended learning seeks to improve the learning process using technology in education. It aims to rethink and redesign the approaches taken by instructors for teaching and learning toward the full engagement of learners in education. It functions as a means to broaden the scope of the learning environment in terms of space and time. The innovative use of blended

learning works in favor of creating beneficial online learning activities (Vaughan *et al.*, 2013). For these reasons, many higher education institutions have taken serious steps toward integrating blended learning into their programs and courses. These steps signify the importance of blended learning, as it provides learners with several highly treasured skills for the workplace and life in general (Macdonald, 2008).

Achievement is an essential component of the argument regarding the adoption of technology in education. Achievement can be defined as the product of a learner's experience of a particular learning experience. The impact of blended learning on learners' achievement has been analyzed using data from pre-and post-tests, exam scores, quizzes, paper or project scores, assignments, course participation rates, final course grades, and other measures (Linder, 2016).

According to Alderman (2013), the importance of motivation is evident in its role as a basic component in fostering the development of learners to reach their full potential. Fostering a sense of motivation in learners undoubtedly results in the development of personal traits. Some personality traits are central to learners' abilities to find resources, learn independently, and achieve their goals. Motivation fosters a resilient attitude toward challenges and setbacks. This is one of the many reasons why researchers have long been interested in motivation and the development of motivation toward learning.

Before the COVID-19 outbreak, many educational institutions chose to limit the role of online and blended learning. However, recent developments have forced educators and students to use online technologies for safe learning. This study, which was conducted after educational institutions switched back to traditional (face-to-face) instruction, looks at how blended learning affected students' academic achievement and motivation at the University of Jordan during the COVID-19 Pandemic and after the country's lockdown was lifted.

## **2. Literature Review**

The following is an overview of the related topics to blended learning.

### **2.1 Blended Learning**

The leading educational trend today is blended learning. The development of long-distance communication technology has inspired several concepts over time, including computer-assisted learning, web-based learning, distance learning, e-learning, and online learning. The ability of blended learning to combine the benefits of two instructional modes, namely face-to-face and online learning, has won recognition (Albiladi and Alshareef, 2019).

Based on the delivery strategy and methods applied to teaching and learning, Monicka and Jayachithra (2018) defined blended learning. The mix of the two is what defines blended learning, which combines traditional (face-to-face) and online learning components. The selection of delivery strategies and pedagogies is seen as supporting the main attribute.

Blended learning has maintained a strong connection and communication channel between instructors and learners and between the learners themselves by borrowing from formal education's strong relationship between instructors and students. It has also opened up opportunities to allow learners to learn anytime and anywhere at their own pace and according to a "participantized" path (Barbour and Clark, 2015). Blended learning offers two forms of interaction and engagement in electronic environments: synchronous and asynchronous. The face-to-face part of blended learning usually accounts for synchronous learning while

maintaining the desired flexibility through asynchronous learning in online sessions and virtual meetings (Vaughan *et al.*, 2013).

## **2.2 Advantages of Blended Learning**

According to Eryilmaz (2016), blended learning offers many advantages in the educational process, such as enhancing the effectiveness of education. Learning outcomes and intended goals are more likely to be effectively achieved using blended learning. The material resources and time spent in learning and educational facilities decreased, while the achievement of outcomes increased. Another advantage of using blended learning is increased access for learners and instructors, as well as convenience. Blended learning allows both instructors and learners to have a more extensive scope of resources for the course. Textbooks are no longer the leading resource for content. Nevertheless, a plethora of valuable online books, articles, websites, and multimedia are available to choose from, and if possible, new and original content material could be produced by the instructor and learners.

Another advantage is the development and enhancement of independent, self-directed learning skills. The use of blended learning in online environments requires learners to have independent study skills. Furthermore, the flexibility offered by blended learning allows differentiated learning to be used to encompass a diverse group of learners. Such an approach would facilitate the inclusion of disabled learners with disabilities (Linder, 2016). The foundation can also come from the preferences and needs of the learners according to the Universal Design for Learning (UDL) principles used in blended environment design (Kovalenko and Konoplianyk, 2019).

## **2.3 Barriers and Obstacles of Blended Learning**

The blended learning system, which consists of all the components necessary for blended learning to operate properly and efficiently, is where blended learning is eventually implemented. Such a system requires two elements: human and technical requirements. The purpose of employing blended learning in education is not to replicate the conventional learning experience in an online setting, but rather to revolutionize and reimagine it in the best way possible, which requires skilled specialists and trained staff to prepare the material and plan for learning situations in a new and innovative light while keeping the learner's needs at the forefront of the planning process. Instructors and staff require professional training (Horn *et al.*, 2015).

Technical requirements can vary from building wiring and the number of devices to purchasing and updating programs. Most instructors would use a handful of commonly used applications or technology tools, in contrast to learning to use a specified new educational tool and adapting the learning material and structure of the course to accommodate it. They are usually chosen because they are commonly known and easy to use by both learners and instructors. Any issues or unfamiliarity with these tools would lead learners and instructors to feel that blended learning is a foreign and uncomfortable learning experience (Caulfield, 2011).

While some argue that blended learning reduces the cost of various conventional learning needs, the initial cost of creating infrastructure and purchasing or subscribing to an e-learning management system or an online service might be somewhat costly. Creating a good learning infrastructure and purchasing a good e-learning management system will go a long way in motivating learners to work and learn in comparison to an inefficient system, which will backfire in the case of login overload (Horn *et al.*, 2015).

Another issue was described as a dilemma by Secker and Morrison (2010) regarding copyrights. Information and communication technology tools provide numerous ways to create and share content. Accompanying these developments toward easier content sharing is the issue of maintaining and upholding copyrights.

#### ***2.4 Blended learning at the University of Jordan***

The Hashemite Kingdom of Jordan launched an initiative to include ICT in higher education in 2007. (Khasawneh and Bani Yaseen, 2017). Five universities teamed up with the Ministry of Higher Education and Scientific Research (MoHESR) and the Higher Education Accreditation Commission (HEAC) in 2013 to raise the bar for technologically improved education in Jordanian higher education institutions. This three-year initiative's goal is to revamp Jordan's higher education system with an emphasis on technology and e-learning (Atoum et al., 2017).

One of Jordan's most prestigious universities, the University of Jordan, has created a strategic plan to implement blended learning in university courses beginning in 2017. Moodle, an e-Learning management system, has been used by the University of Jordan to promote engaging and practical online learning (Modular Object-Oriented Dynamic Learning Environment). Moodle's acceptance was a deliberate move in the direction of higher education's adoption of blended learning. Moodle is open-source and free, so it might be customized to meet the needs of any educational organization (Al-Shboul et al., 2013).

Research and discussion are now possible thanks to the University of Jordan's adoption of blended learning. The implications of a new instructional approach have been explored concerning success factors, challenges, effects on learners' attitudes, and other aspects as well (Al-Shboul *et al.*, 2013; Alkhawaja and Halim, 2019; Almarabeh *et al.*, 2014; Khasawneh and Bani Yaseen, 2017). During the lockdown forced by the pandemic in Jordan in 2021, all educational institutions moved from very little online learning to fully online distance learning, and the University of Jordan moved from (20%) online distance learning to (100%) online learning. After months of fully online distance learning, all graduate studies courses and some courses with a practical nature at the level of undergraduate studies offered during the summer semester (2019/2020) returned to conventional learning (face-to-face).

##### ***2.4.1 Achievement***

The continuous process of improving education and quality monitoring of the educational system relies on the measurement of learners' achievement of learning outcomes. The outcomes of student accomplishment could be used for a variety of things, such as policymaking and alterations to the layout or delivery of educational initiatives to enhance the processes of teaching and learning (Greaney and Kellaghan, 2012). Briefly defined, achievement could be viewed as learners' ability to succeed in accomplishing the learning outcomes, which are measured through the learning scores and with the use of learning measurement instruments. Learning achievement from a cognitive perspective involves improving knowledge and intellectual skills (Harahap *et al.*, 2019). This study defines achievement as the sum of scores obtained from the students' responses to the achievement test prepared specifically for this study.

Al-Zoubi and Younes (2015) suggested that achievement requires increased attention to educational activities and techniques used by instructors in the classroom. Instructor training programs should also focus on applying and implementing educational skills to improve learner achievement. Bloom's taxonomy provides valuable resources for instructors to measure achievement. Bloom's taxonomy identifies recall, understand, apply, analyze, evaluate, and

create as key learning achievement categories (Rothwell et al., 2015). These verbs aid in understanding learners' levels of achievement and performance on a specific test (Harahap *et al.*, 2019).

#### **2.4.2 Motivation toward learning**

Motivation is one of the most influential factors in human behavior. The speed, direction, and intensity of the behavior depended on the participant's motivation. This term describes the process of objective-directed activity initiated by internal or external variables (Firat *et al.*, 2018).

The theory of attribution offers an explanation for how students respond to their academic performance. Learners attribute their skill, effort, task nature, difficulty, or plain luck as the cause of their academic success or failure. According to this theory, attributions are not firmly connected to the real cause but rather to what the learner views as relevant. Learners' motivation is not present or absent, but they become motivated depending on their qualities and reactions to the process of learning and achievement (Elsworth, 2009). The motivation works toward achieving three functions. The first function is the activating behavior. This function could be related to the basic need to engage learners in a learning experience and vice versa. Directing behavior is the second function, in which the participant chooses something over another. The third and final function of regulating the persistence of behavior describes why a participant would continue working toward achieving a goal (Alderman, 2013). This study defined motivation toward learning as the responses obtained from the motivation toward learning scale prepared specifically for this study.

#### **2.4.3 Previous studies**

Entürk (2021) did a study to find out how a mixed teaching-learning strategy affected preservice teachers' academic performance and 21st-century competencies. In the fall of 2019/2020, this quasi-experimental study was carried out on 172 preservice teachers who were split into two equal groups. Entürk (2021) conducted a study to determine the effects of a combined teaching-learning technique on the academic achievement and 21st-century capabilities of preservice teachers. 172 preservice instructors who were split into two equal groups took part in this quasi-experimental study in the fall of 2019–2020. Two of the methods used to gather data were an academic achievement exam and a multidimensional 21st-century talent scale. The experimental group had much superior achievement and 21st-century skills, according to the results. A retention test was also given four weeks after the post-test, and it also showed a significant difference in favor of the experimental group.

In order to determine how teaching short stories in upper secondary English affects students' achievement, motivation, and autonomy, blended learning pedagogical techniques, Wong et al. (2020) conducted a study. Both blended and traditional learning techniques were used in this quasi-experimental study. The research techniques included surveys on learner autonomy, motivation, and achievement. Two sections of 116 upper secondary school students made up the sample. The results showed no discernible variations in performance. However, as compared to traditional learning, blended learning had advantages in terms of motivation and student autonomy.

The effectiveness of blended learning strategies on student performance in an English language course at the University of Jordan was the subject of a study by Al-Hyari (2019). The study was quasi-experimental in design. The sample consisted of two psychology courses that were particularly chosen for this study. The experimental group included 30 undergraduate students, while the control group also included 30 individuals. The validity and reliability of

an accomplishment test were confirmed. Due to the utilization of blended learning, the data analysis results showed a statistical difference between the groups. The researcher suggests the use of blended learning to instruct undergraduate students.

Harahap et al. (2019) conducted a study to ascertain the impact of blended learning on students' learning achievement and science process skills. A quasi-experimental approach was used to examine the impact of blended learning on undergraduate biology students at the University of Negeri Medan in Indonesia. A researcher taught both of the study's two classes, which were split into experimental (51 students) and control (43 students) groups. Random cluster sampling was used in the investigation. The control group studied using the traditional lecture and discussion format, using course materials like PowerPoint presentations.

In contrast, the experimental group used a blended learning strategy in class, using conventional learning methods (discussion and lecture) and a particular educational website with learning media prepared by the researchers using the rotation model. Pre-and post-tests were prepared to include all six levels of Bloom's taxonomy. In terms of their learning accomplishment and science process abilities, students in the biology program profited from the blended learning technique, according to the evaluations' findings on learning achievement and process skills.

Insaiw (2018) conducted a study at the University of Jordan to determine the impact of blended learning (an integrated learning technique) on undergraduate students' academic performance. The study's design was quasi-experimental. The sample consisted of 27 students in the experimental group and 29 students in the control group, who were both specifically chosen for the study and randomly assigned to the therapy. The researcher developed a tool for measuring achievement and investigated its validity and reliability. The experimental group fared significantly better on the achievement test scores compared to the control group. The researcher advises creating blended learning programs and using them to train undergraduate students.

Oweis (2018) examined in a pilot case study the effects of a blended learning method on students' achievement and motivation to learn English in Jordan. For the objective of the quasi-experimental study, 34 students were randomly split into two groups. The experimental group learned English by combining a traditional teaching style with a computer program, whereas the control group got traditional training. The accomplishment test results revealed a significant difference between the two groups, favoring the experimental group. According to the learner motivation scale data, there was a statistically significant difference in favor of the experimental group, which may have been caused by the teaching technique variable.

In a study published in 2016, Almotairi (2016) investigated how blended learning affected Saudi undergraduate students' academic performance and learning motivation (KSA). A test of achievement and a scale of motivation for learning were created by the researcher. The study's design was quasi-experimental. The researcher developed lesson plans for the experimental group, utilizing the ADDIE instructional design technique while instructing the class using the Blackboard e-learning Management System. The control group was investigated utilizing the conventional face-to-face methodology. The results showed that the experimental group greatly outperformed the control group on the motivation scale for learning. The results showed that there were no discernible achievement disparities between the two groups.

*Commentary on Previous Studies*

After reviewing past studies on the use of blended learning in schools, the researcher found that most of them found that it had a positive effect on achievement. (Şentürk, 2021; Al-Hyari, 2019; Harahap et al., 2019; Insaiw, 2018; Oweis, 2018), though some have claimed that blended learning has no effect on achievement (Wong et al., 2020; Almotairi, 2016). Some studies have focused on examining blended learning and motivation toward learning (Wong *et al.*, 2020; Almotairi, 2016; Oweis, 2018). Some studies have specified the instructional design model used in the design of instructional materials (Şentürk, 2021; Harahap et al., 2019; Almotairi, 2016), but none has used the rapid prototyping model used in this study. Previous literature on this study did not address the challenge of social distancing regulations and COVID-19 restrictions on some students' mobility and ability to attend face-to-face sessions.

### **3. Theoretical Foundation of the Study**

#### **3.1 Instructional Design**

Instructional design no longer refers to the act of producing content. A good definition of instructional design includes several key points: It is concerned with optimizing human performance and attempting to reach and maintain efficiency and effectiveness. The instructional design follows a model that mimics human behavior. It is a systematic process that has roots in the psychology of learning and system theory. The instructional design aims to find cost-efficient solutions, solve education-related problems, and enhance learning innovations. (Rothwell *et al.*, 2015).

In addition to maximizing the effectiveness of the learning environment (knowledge and skills), the instructional design also promotes the development of assessments that are closely connected to the assessment of results. Through effective and efficient instruction, learners are guaranteed to acquire the necessary knowledge. The methodical approach eliminates wastage of time, resources, money, and interaction while enhancing learning possibilities. (Piskurich, 2015).

Over the past few decades, many instructional design models have gained popularity among educators owing to their systematic design processes. Recently, the rapid prototyping model has been widely used to overcome challenges such as deadlines and time efficiency. Rapid prototyping is the generation of a working version of the final educational product at an early stage in the instructional design process. This aids the innovative process of instructional design by revisiting five elements while developing working prototypes (learners, outcomes/goals, tasks and activities, assessment, and evaluation). This nonlinear approach to educational product completion does not affect the systemic nature of the instructional design process. However, it stresses the importance of reevaluating that the activities, assessment, and resource choice are all working toward the intended instructional goals (Richey *et al.*, 2010).

#### **3.2 Research Hypotheses**

This study tested two hypotheses:

H01: There are no significant differences at the level of significance ( $\alpha=0.05$ ) in the arithmetic means of the participants of the study groups on the achievement test due to the instructional strategy (blended learning vs. conventional learning).

H02: There are no significant differences at the level of significance ( $\alpha=0.05$ ) in the arithmetic means of the participants of the study groups on the motivation toward learning scale due to the instructional strategy (blended learning vs. conventional learning).

## 4. Methodology

A non-equivalent control-group design with two pre-tests and two post-tests was used in the study's quasi-experimental methodology (the achievement test and the motivation toward learning scale). The research team selected the study sample based on its accessibility, but the experimental and control groups were assigned at random. During the summer semester of 2019/2020, approximately (80%) of the courses had to move to e-learning to maintain social distancing regulations and ensure students' protection. A few courses (approx. 20% as well as graduate studies courses) remained on campus (face-to-face) because of the practical nature of the course and the need for face-to-face sessions for practice and university laboratory time use. "Designing and Using Instructional Materials" is one of these courses that needed to be taught on campus at the School of Educational Sciences, and it was chosen for the implementation of this study treatment.

### 4.1 Participants

The study population consisted of every undergraduate student at the School of Educational Sciences at the University of Jordan. The study's sample was available since it catered to the researcher's interests and the study's objectives. Undergraduate students made up the participants in two-course sections of the "Designing and Using Instructional Materials" course provided by the School of Educational Sciences at the University of Jordan in the summer of 2019/2020. There were 55 pupils total in this study. The two groups were consequently divided into experimental and control groups at random. The experimental group had 28 students who were taught using blended learning, while the control group had 27 students who were taught conventionally.

### 4.2 Instruments of the study

#### A) Achievement test

The researchers developed an achievement test as a pre-and post-test for students' achievement in the course. After determining the learning outcomes, the content material was determined and analyzed, and a specifications table was drafted. The achievement test was conducted according to the University of Jordan specifications. The final version of the achievement test included (20) multiple-choice items that comprehensively covered the entire instructional materials. The results of the internal consistency test indicated a coefficient of 0.86, which is acceptable for this study.

The achievement test was conducted with a pilot sample of (20) students from within the population and outside the sample group. Difficulty and discrimination coefficients were calculated. The difficulty coefficients varied between (0.30-0.63) and the discrimination coefficients varied between (0.33-0.60), which are considered acceptable values for scientific research (Backhoff *et al.*, 2000). The reliability of the accomplishment test was confirmed using the test and re-test procedure with a 14-day gap between the first and second tests. Between the test and the retest, Pearson's coefficient was determined, and it was discovered to be (0.84). The Kuder-Richardson 20 was used to gauge internal consistency (KR-20). The internal consistency test findings showed an acceptable coefficient of (0.86) for this investigation.

### 4.3 The Motivation Toward Learning Scale

The School of Educational Sciences developed the Motivation Toward Learning Scale to assess how the instructional strategy (blended learning, traditional learning) affected



undergraduate students' motivation to learn. This study benefited from previous studies and literature on motivation toward learning in the development of the scale (Oweis, 2018; Kashefi *et al.*, 2012; Koh and Lee, 2017). The original version of the scale included 30 items verified by several experts in the fields of curriculum and instruction, educational technology, measurement and evaluation, and educational psychology at the University of Jordan. After considering experts' suggestions, some items were edited, and a criterion of (80%) was established as the standard for item validity. The final version of the scale consisted of 30 items. A high percentage of experts agreed that the scale items were accurate and clear. This scale underwent more validation. A Cronbach's alpha score of 0.85 deemed all scale elements to be acceptable (0.85). The motivation scale's reliability was examined using a pilot sample drawn from outside the study population, and the reliability coefficient was 0.87. Using Cronbach's alpha to measure internal consistency, the test produced a coefficient of (0.85) that was regarded satisfactory for this inquiry.

#### 4.4 Sample Groups Equality

Pre-tests for the research instruments were used to confirm the equivalence of the two groups. The arithmetic means, standard deviations, and t-tests for independent samples were calculated for the study instruments' pre-test. The determined (t) value suggests that there were no significant differences between the two groups in the arithmetic means. The table displays the results of the t-test for independent samples (I).

**Table I.** Arithmetic Means, Standard Deviations, and t-Test for Independent Samples for the Performance of the Study Sample Groups upon the pre-Test of the Study Instruments

	Group	N	Mean	Std. Deviation	t	Sig.
Pre-Achievement Test	Experimental	28	7.25	2.730	-1.079	0.286
	Control	27	7.96	2.121		
Pre-Motivation toward Learning Scale	Experimental	28	80.93	16.620	0.097	0.923
	Control	27	80.48	17.467		

##### 4.4.1 The instructional strategies of the study

**Blended Learning:** This method combines online learning tools with face-to-face sessions. The researchers chose this strategy because of the need for student-centered activities and engagement tools that abided by the need for social distancing and health protection under the regulations of the COVID-19 pandemic. The researchers' perspective of blended learning was based on utilizing several available online learning tools (Google Slides and Pear Deck add-on, Moodle, and computer labs at the university campus) to engage learners in planned activities during face-to-face sessions, which would give the students the ability to participate in designing instructional materials even at a distance. The use of technology would enhance the interactivity between learners as well as between learners and their instructors. Google Slides creates interactive learning material by integrating available add-ons.

Additionally, Google Slides add-ons allowed for the creation of interactive questions and answers within the content material presentation and discussion. The content of the material was presented and discussed. Students answered open-ended questions before and after each section of the material and collaborated online to create not only personalized examples but also richer instructional materials. Students who were under quarantine during the face-to-face sessions were able to join Google slides synchronously, participate, and view their classmates' and instructors' participation. The students' answers and the instructor's notes were made available on Moodle after each session if any student needed to review them.

The weekly sessions were divided into three face-to-face sessions on Sundays, Mondays, and Tuesdays, and two distance-delivered sessions using Moodle on Wednesdays and Thursdays. The distance-delivered sessions also included Google slides with the Pear Deck add-on, which required the students to answer questions before and after each section of the instructional material. Online assignments were sent to the students using Moodle, which required each student to further connect the material with their reflections and experiences. This method was used to teach experimental groups.

**Conventional Learning:** This tactic makes use of written content items on paper. It makes use of lectures, the question-and-answer approach, and group projects. Face-to-face encounters were used by students to interact with the lecturer, peers, and paper-based course material. Students had to attend sessions on campus daily and were provided with a large seminar room to maintain social distancing regulations at the time. Students who were quarantined at the time were sent instructions for the content material and differentiated assignments to be done at home. The instructor used lecturing and then discussed the material with the students using the question-answer method. Group work activities included worksheets performed during the session time, handed over to the instructor at the end of the session, and then returned to the students the following day. The control group underwent this procedure.

#### 4.5 Study Limitations

**Spatial limits:** This investigation was only conducted at the University of Jordan's School of Educational Sciences, Jordan.

**Time limits:** The research was done in the 2019–2020 summer semester. The course was held between June 21, 2020, and July 5, 2020, for a total of two weeks.

**Human limitations:** The study's participant pool was limited to undergraduate students enrolled in the two sections of the course "Designing and Using Instructional Materials" offered by the School of Educational Sciences at the University of Jordan (0832303). There were a total of 55 students that had signed up for the course. While the other sections each had 28 pupils, only one section had 27 students.

**Objective determination:** Because the measures were created for this study, their validity and reliability are essential to the study's conclusions and any related generalizations.

## 5. Results

### 5.1 Achievement

To assess the first hypothesis of the study, the arithmetic means and standard deviations in the experimental and control groups were computed before and after the achievement test in each group. Table (II) presents the results.

**Table II.** Means And Standard Deviations in The Performance of The Two Study Groups on the Achievement Pre-Test And Post-Test

Group	N	Maximum Score	Pre-Test		Post-Test	
			Mean	SD	Mean	SD
Experimental	28	20	7.25	2.73	15.11	2.67
Control	27		7.96	2.12	10.30	2.52

Table (II) displays the post-achievement test results, with the means of the experimental and control groups clearly differing from one another. The results are provided in the table. One-way ANCOVA was performed to ensure that the difference between the arithmetic means was statistically significant at the level of significance ( $=0.05$ ). The findings are shown in Table (III).

**Table III.** *The ANCOVA Analysis of the Performance of the Two Study Groups on the Achievement Test*

Source of Variance	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test	9.318	1	9.318	1.388	0.244	
Group	295.704	1	295.704	44.06	0.000	0.459
Error	348.99	52	6.711			
Corrected Total	676.436	54				

Table (III) shows that the value of calculated (F) for the difference between the experimental and control groups' scores was (44.06), which is statistically significant at the level of significance in accordance with the instructional technique (0.00). The study demonstrated that the instructional technique was responsible for the statistically significant difference between the experimental and control groups on the post-achievement test (blended learning vs. conventional learning).

The results of eta squared (Table III) showed the extent of the effect caused by the instructional strategy (blended learning) on the participant's achievement, showing that a percentage of 45.9% of the difference in achievement between the groups was due to the instructional strategy and the remaining percentage (54.1%) was due to other variables not undertaken by the current study. These results show how blended learning has a positive effect on increasing academic achievement among first-year students at the University of Jordan.

## 5.2 Motivation toward Learning

To test the second hypothesis, the pre-and post-test averages of the desire toward learning scale, as well as their arithmetic means and standard deviations, were calculated for the study participants. The results are presented in Table (IV).

**Table IV.** *Means and Standard Deviations for the Students' Performance on the Motivation toward Learning Scale*

group	N	Maximum Score	Pre-test		Post-test	
			Mean	Std. Deviation	Mean	Std. Deviation
experimental	28	150	80.93	16.62	128.64	13.96
Control	27		80.48	17.47	108.67	18.62

The means of the study groups differ noticeably in the post-test motivation toward the learning scale total score, as shown in Table (IV). The control group, which received teaching using traditional learning methods, received a mean score that was lower than that of the experimental group (128.64), which received instruction through blended learning (108.67).

The difference in the study group's means was apparent, and to verify whether the difference was statistically significant, the ANCOVA test was utilized. Table (V) presents the results:

**Table V.** *The Findings of ANCOVA for the Students' Performance on the Motivation toward Learning Scale's Post-Test*

Source of Variance	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test	1447.299	1	1447.299	5.866	0.019	
Group	5409.1	1	5409.1	21.925	0.000	0.297
Error	12829.129	52	246.714			
Corrected Total	19761.527	54				

The difference between the study groups' post-test total scores on the motivation toward learning scale was computed as (21.925), as shown in Table (V), and is significant statistically at the significance level (0.000). The table shows that the instructional method was what caused the experimental and control groups' statistically significant differences in motivation for the post-test of the learning scale. The second null hypothesis was thus disproved.

The experimental group had mean scores of (128.64) in accordance with the prior results, while the control group had mean scores of (108.67). On average, the experimental group outperformed the control group after receiving training through blended learning. This demonstrates how the School of Educational Sciences at the University of Jordan's blended learning program affects undergraduate students' willingness to learn. The results of eta squared (Table V) show that the extent of the effect caused by the instructional strategy (blended learning) on the participants' motivation toward learning was (0.297). This result shows that a percentage of (29.7%) of the difference in motivation toward learning between the study groups was due to the instructional strategy, and the remaining percentage (70.3%) was due to other variables not undertaken by the current study.

## 6. Discussion

### 6.1 Achievement

On the achievement post-test, the experimental group's arithmetic mean was significantly higher than the control groups. The blended learning strategy, which provided the experimental group's students with several opportunities to interact with the course material, the instructor, and their peers, was responsible for this differentiation. Every student was given a chance to express themselves and state their opinions through the questions and interactive slides in the material. The students could interact in the class's real-time, see their peers' answers, and comment on them. The material questions ranged from general information to ice breakers that anyone could answer. The questions gradually became more related to experiences in the field of designing instructional materials to connect the material with personal experiences.

The use of interactive learning tools designed using the rapid prototyping model positively affected learning in the experimental group. Text, pictures, videos, external links, and interactive questions were designed and integrated into the instructional materials to support the learning experience. In an effort to draw students' attention to the lesson material and to promote active engagement in the learning process, the experimental group was put in a brand-new learning environment. The interactive questions created by the Google Slides add-

ons varied from open-answer questions to multiple-choice and short-answer questions. The engaging questions enabled the students to concentrate on the material, examine it, and then respond with the best response in light of their opinions and experiences. This could explain why the experimental group found the material more closely connected with their personal experiences than did the control group. This may explain the apparent differences in student retention between the experimental and control groups.

This conclusion is consistent with those of Oweis (2018), who found that utilizing a blended learning technique in Jordanian higher education institutions increased learners' achievement. The current study's findings support the findings of Al-(2019) Hyari's study, which revealed that blended learning at Mu'tah University improved students' academic performance. The results of this research also agree with those of Harahap et al. (2019) and Insaiw (2018). The conclusions of this study, however, differ from those of Almotairi's (2016) study, which claimed that the use of blended learning by students at King Saud University in Saudi Arabia did not significantly affect their performance on the achievement exam. The use of the rapid prototyping instructional design technique or the inclusion of interactive activities in synchronous sessions in this study may be responsible for the inconsistent outcomes.

## **6.2 Motivation for Learning**

The results showed that the instructional strategy improved the experimental group's performance on the motivation toward the learning scale post-test. These results may be attributed to the method of instruction delivery and the development of a friendly and accepting environment, where the subject matter was presented in a variety of ways and the students were required to participate and contribute their opinions, experiences, and reflections to the subject matter. The variation in the students' performance on the motivation toward learning scale might be a result of presenting the material using a design based on psychological principles concerning the use of colors, content, spaces, and personal questions. The rapid prototyping model of instructional design is a systematic nonlinear method of revising and redesigning the designed material, which allows for better visualization of the final product during the material's design process with every revision.

The findings could be attributed to the synchronous process where the students had the opportunity to both engage in the learning process and receive immediate feedback from the instructor and peers upon their participation. Students' motivation to participate in and engage in the process of studying the subject matter was likely impacted by such a procedure. Synchronous communication and the flow of responses and feedback in a closed environment of instructors and peers might have led to an improvement in the experimental group's motivation toward learning.

The increase in motivation may be caused by the shift in course dynamics, where the students became the center of the learning process and were encouraged to become actively involved in the instructional activities. The private and contained environment for interaction and engagement, unexposed to the public eye or opinions, may have aided in giving students a sense of safety while learning. Only the instructor and their known peers were privy to the interactions and coursework, so the students felt sufficiently relaxed about their responses and communication.

The various questions and activities that required the students to participate and become involved in the process of learning also enabled them to become active participants in shaping the content's material. The students' responses provided a personal touch to the content

material, and it became a more personal experience. All of this may have affected students' performances on the motivation toward the learning scale.

The findings of this study concerning motivation toward learning concurred with the findings of different studies such as Oweis (2018) and Almotairi (2016).

## 7. Recommendations

The study suggests the following in light of its findings:

- Blended learning is adopted in the learning process because of its vital role during the COVID-19 pandemic. This has contributed to the creation of a healthy environment in line with social distancing regulations.
- Using blended learning by faculty at the undergraduate level is due to its positive effect on students' achievement and motivation toward learning.
- Providing the appropriate facilities needed to apply and enhance the experience of using blended learning in instruction.
- Utilizing blended learning for students' engagement via technological tools, where each student is allowed to participate and add content material.

## 8. Conclusions

Employing blended learning during the COVID-19 epidemic had a significantly positive influence on undergraduate students' achievement and motivation for learning in the School of Educational Sciences at the University of Jordan.

Face-to-face meetings were combined with e-learning resources to create the interactive environment that was intended, with scheduled activities flowing effortlessly between the two types of sessions. The learners had the opportunity to control and participate in creating content and add a personal touch to the material. These advantages were only possible by utilizing e-learning tools while maintaining treasured face-to-face interaction with the instructor and their classmates during a time of social distancing and limitations. The e-learning environment provides an interactive and educational tool to recreate and continue communicating and learning at a distance during the COVID-19 pandemic.

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