

Perception of the Role of Technology in Achieving the effectiveness of Distance and Blended Learning among Students of Mohamed Bin Zayed University for Humanities (MBZUH), Abu Dhabi

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Abstract

This study investigates the impact of technological development on the effectiveness and acceptance of distance and blended learning models at Mohamed Bin Zayed University for Humanities, Abu Dhabi. It employs the descriptive-analytical design. Data were collected through a structured questionnaire distributed to 140 students. Descriptive statistics and t-tests were utilized to analyze the data. The findings show a statistically significant positive relationship between technological development and the effectiveness of distance and blended learning modalities. The student respondents reported instructional engagement, flexibility and instant feedback as the learning conditions improved through the utilization of tech-supported modalities at Mohamed Bin Zayed University for Humanities. Blended learning was rated slightly higher in effectiveness than a purely online learning mode. The study concludes that long-term

investment in technological tools through institutional support and readiness is significantly essential in maintaining the effectiveness of tech-driven educational processes.

Keywords: Educational Technology, E-learning, Instruction, Distance Learning, Blended Learning.

Introduction

The advent of digital technologies has significantly reconfigured the dynamics, structure and medium of knowledge acquisition in contemporary school systems (Yusuf, 2005; Okebukola, 2007; Adomi & Kpangban, 2010; Yusuf & Balogun, 2011; Barhoomy, 2022). Specifically, the adoption and integration of educational technologies into university learning systems have redefined access to learning materials and delivery of learning objectives (Al-Mamar, 2012; Omotosho et al., 2015; Al-Dershoy, 2019; Olufunke et al., 2024). It has been consistently affirmed that digital technologies have expanded access to knowledge, apparently enhancing learner-centered lesson delivery (UNESCO, 2021; OECD, 2021). Empirical analyses have further proven that tech-driven learning frameworks improves lesson objectives, academic achievements and learner satisfaction (Means et al., 2013; Ifediora & Ugwuanyi,

2020; Alqahtani & Rajkhan, 2020; Adeoye & Olatunde, 2021). This is in contradistinction to the single-mode delivery, where teaching or instructional designs are pedagogically similar (Means et al., 2013). These transformations in the classroom learning process provide the intellectual and pragmatic leverage on which to examine the effectiveness of distance and blended learning approaches at the Mohammed Bin Zayed University for Humanities.

In the current fast-paced tech-driven global society, pedagogy or the general enterprise of teaching and learning is no longer restricted to activities in the physical four-walls of the classroom. (Zarroot, 2025). Studies such as Bates (2019) and Hodges et al. (2020) affirm that the development and integration of educational technology have transformed the processes for teaching and learning. The delivery of lesson materials can occur beyond traditional campus structures,

making it feasible for interaction to exist between instructor(s) and learner(s) through distance and blended learning models.

Distance learning is basically described as the educational experiences which are structured to allow communication between instructors and learners, separated by geographical boundaries (Moore & Kearsley, 2012; Musa & Saheb, 2016; Simonson et al., 2019). Such interaction is mediated through educational technologies. Prior development shows that distant communications have evolved overtime. The human society has developed various tools for transferring knowledge, thus, navigating the challenges of geographical distances (Watson, 2008; Aina, 2007). Pre-existing cultural practices such as indispensable gongs were effectively utilized by indigenous communities. Subsequently, the development of Western literacy system further reconfigured these pre-existing practices. By inventing letter writing, the colonial regimes, missionaries, adventurers, traders and explorers efficiently inter-exchanged knowledge, ideas and values. This system, evidently became the most effective means of sharing knowledge at

the time. In those climes, certain level of progressions was attained in spite of the posing difficulties of residential or location gaps. On the other hand, the innovation of blended learning programme that integrates physical presence with digital mediation resulted in a consolidation of resources for flexible educational experiences (Garrison & Vaughan, 2008; Graham, 2013). Scholars like Hrastinski, (2019) and Boelens et al. (2017) have maintained the argument that blended learning model enhances effective learning engagement, collaboration and autonomous learning experiences. This model structures learner's cognition, promoting instructional delivery.

On the contrary, scholars have equally demonstrated the existence of structural challenges to distance and blended learning models, such as learner's socio-economic status, shortage of skilled faculty, unstable infrastructures, digital literacy and lack of institutional support systems etc (Means et al., 2013; Bernard et al., 2014; Pane et al., 2015; Holmes et al., 2019; Van Dijk, 2020; UNESCO, 2023). Even in the midst of these challenges, tech-based educational experiences are constantly transforming teaching and

learning processes within global systems of higher education (Hodges et al., 2020; Ally, 2020). Historical antecedent has demonstrated the success of these ongoing transformations. In the last decade, the emergence of global crises intensified the adoption of, and reliance on digital learning mechanisms. For instance, the COVID-19 pandemic caused a paradigm shift in teaching and learning, prompting the acceleration and innovation of remote learning frameworks. The pandemic disrupted the learning activities of over 1.6 billion students globally, pressuring universities to adopt online pedagogical modalities (UNESCO, 2020; World Bank, 2021). In their respective comparative studies, Crawford et al. (2020) and Marinoni et al. (2020) have revealed that universities often establish blended learning models to enhance student-centered curriculum, learning continuity, and the attainment of learning objectives.

Notwithstanding, existing studies have often emphasized that educational technology alone does not guarantee learning improvement (Selwyn, 2011; Means et al., 2013). Learning outcomes are dependent on several factors such as pedagogical congruity, effective

institutional systems and the integration of both cognitive and social dimensions of learners' development within the online learning process (Garrison et al., 2000; Rapanta et al., 2020). Garrison and Vaughan (2008) have identified the influence of cognitive, social and pedagogical factors in the attainment of effective learning outcomes. On the influence of technology, other scholars have suggested that learning success should be adjudged based on the perceived usefulness and perceived ease in the utilization of tech-based learning models (Venkatesh & Bala, 2008).

Global studies have largely demonstrated that the integration and utilization of digital technologies in higher educational pedagogy enhances effective lesson delivery. A research study based on the American and Canadian educational systems demonstrates that tech-mediated learning process promotes learner-centered educational experiences in a manner that goes beyond traditional classroom setting (Johnson et al., 2020). Another study by the European Commission (2018) reports that educational technologies facilitate inclusive and learner-independent experience. In China, South Korea and

India, e-learning technologies are strongly leveraged to consolidate instructional progression, and enhance learners' engagement (Kim & Lee, 2018; Kumar & Jena, 2021). Other extant literatures highlight the positive impacts of educational technologies on students' academic performances (Nafiu, et al., 2023; Ilavbare & Ewere, 2025). They revealed that there is statistically significant correspondence between educational technologies and improved academic outcomes. Digital learning technologies enhance students' access to instructional resources. The gulf region has advanced online learning system as a strategic calibration of building up global knowledge systems (OECD, 2021; World Bank, 2022).

Available scholarly evidence shows that there is no significant attention to the study of students' perspectives on the effectiveness of distance and blended learning models at Mohamed Bin Zayed University for Humanities, Abu Dhabi (MBZUH) in existing studies. Therefore, this study aims to investigate the perspectives of MBZUH students on the role of educational technology in achieving effective learning outcomes. The idea of effectiveness is primarily

conceptualized in terms of students' engagement, accessibility, academic achievement, and personalization of subjects of learning. The study adopts a descriptive-analytical design to collate students' assessment of the effectiveness of distance and blended learning models. Preliminary findings indicate that the integration of tech-based learning frameworks enhances flexibility in students' access to learning materials, as well as self-paced or personalized study pattern; hence, strengthening their active engagements. The study argues that educational technology plays a critical role in achieving effective distance and blended learning across institutions of higher education, and these institutions have the prospects of achieving long-lasting educational transformation. However, sustainable implementation of these models requires faculty or personnel development, and pedagogical alignment. Within the context of the university under study, this paper contributes to the global discussions on the future of educational technologies in higher education systems.

Definition of Terms

Distance Learning

Distance learning is an educational approach that aims to personalize the learning experience to suit the needs and interests of each learner individually. So instead of adopting a "one-size-fits-all" approach, individualized learning pathways are designed for each student based on their learning styles, abilities, and prior knowledge. Hijazy and Al-Khamis (2021) defined it as the provision of education or training through electronic educational media, including satellite, videos, recorded audio tapes, computer programmes, and various technological systems and multimedia instructional tools, in addition to a number of other media.

Blended Learning

Blended learning is an educational strategy that integrates e-learning with traditional face-to-face learning within a single instructional framework. It relies on the combined use of various communication tools to deliver a specific course, employing computer-based and network-based e-learning technologies to present lessons and lectures (Al-Qahtany, 2021). Accordingly, it can be said that

blended learning is based on the use of modern technology in teaching without abandoning the traditional educational setting and physical classroom attendance. It emphasizes direct interaction within the classroom through the use of modern communication tools such as computers, networks and internet portals.

E-learning

This kind of learning is considered among the most prominent modern trends in the field of education, as it provides innovative and flexible learning experiences for learners in this contemporary digital age. The learners rely on modern technologies to achieve their objectives, which include personalizing and facilitating the learning process (Hashim, 2016).

Learning Technology

Learning technology can be defined as a systematic or methodical approach to designing, implementing, and evaluating the entire educational process. This technology is based on clearly defined objectives and on research findings in the processes of teaching, learning, and communication, through the use of all human and non-human resources in

order to enhance the effectiveness of education and self-learning (Al-Zahrany, 2020).

Significance of the Study

The current study seeks to examine the role of educational technology in contemporary pedagogical processes. It is expected to benefit decision-makers at MBZUH by supporting educational policies aimed at improving the quality of education in contemporary pedagogical standards. It is also anticipated that faculty members at the university will benefit from this study by strengthening their areas of competence in utilizing distance and blended learning models into their study plans and instructional activities. Furthermore, the study will contribute to the development of curricula specifically designed for distance and blended learning, which will correspond to contemporary technological demands.

Objectives

The objectives of this study include to:

1. access the role of technological development in achieving the effectiveness of personalized learning through internet or online learning;
2. identify the role of technological development in achieving the effectiveness of blended learning;
3. examine the impact of using the blended learning strategies on students' achievement in MBZUH;
4. identify the obstacles that limit the implementation of blended learning and distance learning at MBZUH;
5. analyze the differences between the mean responses of the study sample in their evaluation of the effectiveness of distance learning and blended learning from the students' perspective at MBZUH.

Research Questions

The following questions were framed to this study:

1. What is the role of technological development in achieving the effectiveness of personalized learning through internet or online learning?
2. What is the role of technological development in achieving the effectiveness of blended learning?
3. What is the impact of using the blended learning strategies on students' achievement in MBZUH?
4. What are the obstacles that limit the implementation of blended learning

- and distance learning via the internet at MBZUH?
5. Are there statistically significant differences at the significance level ($\alpha = 0.05$) between the mean responses of the study sample in their evaluation of the effectiveness of distance learning and blended learning from the students' perspective at MBZUH?
 4. Distance learning lacks statistically significant positive impact on students' academic achievement at the University.
 5. There are no statistically significant hurdles or difficulties challenging the implementation of distance and blended learning models at the University.

Hypotheses

The study is anchored on the following null hypotheses, statistically tested at (0.05) significance level:

1. There is no statistically significant relationship between technological advancement and the effectiveness of distance learning model among the students of MBZUH.
2. There is no statistically significant relationship between technological advancement and the effectiveness of blended model among the students of MBZUH.
3. Blended learning lacks statistically significant positive impact on students' academic achievement at the University.

Literature Review

In the 21st century, education has witnessed profound transformation. This is primarily shaped by the advent of technology and the socio-economic layers of globalization. Giddens et al., (2011) conceptualize this impact in terms of advanced modernity. Their analysis contextualizes the transformation in education within the global field of social engineering. They affirm that globalization and technological advancements have unsettled traditional institutions. An inference from their exposition shows that the processes of facilitating knowledge has gone beyond designated class or school buildings. The challenges associated with spatial classroom have significantly reduced as a result of the integration of educational technologies in the process of teaching and learning. Giddens et al.,

(2011) explain the emergence of blended learning as resulting from the transformation of the contemporary social system. Their study is basically a sociological approach to explaining the proliferation of distance and blended learning as structural reactions to the dynamics of globalization.

Abu Eitah (2017) builds on the macro-sociological perspective to examine the empirical impact of blended learning on the academic achievements of students and instructional designs used by teachers. The study adopted a descriptive analysis; questionnaires were shared to a sample of 30 students to collect data, which were analyzed using standard deviation and t-tests. The study discovered that reflective thinking and academic achievement could be enhanced through blended learning. It was also found that students developed a positive perception towards education generally. Abu Eitah's study sustains the argument that facilitating a lesson through distance learning, complements the traditional physical instruction method. Thus, distance learning improves cognitive alertness and positive academic results.

In the same line of thought, AL Shamatti (2022) investigated the perceptions of undergraduates across universities in Jordan on the effectiveness of distance and blended learning. The researcher adopted analytical descriptive method; distributed questionnaires to 390 undergraduates, selected randomly. The study showed that the undergraduates perceived distance learning as moderately effective, while blended learning was perceived as highly effective. There are no statistically significant differences in gender, institutional affiliation and academic discipline in the effectiveness of distance and blended learning methods. The findings indicate that though distance learning is widely acknowledged, undergraduate students perceive blended learning as a more robust framework. Furthermore, Zarroot and Baghdady (2025) explored how technological advancement is impacting on education beyond the use of classroom and textbooks. The scholars adopted the descriptive analytical method, while using the SPSS Statistics to analyze the data drawn from questionnaires distributed to 30 students at Aghwat University. The study highlighted that there is a positive correlation between the utilization of

digital platforms and students' satisfaction with the integration of distance and blended learning models in the learning processes. It further suggested that distance learning is effective given the current level of technological infrastructure employed in it. In line with this finding, access to technological tools is a primary determinant and bolster to the transformation of educational experiences through distance and blended learning. Al-Harthi and Al-Outaiby (2022) argues from the perspective of administration and supervision that blended learning is moderately accepted within Riyadh's educational system. The researcher used the descriptive method of analysis, while gathering data from 60 female supervisors of education using survey method. The findings of the study revealed that blended learning enhances developmental changes but still suffers from barriers such as training limitations and inadequate materials.

In a broad perspective, Peters (1998) contextualizes distance learning as an industrialized type of teaching, structured within the terms of division of labour and tech-assisted frameworks. On the

contrary, Moore (1993) theorized the idea of transactional distance in which it is emphasized that the psychological and communicative gaps between learners and teachers are mediated in a tech-space. The scholar expounds that effective distance learning is dependent on structured communications and learner independence. This is reinforced by the advent of blended learning model. In addition, Garrison and Vaughan (2008) propose the theory of Community of Inquiry Framework that demonstrates the impact of the presence of cognitive, social and pedagogical factors in both online and blended learning models.

Overall, the existing literature points to a progressive dynamic from traditional instructional frameworks to tech-oriented systems. A constant submission is that blended learning is often framed as more effective than distance learning models. This is because the former balances tech flexibility with potential human social realities. However, the positive results of distance learning programmes depend largely on the utilization of tech-tools, instructional designs, and institutional empowerment. Hence, distance learning demonstrates a paradigm shift in transforming

educational experiences. It is often shaped by infrastructural capacity and globalization. The extant literature shows that when distance and blended learning models are properly designed, it enhances students' accessibility of instructional materials/knowledge, students' engagement during instructional processes and overall academic achievement.

Theoretical Underpinning

This study is framed around two schools of thought in educational technology research. These are: the technology acceptance model (TAM) and the Community of Inquiry Framework. The former was originally expounded by Davis (1989) while the later was proposed by Garrison et al., (2000). It is important to note that TAM was further expanded Venkatesh and Bala (2008) using the TAM3, through which they argued that the adoption of technological tools in education is primarily shaped by two major reasons: perceived usefulness and perceived ease of use.

Davis (1989) originally contends that perceived usefulness implies the extent to which a user believed that using a system enhances productivity or performance

whereas the perceived ease of use connotes the degree of belief in which using a system demands minimal effort. Later adjustments by Venkatesh and Bala (2008) further extended the explanatory importance of this principle by incorporating social factors such as influence, conditions and experiences. Thus, based on this explanation, TAM offers a behavioral perspective to examine students' viewpoint on educational technology at the university under study. The perceptions and understanding of students regarding the concepts of academic achievement, accessibility and usability impacts directly on the general receptivity of the use of distance and blended learning technologies.

To complement the behavioral thought emphasized in TAM, the framework of Community of Inquiry (Col) conceptualizes distance and blended learning strategies as emerging pedagogical systems involving the interactions of three dynamic inter-dependent presences such as cognitive presence (the ability of making meanings from discourses), the social presence (the capacity to participate socially or emotionally) and the teaching/instruction

presence (the instructional design, facilitation of the cognitive and social processes). Meanwhile, Garrison et al. (2000) have argued that for a meaningful educational experience in using educational technologies, there ought to be a deliberate attempt at integrating the above presences. Moreover, it has also been demonstrated that blended learning strategy is specifically relevant in the operationalizing Col as these three presences often align with both physical and online interactions. Thus, the application of the two chosen theoretical frameworks will allow the study to examine the adoption, acceptance and impact of educational technologies within distance and blended learning methods of teaching and learning.

Methodology

This study utilizes a descriptive-analytical research design. This design enabled the in-depth analysis of the perspectives of students on the effectiveness of distance and blended learning models at MBZUH. The research design is globally recognized in educational technology research for the primary reason that it allows the examination of the indicators of institutional performance, perception and

satisfaction (Creswell & Creswell, 2018; Cohen et al., 2018).

Population of the Study

The population of the study includes 1,177 students enrolled in the different colleges of Mohamed Bin Zayed University for Humanities (Gulf Time, 2023) The population also consists of both male and female students to ensure a balanced gender representation.

Sample Size

The study used a sample size of 140 respondents. The sample size was determined using Yamane's (1967) formula at a confidence level of 95% and a margin of error of 8% resulting in a minimum sample size of appropriately 140 respondents.

Sampling Technique

The simple random sampling technique was employed to select the sample of the study. The technique was preferred to other sampling techniques as it gave every member of the population equal representation in the sample size.

Scope of the Study

The study is limited to students of Mohamed Bin Zayed University for

Humanities. The study was conducted during the 2023/2024 academic session.

Instrument for Data Collection

A structured interview was used, administered through a simple random technique to 140 students at the university. Data were analyzed by using central tendency and dispersion measures. This was complemented with inferential statistics and sample t-tests, which were used to evaluate significant differences at $\alpha = 0.05$.

Data Presentation and Analysis

The data of the study were analyzed using the Statistical Package for the Social Sciences (SPSS); Cronbach's Alpha Coefficient was used to examine the reliability and consistency of the research instrument. Means and Standard Deviations was utilized to determine the degree to which the respondents agreed with each of the research questions. The descriptive analysis of the variables was

employed to summarize the responses and identify consistencies. In order to test the hypotheses and systematically analyze the relationship between the variables, the responses were measured using the Likert Scale four point as shown below:

- i. Strongly Disagree
- ii. Disagree
- iii. Agree
- iv. Strongly Agree

Moreover, in order to interpret the arithmetic means of the ratings of the respondents' answers, the formula below was employed to determine the length of interval:

Based on this calculation, agreement levels were classified as:

Low agreement: $1.00 < 2.00$

Medium agreement: $2.00 < 3.00$

High agreement: $3.00 < 4.00$

Table 1: Results of the Reliability Analysis using Cronbach's Alpha

Dimensional	Cronbach's alpha
There is no statistically significant relationship at the (0.05) significance level between technological development and achieving the effectiveness of distance and online learning for students at Mohammed Bin Zayed University for Humanities.	0.74

There is no statistically significant relationship at the (0.05) significant level between technological development and achieving the effectiveness of blended learning for students at MBZUH.	0.81
Blended learning strategy does not have a positive impact on students' academic achievement at MBZUH.	0.86
Online distance learning strategy does not have a positive impact on the academic achievement of students at MBZUH.	0.80
There are no significant and obstacles may hinder the implementation of distance learning and blended learning strategies at MBZUH.	0.87
Total	0.92

Table 1 demonstrates the internal consistency coefficients items in the data as measured using Cronbach's Alpha. The alpha values for the five dimensions range between 0.74 and 0.87, while the overall reliability coefficient of the instrument reached 0.92. The values go beyond the standard minimum of 0.70 for social scientific research, suggesting

satisfactory excellence of the internal consistency (Cronbach, 1951; Nunnally & Bernstein, 1994).

Respondents Demography

The sample size consists (140) students, comprising both male and female. Table 2 shows the demographic distribution of the sample respondents.

Table 2: *Demographic Distribution of the Respondents*

Variable		Frequency	Percent
Gender	Male	99	69.7
	Female	43	30.3
	Total	142	100.0
Major	Islamic studies	46	32.5
	Tolerance and coexistence	81	57.0
	Arabic studied and literature	10	7.0
	Philosophy	5	3.5
	Total	142	100.0
GPA	Excellent	17	12.0
	Very good	72	50.7
	Good	44	31.0
	Acceptable	9	6.3
	Total	142	100.0

Table 2 shows the distribution of the sample size for the current study. First, a significant number of the respondents were male; 99 participants, 69.7%. Whereas 43 participants, 30.3% were females. Secondly, with regard to the major of the respondents, 57.0% was recorded as the highest percentage for Tolerance and co-Existence. Philosophy had 3.5% as the lowest percentage. Lastly, in the context of Grade Point

Average (GPA), 50.7%, being the majority of the students, had a very good GPA as opposed to the smallest number of 12.0% of those who had an excellent GPA.

Hypothesis 1

There is no statistically significant relationship between technological advancement and the effectiveness of distance learning model among the students

Table 3: Means and Standard Deviations of the Study Sample's Responses Regarding the Dimensions of Relationship Level Between Technological Development and Achieving the Effectiveness of Distance and Online Learning.

No	Item	mean	standard deviation	Rank	Degree
7	E-learning provides me with additional skills and scientific knowledge that will help to understand my lessons	4.00	0.00	1	high
1	E-learning and distance learning allows learners to access high quality educational opportunities without the need for physical attendance.	3.90	0.30	2	high
5	The technological evaluation makes online distance learning essential for continued education and meeting job market demands.	3.90	0.30	2	high
2	My learning journey involves continuous and varied assessment methods within the e-learning environment.	3.85	0.36	4	high
3	1 can seamlessly send and receive educational materials and activities through the e-learning platform.	3.84	0.37	5	high

No	Item	mean	standard deviation	Rank	Degree
6	Online remote learning allows students to access high-quality educational opportunities without needing to be physically present at the university.	3.82	0.39	6	high
4	1 can obtain my digital courseware through dedicated e-learning educational programmes.	3.80	0.40	7	high
8	here are several problems and obstacles I face while studying scientific materials through E-learning.	1.95	0.22	8	Low
relationship level between technological development and achieving the effectiveness of distance and online learning		3.63	0.19	High	

Table 3 presents the arithmetic means of the responses on the dimension "relationship level between technological development and achieving the effectiveness of distance and online learning", ranging from 1.95 to 4.00. Item number 7 is the highest-rated item indicating that "E-learning provides me with additional skills and scientific knowledge that will help to understand my lessons". The lowest-rated item is the

Item 8 which shows "there are several problems and obstacles I face while studying scientific materials through E-learning". The total mean for the dimension was 3.63, suggesting a high level of agreement. The mean for the dimension as a whole was (3.63) with a high evaluation score. The application of the One-Sample T-test for this dimension is presented in Table 4.

Table 4: Result of the (One Sample T-test) Relationship Level Between Technological Development and Achieving the Effectiveness of Distance and Online Learning.

	Mean	S.D	Degree	T	Sig.
There is no statistically significant relationship at the (0.05) significance level between technological development and achieving the effectiveness of distance and online learning for students at MBZUH.	3.63	0.19	High	71.644	0.00

Table 4 shows that there is a statistically significant relationship between technological development and achieving the effectiveness of distance and online learning for students at the significance level ($\alpha \leq 0.05$); The value of (T) reached 71.644, which is a statistically significant value at the level of significance ($\alpha \leq 0.05$), and the arithmetic mean was 3.63, which is higher than the standard score for the four -point scale (2.5),

indicating positive relationship between technological development and achieving the effectiveness of distance and online learning.

Hypothesis 2

There is no statistically significant relationship at the (0.05) significant level between technological development and achieving the effectiveness of blended learning for students.

Table 5: Means and Standard Deviations of the Study Sample's Responses Regarding the Dimensions of Relationship Level Between Technological Development and Achieving the Effectiveness of Blended Learning.

No	Item	mean	standard deviation	Rank	Degree
6	University academic staff can administer online exams and assessments and providing instant feedback	4.00	0.00	1	High
7	Electronic technologies contribute to creating interactive learning environment that combines distance learning and face-to-face learning within the classroom	4.00	0.00	1	High
1	Blended learning relies heavily on the availability of technological infrastructure represented by computers and internet.	3.92	0.27	3	High
4	Blended learning is an approach that combines traditional face-to-face instruction with online-learning.	3.75	0.70	4	high

No	Item	mean	standard deviation	Rank	Degree
5	E-learning provides students with the opportunity to access the knowledge they gained through distance learning while being in the classroom.	3.75	0.70	4	high
2	The lecturer delivers part of the content online before he starts the classroom lectures while in-class activities are limited to discussions and practical applications.	3.61	0.91	6	high
3	This approach enhances the students critical and creative thinking skills.	3.00	0.00	7	high
relationship between technological development and achieving the effectiveness of blended learning for students at MBZUH.		3.72	0.35	High	

Table 5 shows that the arithmetic means of the responses of the study sample regarding the items of the dimension "relationship between technological development and achieving the effectiveness of blended learning for students" ranged between (3.00–4.00). Items 6 and 7 came first as "University academic staff can administer online exams and assessments and providing instant feedback, Electronic technologies contribute to creating interactive

learning environment that combines distance learning and face- to-face learning within the classroom". Last was the Item 3 "this approach enhances the students critical and creative thinking skills". The mean for the total dimension was 3.72 with a high evaluation score. To apply the test (One Sample T-test) to "relationship between technological development and achieving the effectiveness of blended learning", Table 6 shows thus:

Table 6: Result of (One Sample T-test) to Relationship Between Technological Development and Achieving the Effectiveness of Blended Learning

	Mean	S.D	Degree	T	Sig.
There is statistically significant relationship at the (0.05) significant level between technological development and achieving the effectiveness of blended learning for students at MBZUH.	3.72	0.35	High	41.25	0.00

Table 6 indicates that there is a statistically significant relationship between technological development and achieving the effectiveness of blended learning at the significance level ($\alpha \leq 0.05$); The value of (T) reached 41.25, which is a statistically significant value at the level of significance ($\alpha \leq 0.05$), and the arithmetic mean attained 3.72, which is higher than the standard score for the

four -point scale 2.5, which shows "there is a positive relationship between technological development and achieving the effectiveness of blended learning for students".

Hypothesis 3

Blended learning strategy does not have a positive impact on students' academic achievement.

Table 7: Means and Standard Deviations of the Study Sample's Responses Regarding the Dimensions of Blended Learning Strategy does Have a Positive Impact on Students' Academic Achievement

No	Item	mean	standard deviation	Rank	Degree
7	Blended learning provides students with greater flexibility to access educational content and study materials at any time and from anywhere.	4.00	0.00	1	high
6	Blended learning encourages students to interact within the classroom and enables them to access course materials both online and through traditional classes	3.95	0.22	2	high
5	Blended learning enables university faculty members to move between activities to	3.93	0.26	3	high

No	Item	mean	standard deviation	Rank	Degree
	interact with individual groups of students and track their progress.				
3	Blended learning enhances social relationships between lecturers and students at the university level and improves communication skills.	3.85	0.36	4	high
4	Blended learning provides students with the opportunity to control the pace and method of their learning.	3.83	0.38	5	high
1	Blended learning facilitates achieving the best educational goals by using educational technologies to meet suitable personal learning styles.	3.80	0.40	6	high
2	Blended learning enhances the importance of collaborative work and instills scientific and educational values among university students.	3.62	0.91	7	high
Blended learning strategy does have a positive impact on students' academic achievement		3.86	0.33	High	

Table 7 shows that the arithmetic means of the responses of the study sample regarding the items of the dimension "Blended learning strategy does have a positive impact on students' academic achievement" ranged between 3.62 to 4.00. Item 7 came first "Blended learning provides students with greater flexibility to access educational content and study materials at any time and from anywhere". Item 7 came last "Blended

learning enhances the importance of collaborative work and instills scientific and educational values among university students". The mean for the dimension as a whole was 3.68 with a high evaluation score.

As has been the application of the test (One Sample T-test) to "Blended learning strategy does have a positive impact on students' academic achievement" Table 8 shows that.

Table 8: Result of (One Sample T-test) to Blended Learning Strategy does Have a Positive Impact on Students' Academic Achievement

	Mean	S.D	Degree	T	Sig.
Blended learning strategy does have a positive impact on students' academic achievement	3.86	0.33	High	49.27	0.00

Table 8 shows that there is a statistically significant Blended learning strategy does have a positive impact on students' academic achievement he wants at the significance level ($\alpha \leq 0.05$); The value of (T) reached 49.27, which is a statistically significant value at the level of significance ($\alpha \leq 0.05$), and the arithmetic mean reached 3.86, which is higher than the standard score for the four -point

scale 2.5, which indicates There is Blended learning strategy does have a positive impact on students' academic achievement.

Hypothesis 4

Online distance learning strategy does not have a positive impact on the academic achievement of the students.

Table 9: Means and Standard Deviations of the Study Sample's Responses Regarding the Dimensions of Online Distance Learning Strategy does not Have a Positive Impact on the Academic Achievement

No	Item	mean	standard deviation	Rank	Degree
7	E-Learning helps learners to become familiar with virtual environments and explore a wide range of knowledge.	4.00	0.00	1	high
2	Distance and personalized learning encourage students to develop self- directed learning skills and independence.	3.98	0.14	2	high
3	Distance learning provides both teachers and students with the opportunity to exchange written messages with each other by using computers.	3.97	0.17	3	high

No	Item	mean	standard deviation	Rank	Degree
4	Distance learning achieves the principles of feedback on students' progress and performance to help identifying their strengths and weakness and improving the learning process.	3.95	0.22	4	high
1	Advanced distance and online learning enables students to use the advanced e-learning tools and data-driven analytics.	3.91	0.29	5	high
8	Distance learning and e-learning make learning more engaging and stimulating.	3.90	0.30	6	high
5	Students face a number of problems and challenges when studying academic subjects through e-learning.	1.61	0.92	7	low
6	Distance learning hinders social interaction and the exchange of experience among students.	1.61	0.92	7	low
Online distance learning strategy does not have a positive impact on the academic achievement		3.37	0.28	high	

Table 9 shows that the arithmetic means of the responses of the study sample regarding the items of the dimension "Online distance learning strategy does not have a positive impact on the academic achievement" ranged between (1.61–4.00). Item 7 came first "E-Learning helps learners to become familiar with virtual environments and explore a wide range of knowledge". Items 5 and 6 came last "Students face a number of problems and challenges when studying academic

subjects through e-learning; "Distance learning hinders social interaction and the exchange of experience among students". The mean for the total dimension was 3.37 with a high evaluation score. As has been the application of the test (One Sample T-test) to Online distance learning strategy does not have a positive impact on the academic achievement, Table 10 shows that.

Table 10: Result of (One Sample T-test) to Online Distance Learning Strategy does not Have a Positive Impact on the Academic Achievement

	Mean	S.D	Degree	T	Sig.
Online distance learning strategy does not have a positive impact on the academic achievement	3.37	0.28	High	36.75	0.00

Table No. (10) shows that there is a statistically significant Online distance learning strategy does not have a positive impact on the academic achievement he wants at the significance level ($\alpha \leq 0.05$); The value of (T) reached (36.75), which is a statistically significant value at the level of significance ($\alpha \leq 0.05$), and the arithmetic mean reached (3.37), which is higher than the standard score for the

four -point scale (2.5), which indicates There is Online distance learning strategy does not have a positive impact on the academic achievement.

Hypothesis 5

There are no significant difficulties and obstacles may hinder the implementation of distance learning and blended learning strategies.

Table 11: Means and Standard Deviations of the Study Sample's Responses Regarding the Dimensions of Difficulties and Obstacles May Hinder the Implementation of Distance Learning and Blended Learning Strategies

No	Item	mean	standard deviation	Rank	Degree
1	The University provides the necessary technological infrastructure for e-learning.	4.00	0.00	1	high
4	I can send and receive educational materials and activities without obstacles through the e-learning system available at the university.	4.00	0.00	2	high
3	E-Learning available at the university has contributed to exploring virtual worlds and discovering the wealth of knowledge	3.99	0.12	3	high

No	Item	mean	standard deviation	Rank	Degree
2	The Faculty members possess sufficient skills to teach using the e-learning resources available at the university.	3.98	0.14	4	high
7	Blended learning and e-learning systems face some challenges, such as teachers' managing their time to coordinate content and activities across different platforms.	2.00	0.00	5	low
8	There is a shortage of technical staff responsible for providing technical support in using e-learning for teaching at the university.	2.00	0.00	5	low
6	The transition to blended learning requires significant investments and costs, such as purchasing devices, which place a big burden on the budget of the university.	1.20	0.40	7	high
5	There is no any clear strategy and specific objectives related to e-learning at the university.	1.00	0.00	8	high
Difficulties and obstacles may hinder the implementation of distance learning and blended learning strategies		2.77	0.06	middle	

Table 11 shows that the arithmetic means of the responses of the study sample regarding the items of the dimension "difficulties and obstacles may hinder the implementation of distance learning and blended learning strategies" ranged between 1.00 to 4.00). Items 1 and 4 came first "The University provides the necessary technological infrastructure for e-learning"; "I can send and receive educational materials and

activities without obstacles through the e-learning system available at the university". Item 5 came last "There is no any clear strategy and specific objectives related to e-learning at the university". The mean for the dimension as a whole was 2.77 with a middle evaluation score.

Findings and discussion

Through a grounded analytical inference, the current study offers a conceptual and statistical submission that technological

development significantly fosters the effectiveness of both distance and blended learning models at MBZUH, Abu Dhabi. With regard to the effectiveness of tech-driven learning strategies, the analysis in Table 3 demonstrates that mean scores ranged between 1.95 and 4.00, with a total mean of 3.63(SD=0.19), suggesting a significant level of agreement among MBZUH students. The result of the One-Sample T-test ($T = 71.644$, $p < 0.05$) reveals that the mean, as observed, significantly goes beyond the Likert midpoint of 2.5. This leads to the rejection of the null hypothesis. Majority of the students concurred that e-learning offers additional skills, and also improves scientific knowledge ($M=4.00$). This finding reflects a unanimous affirmation among students at MBZUH that tech-inclined learning processes build cognitive capacity and enhance academic achievement.

The finding is in line with Bernard et al. (2014), who have also demonstrated that well-designed distance learning model produces positive learning outcomes as comparable to traditional instructional processes. In a similar research, Means et al. (2013) have also reported how students in online and blended learning

platforms excelled modestly, better than those in physical classroom environments. The submission sustained by scholars and underscored by this study is also theoretically affirmed by Garrison et al.'s (2000) principle of Community of Inquiry (Col). The theory expounds that effective online learning programme is enhanced by the adoption and subsequent integration of cognitive, social and teaching presences. These are elements which are feasible through the mediation of educational technologies. Complementing this position is the Moore's (1989) theory of transactional distance. It emphasizes that structured communication reduces both psychological and interactional gaps in the distance learning model.

Items associated with the availability of digital resources, accessibility, diversity and assessment, recorded high means of 3.80 to 3.90. This is suggesting that students view digital learning programmes as highly central in sustaining learning as it also improves evaluation processes. Scholars like Bao (2020), and Martin et al. (2020) also maintained that digital tools are notable for improving academic progression. Conversely, the $M=1.95$ low mean

indicating the perceived challenges to online learning models, demonstrates that students do not consider technological challenges as constituting a major problem at MBZUH. Rasheed et al. (2020) have also shown that where there is strong technical and institutional support systems, students report less barriers to effective digital learning models.

The findings relating to blended learning suggest even stronger students' perception about effectiveness. Table 5 reports a total mean of 3.72 (SD=0.35), with ($T = 41.25, p < 0.05$) of the T-test result as a confirmation of statistical significance. The students in a unanimous response affirm that educational technologies enable interactive instructional process and immediate feedback ($M=4.00$). These results align with the studies of Graham (2013), who defines blended learning as a systematic integration of physical and online learning modalities that leverages instructional flexibility. Broadbent (2017) also revealed that blended learning improves self-paced learning process. Further, Kintu et al. (2017) highlight that effective technological tools and coherent instructional designs are

important factors for the success of blended learning modality, which confirms the importance of institutional support emphasized in this study.

The impact of the blended learning model on students' academic achievement is specifically emphasized in this study. The analysis in Table 7 shows a high total mean of 3.86 (SD=0.33). The One Sample T-test ($T = 49.27, p < 0.05$) proves a statistically significant positive impact of blended learning on the students' academic experience. The students affirm that blended learning promotes interaction, communication and flexible instructional delivery. This finding agrees with Vo et al.'s (2017), argument that blended learning programmes always outperform physical or traditional instructional processes in promoting student satisfaction and positive outcomes. Bernard et al. (2014) have also demonstrated that blended learning modalities often yield satisfying outcomes than pure tech-driven or traditional modalities. The utilization of both digital tools and physical classroom settings enhance cognitive development and collaborative learning engagements (Garrison & Vaughan, 2008).

Further, distance learning modalities also showed a statistically significant positive effect on the students' academic achievement with ($M=3.37$; $T=36.75$, $p < 0.05$). The students reported positive impacts in terms of digital literacy, self-paced learning frameworks and access to feedback. Dhawan (2020) has also observed that distance education enhances independent learning abilities and adaptability. Bao (2020) did also emphasize that well-designed online instructional delivery and active participation improves academic outcomes.

On the other hand, despite the above positive affirmations, Table 11 suggests that there is an average or moderate level of perceived setback to the implementation of distance and blended learning modalities with $M=3.37$; $T=36.75$, $p < 0.05$). With a mean of (4.00), the analysis indicates that infrastructure and faculty readiness are rated high among the challenges of blended learning. Meanwhile, there were other concerns of costs, planning and time management. These were indicated as areas that requires institutional improvement. Hodges et al. (2020) differentiated between emergency online

instructions and structured online learning. The scholar noted that sustaining digital learning modalities depends on the readiness and planning of the supporting institution. Bozkurt et al. (2020) had similarly pointed out that long-term achievement in digital education programmes demands such factors as technical support system, well-defined policy and personnel development.

Generally, the findings have consistently demonstrated that technological development plays significant roles in the educational process, promoting effective distance and blended learning models. The student respondents appreciate blended learning as having a stronger impact on teaching and learning than a pure online-based system. This aligns with existing globally supported research that identifies blended modalities as providing a balance between flexible lesson delivery, optimal interaction and lesson coherence (Graham, 2013; Vo et al., 2017). In summary, the findings of this study support the rejection of the study's null hypotheses; however, the findings finally demonstrate that technological advancement serves as a transformative force that sustains

blended learning modalities in contemporary university educational systems.

Conclusion

The study investigated the role of technological development in achieving the effectiveness of distance Learning and blended Learning from the perspectives of MBZUH students. The results have demonstrated that educational technologies significantly promote academic achievement, active students' instructional participation, accessibility, and flexible instructional delivery. Both the two modalities of distance and blended learning were positively rated by the students. However, blended learning model received slightly greater ratings for effectiveness.

The findings of the study also confirm that educational technologies alone do not guarantee all round effectiveness; their effectiveness depends on instructional alignment, well-designed instructional design and institutional support systems. The statistically significant results of the hypotheses tested revealed that tech-supported learning strategies contribute highly to modern university educational process.

Therefore, it is concluded that long-term investment in educational technological tools, adequate faculty training and innovative instructional process are significantly relevant to consolidate the advantages of both distance and blended learning methods. In the context of MBZUH, the integration of these digital learning tools into instructional procedures remains vital to the institution's strategic development and transformation of its educational landscape, in line with global standards of university education systems.

Recommendations

Based on the results and findings of the study, the researchers provided some recommendations, and here are the most important of them.

1. It is necessary to deepen the role of technological development in distance and personalized learning frameworks to alleviate the financial burdens faced by low-income university students, such as the high costs of transportation and off-campus housing, while simultaneously preserving the students' vital connection to the university environment and their

- colleagues. Thus, for this reason, blended learning represents the most effective approach in university education. It allows students to reap the benefits of distance learning while maintaining the essential advantages of face-to-face instruction within the classroom.
2. The University administration must prioritize distance learning and blended learning by developing appropriate strategies which should allow students to reap the benefits of both remote learning and face-to-face instruction within the classroom. In addition, the administration must maintain constant communication with students to ensure they understand their course materials and achieve the highest level of success, qualifying them for suitable career opportunities.

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