Learning Technologies among Academics in the United Arab Emirates: One Academic Year since COVID-19

Nada Shahin and Haneen Al Arfaj

Abstract—**This research aims to investigate the adoption of learning technologies among academics in higher education institutes within the United Arab Emirates (UAE) after completing one academic year teaching through a hybrid technique due to the Coronavirus (COVID-19) pandemic. The researchers propose a validated framework that integrates the Technology Acceptance Model (TAM), Social Cognition Theory (SCT), and Innovation Diffusion Theory (IDT). The research was conducted using the quantitative method, where 170 academics from 22 higher education institutes in the UAE completed an online survey. The researchers found that the adoption of learning technologies depends on the individual academics and the higher education institutes; therefore, the researchers suggest building a more effective strategy to accelerate adoption. Additionally, the researchers also found that the academics' perceptions of the usefulness of learning technologies do not affect their behavior while utilizing them, and that the behavioral intention does not affect the actual usage of the learning technologies.**

Index Terms—**Higher education, learning technology, technology adoption.**

I. Introduction

Information and Communication Technology has been evolving for many decades and is now a fundamental part of education, including Learning Management Systems (LMS), Videoconferencing, Virtual Reality (VR), Augmented Reality (AR), Gamification, Artificial Intelligence (AI), Mobile Learning (M-Learning), Multimedia, Wikis, and much more [1]-[3]. Therefore, it is essential to study this field at a domestic level [2], especially given the current situation where traditional classrooms have been replaced with virtual ones due to the Coronavirus (COVID-19) pandemic, which has forced academics to utilize at least one learning technology to deliver a lecture.

Previous studies have explored the adoption of learning technologies in higher education [1]-[9]. Importantly, [8] found that although academics supported the implementation of new technology, many had difficulties implementing technology in the classroom. Moreover, Al-Hunaiyyan and Alhajri *et al.* [9] stated that there are multiple challenges in implementing M-learning in Kuwait, such as the lack of change management and policy support, and the absence of technical support. Additionally, based on [4], it is recommended that higher education institutes take various steps such as building technology teaching centers, improving technology literacy and awareness, and providing technical support. This study also recommended that academics should enroll in professional development programs to improve their technical knowledge and skills, and more technologically literate academics should help those who are less technologically literate. However, despite these previous studies, the literature has failed to examine academics' adoption of learning technologies during the COVID-19 pandemic.

In this study, the researchers aim to explore learning technologies in the higher education sector within the UAE since academic institutions are adopting different technologies in their teaching and developments [4]. To achieve this, the researchers integrated the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT) to gain better and far-reaching results. Additionally, they organized the variables using the Social Cognitive Theory (SCT) to prove its application in the technological field. The researchers will answer the following questions using the quantitative method by developing survey questions based on a literature review:

- What influences the adoption of learning technologies by higher education academics in the UAE?
- To what extent do Personal Factors (PF) and Environmental Factors (EF) affect the academics' Behavioral Intentions (BI) in adopting learning technologies?
- To what extent do PF and EF affect each other in terms of adopting learning technologies?
- To what extent do elements of the IDT affect Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) in terms of adopting learning technologies?

II. Literature Review

A. What Is Technology Adoption?

Learning techniques have been rapidly increasing in number in the education sector to improve the process and productivity of teaching and learning [10]. One of the main applied learning techniques in the higher education sector involves new and emerging technology [4]. However, to utilize the maximum benefits of technology, the end-user, whether it is the student or the instructor, should go through a process of "adoption" [11].

Many previous studies have explored technology adoption in different sectors [1], [3]-[5], [12]-[14] and concluded in one way or another that the term "technology adoption" refers to the degree of readiness an individual develops over

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Nada Shahin is with the Faculty of Engineering and Information Sciences, University of Wollongong in Dubai, Dubai, UAE (e-mail: ns842@uowmail.edu.au).

Haneen Al Arfaj is with the College of Engineering and Information Technology, Ajman University, Ajman, UAE (e-mail: haneen.a.alarfaj@gmail.com).

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time to make full use of a certain technology. This differs from technology acceptance which, according to [4] and [15], is "a person's psychological condition regarding his/her intention to use a technology." Additionally, some learning institutions have failed to adopt technology or stopped using it after a short period. This proves that adopting technology needs a commitment from all stakeholders since their attitude will affect the overall technology adoption, be it positive or negative. Positive conduct refers to the enjoyment and excitement that will eventually ease the process of adoption [16]. In contrast, negative conduct includes nonacceptance, fear of change, and taking risks, all of which are obstacles [8].

B. Learning Technologies in Higher Education

As generations evolve and technologies are adopted, e-learning provides the community with a new approach to delivering information to its audience by introducing new technologies that can enhance the learning processes and improve the educational system [5]. Moreover, theories such as connectivism or connected learning are popular in the field of digital learning. On this basis, the researchers discussed how pedagogy is an essential part of any educational technology, as it will enhance the learning process by focusing on instructional elements [17].

However, although there is not a clear definition of learning technology [18], researchers agreed that these technologies are utilized by both instructors and students and can include the internet [19], the intranet [20], LMS [1], chat systems [21], email [22], gamification [23], online classes [24], AI [25], VR [26], AR [27], mobile learning [28], voice assistants [29], the internet of things [30], and others. Since the higher education environment is significantly larger than other educational settings, many of these learning technologies have been implemented.

For example, gamification in higher education involves game factors in a context that does not relate to gaming [31]. Gamification is known to improve the interaction between students and instructors, therefore, it is utilized to improve the process of education, where it directly affects BIs, builds self-efficacy, and increases the enjoyment of lectures [32].

Moreover, VR in higher education enhances the educational processes by imitating the surrounding environment and adding more features that cannot be easily afforded or acquired. VR enhances the accessibility of online interaction, offers more practical experience, and disseminates content related to the course itself in a way that is easy for students to remember [33].

Furthermore, AI is an important element of the daily life of humans [34], therefore, researchers discussed the utilization of AI in higher education to detect cheating, authenticate students' identities, and perform surgical laboratory explanations and examinations [35]. Researchers also discussed whether AI would eventually replace the roles of academics without respecting the essential pedagogical needs [35].

Additionally, AR, which is a technology that promotes the real-world environment through virtual interfaces in 2D and 3D [36], has been implemented in higher education to improve outcomes in Science, Technology, Engineering, and Math courses. In contrast to other learning techniques, AR enhances the learning environment by boosting the engagement between the lecturer, the student, and the course material [37].

Besides, the Internet of Things (IoT) is utilized in higher education by implementing smarter plans to build a safer campus architecture, especially during COVID-19, to enhance access to information and essential resources that are consequently tracked [30]. Researchers have also explained how IoT systems have an enormous potential to enhance the motivation and the interaction between students and lecturers.

C. Higher Education in the UAE during COVID-19

During COVID-19, higher education institutes rapidly moved to e-learning systems using different software to adopt e-learning technologies. In 2020, researchers implemented and discussed a framework for e-learning technology acceptance in the UAE [2]. As all universities have started implementing online learning, the study focused on conducting an analysis of students' points of view of effective variables that can impact the acceptance of an e-learning system. The study findings revealed that Social Influence (SI), Enjoyment (EN), and Self-Efficacy (SE) have a positive and affirmative effect on PEOU and PU among students. Additionally, the effectiveness of e-learning fundamentally relies on users' characteristics and their awareness of and familiarity with mobile phones and computers [2]. This study is essential because 2020 is the year when people were obliged to use e-learning technologies due to COVID-19; however, this study only explores the students' perspectives, and does not investigate the points of view of academics in higher education institutes.

Furthermore, Ali [38] discussed the dramatic shift to online education in the UAE during the COVID-19 pandemic and indicated that e-learning has provided the education system with the flexibility that a traditional education system has not been able to provide. Additionally, the researcher argued that students were more focused on autonomous learning which minimized the load on the instructor.

D. Theoretical Model

In this paper, the researchers aimed to target two main theoretical models, the TAM and the IDT, which are well known in the field of technology adoption; however, many variables in these two theoretical models were organized using elements of SCT.

1) Technology acceptance model (TAM)

The TAM originated in 1989 and was developed to study the willingness of people to use a specific system or technology [4]. TAM has been supported in multiple research studies, including technology in education [1]-[6], [39]. The main concepts of TAM include:

- **Perceived Usefulness (PU)**, which is "the degree to which a person believes that using a particular system would enhance his or her job performance" [40].
- **Perceived Ease of Use (PEOU),** which is the "degree to which a person believes that using a particular system would be free of effort" [40].
- **Behavior Intention (BI) & Usage** are essential concepts

in technology adoption [4], which many researchers utilized as dependent variables [41]-[43]. According to [43], the BI of a new technology predicts the actual usage.

2) Innovation diffusion theory (IDT)

The IDT was developed in 1962 by Rodgers [4], who defined it as "the process by which innovation is communicated through certain channels over time, among the members of a social system" [11]. Although the researchers did not explore innovations in this study, they believe that the following IDT variables impact technology adoption:

- **Relative Advantage (RA)**, which "is the degree to which innovation is perceived as being better than the idea it supersedes" [4].
- **Compatibility (COMP)**, which is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" [11].
- **Trialability (TRIAL)**, which is "the degree to which an innovation may be experimented with a limited basis" [11].
- **Observability (OBS)**, which is "the degree to which the results of an innovation are visible to others" [11].

3) Social cognitive theory (SCT)

SCT is a psychological framework developed by Albert Bandura in 1986, which studies the adoption of human behavior in terms of **personal, environmental, and behavioral** variables [4], [44]. The main concepts utilized from this theory are:

- **Personal Factors (PF)**, including **SE**, which is "the degree to which an individual believes that he or she has the ability to perform a specific task/job" [2] and **Anxiety (AN)**.
- **Environmental Factors (EF)**, which might influence the individual's psychology and behavior [45], including **SI**, which is related to the connection between the environment and the individual, **and Organization Support (OS)**.

E. Theoretical Model Design

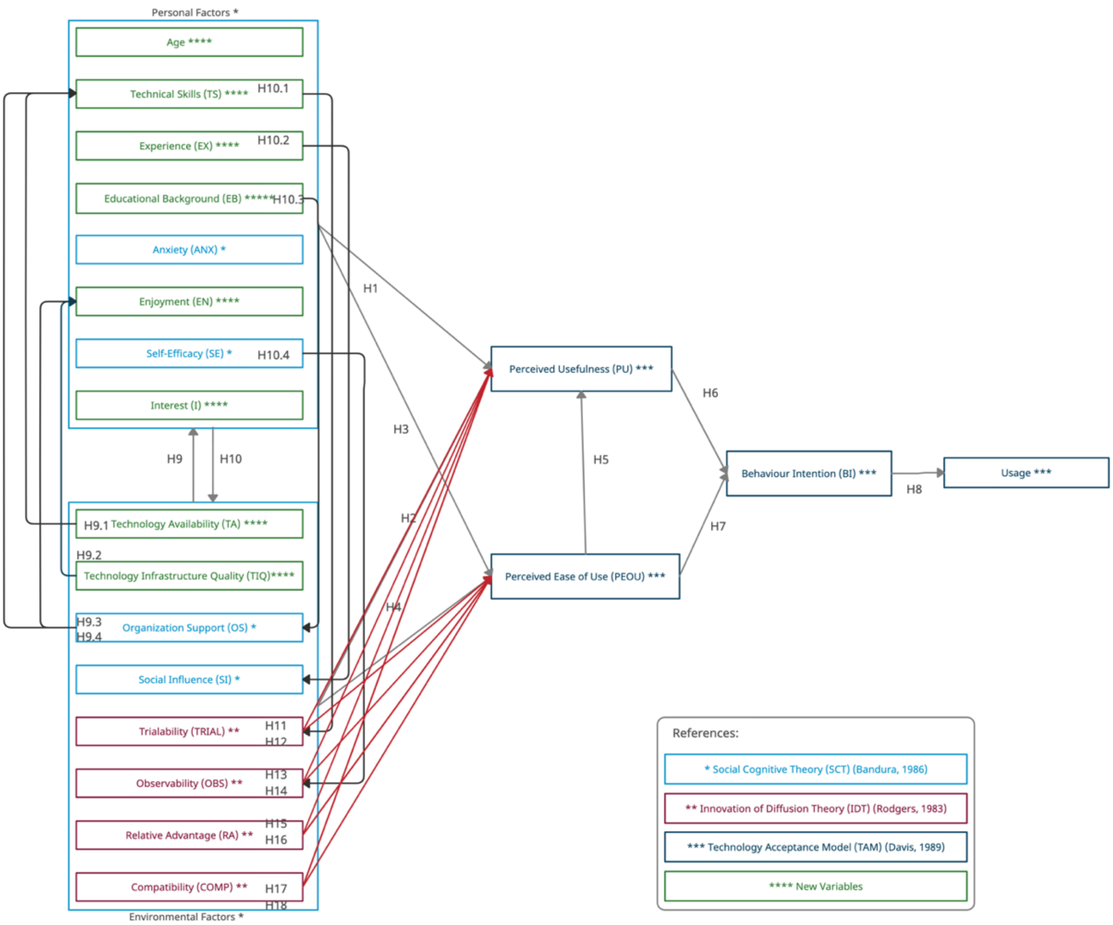

Fig. 1. Theoretical model design.

According to [11] and [40], TAM & IDT are two of the most influential theories for technology acceptance and adoption; and according to [6], these theories have been widely utilized by other researchers in the field of technology adoption. Moreover, the researchers believe that the three models complement each other, therefore, they combined the basic TAM concepts with most of the IDT variables and other variables, and organized them using the main SCT concepts, as illustrated in Fig. 1, noting that the **PF** refer to the academic and the **EF** refer to the higher education institute where the academic works. Moreover, the following new variables were added to the framework:

- **Age** of the academic

- **Technical Skills (TS)**, which is related to an academic's computer skills
- The academic's Experience **(EX)** in years
- **Educational Background (EB)** which reflects the highest degree completed, year of completing the degree, and the country in which the academic obtained the degree
- **Enjoyment (EN)**, which is "the extent to which the act of using a specific system is perceived to be enjoyable in its own right" [46]
- **Interest (I)**, reflecting the academic's personal curiosity in utilizing a certain system
- **Technology Availability (TA)** by the higher education institute, and according to [7], TA influences technology adoption
- **Technology Infrastructure Quality (TIQ),** including computers [47], software, and internet reliability [48] which all influence the adoption process [5].

III. Methodology

A. Survey and Sampling

The survey was developed based on a literature review and included 33 questions. The survey questions were available in both English and Arabic and were divided into the following parts:

- **Demographic information:** including the institute name, age of participant, highest degree completed, teaching experience in years, and list of learning technologies used in the academic year 2020/2021 and in previous years [1], [3], [8].
- **Personal Factors (PF):** including 10 questions that were ranked using a Likert scale (from 1 to 5). The questions covered the following aspects of each participant: computer skills, interest in learning technologies, anxiety when using learning technologies, enjoyment when using learning technologies, performance, consistency between values and learning technologies, ease of use of learning technologies, and SI [2], [5], [8], [49].
- **Environmental Factors (EF):** including eight questions that were ranked using a Likert scale (from 1 to 5). The questions covered the quality of the institute's technology infrastructure, technical support for learning resources and workshops, influence, trialability, observability, and TA [2], [5], [8].
- **Personal Opinion:** including five questions that were ranked using a Likert scale (from 1 to 5) to measure the participants' agreement as regards learning technology, student collaboration, learning outcomes, and other factors which will be highlighted in the following sections [8], [9], [50].

Furthermore, according to the Ministry of Higher Education in the UAE [51], the number of higher education academics in the UAE is 7907. The researchers collected data through an online survey which was sent to 1000 university academics by email and the response rate was 17%. Therefore, with an 8% margin of error and 95% confidence interval, 170 respondents was sufficient.

B. Data Analysis and Hypotheses Testing

To test the hypotheses, the researchers used IBM SPSS software to perform validity and reliability analysis. Reliability was calculated using Cronbach's Alpha with 0.7 as a threshold level. The results revealed that the minimum value of Cronbach's Alpha was 0.776 and the maximum value was 0.886. Additionally, the researchers conducted convergent validity to ensure the correlation between the variables, which was satisfactory.

IV. Results and Analysis

A. Demographics

In total, academics from 22 universities in the UAE participated in the research and were mainly current academics in either Ajman University (47.2%), Zayed University (10.3%), or Al Ain University (7.9%). The majority of the participants (96.9%) teach full-time in their university. Moreover, the top three subject areas of the participants are Social Sciences (17.6%), Business Administration (14.5%), and Dentistry (13.3%). Furthermore, the average age of the participants is 47 years old with an average of 17 years of teaching experience. Additionally, 75.2% of the participants are Ph.D. holders, 21.8% are master's degree holders, and 3% are bachelor's degree holders. The top three areas for the highest degree the participants obtained are either from the Middle East and North Africa region (35.2%), Europe (32.7%), or North America (18.8%).

As for the average number of learning technologies utilized, it was four in the academic year 2020/2021, and three in the previous academic year. This shows that the circumstances which the academics had to face during the COVID-19 pandemic encouraged them to use more technology to deliver their lectures and meet the requirements of their work. Moreover, the results revealed that the top three learning technologies utilized in the academic year 2020/2021 were video conferencing software such as Zoom and Microsoft Teams (88.5%), LMS such as Moodle and Blackboard (87.9%), and video streaming services such as YouTube (72%). This is to be expected due to the measures that the UAE government put in place at the beginning of the pandemic which included implementing a hybrid system in higher education from March 2020 [52]. On the other hand, 83.6% of the participants reported using an LMS before 2020, 63.3% reported using video streaming services, and 59.4% reported using productive tools, such as word processors and spreadsheets, in the classroom.

B. Model Analysis

In this research, the researchers studied the academics' adoption of learning technologies through TAM, SCT, and IDT. Based on the proposed framework and variables, Table 1 reflects the hypotheses and the results of the analysis, and Fig. 2 reflects the validated framework after performing the analysis. Noting that out of 26 hypotheses and sub-hypotheses based on the three models, nine were rejected.

TABLE I: HYPOTHESES AND VALIDATION OF THEORETICAL FRAMEWORK

Hypotheses	SE	P-value	Result
H1. There is a positive relationship between PF and PU	0.039	<0.001	Supported
H2. There is a positive relationship between PF and PEOU	0.037	<0.001	Supported
H3. There is a positive relationship between EF and PU	0.048	<0.001	Supported
H4. There is a positive relationship between EF and PEOU	0.069	0.040	Supported
H5. There is a positive relationship between PEOU and PU	0.058	0.050	Supported
H6. There is a positive relationship between PU and BI	0.064	0.144	Unsupported
H7. There is a positive relationship between PEOU and BI	0.048	0.047	Supported
H8. There is a positive relationship between BI and Usage	0.066	0.109	Unsupported
H9. There is a positive relationship between EF and PF	0.041	<0.001	Supported
H9.1. There is a positive relationship between TA and TS	0.060	0.138	Unsupported
H9.2. There is a positive relationship between TIQ and EN	0.060	<0.001	Supported
H9.3. There is a positive relationship between OS and EN	0.67	<0.001	Supported
H9.4. There is a positive relationship between OS and TS	0.088	0.012	Supported
H10. There is a positive relationship between PF and EF	0.039	<0.001	Supported
H10.1. There is a positive relationship between TS and TRIAL	0.050	0.103	Unsupported
H10.2. There is a positive relationship between EX and SI	0.081	0.177	Unsupported
H10.3. There is a positive relationship between EB and OS	0.088	0.335	Unsupported
H10.4. There is a positive relationship between SE and OBS	0.042	<0.001	Supported
H11. There is a positive relationship between TRIAL and PU	0.081	<0.001	Supported
H12. There is a positive relationship between TRIAL and PEOU	0.114	0.076	Unsupported
H13. There is a positive relationship between OBS and PU	0.082	<0.001	Supported
H14. There is a positive relationship between OBS and PEOU	0.120	0.071	Unsupported
H15. There is a positive relationship between RA and PU	0.089	<0.001	Supported
H16. There is a positive relationship between RA and PEOU	0.13	0.1	Unsupported
H17. There is a positive relationship between COMP and PU	0.067	<0.001	Supported
H18. There is a positive relationship between COMP and PEOU	0.094	<0.001	Supported

Note: SE is Standard Error.

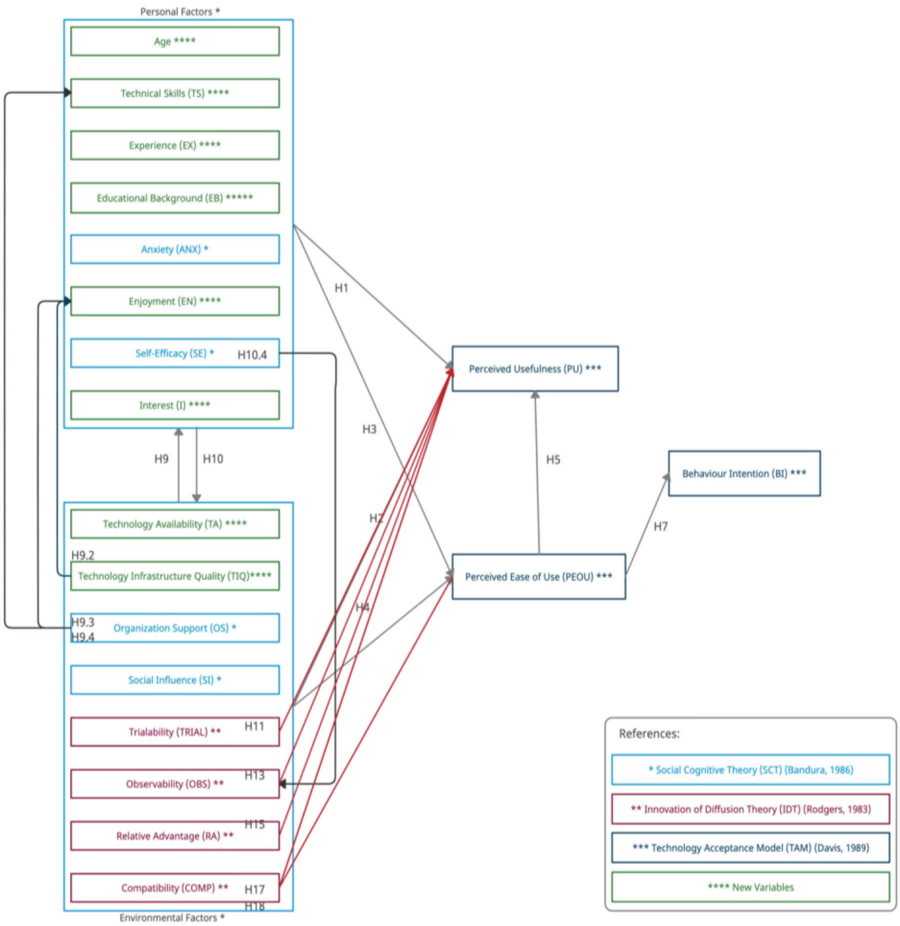

Fig. 2. Validated framework.

1) TAM analysis

The first eight hypotheses are related to TAM. According to Table I and Fig. 2, the relationship between PF and PU is positive and significant (p < 0.001), therefore H1 is supported, which means that the personal factors of the academics in the UAE positively affect the perceived usefulness of the learning technologies. The second hypothesis (H2) studies the relationship between PF and PEOU and proves that the relationship is positive and significant (p < 0.001), therefore H2 is supported. This means that the PF of the academics in the UAE positively affect the PEOU of the learning technologies. The third hypothesis (H3) studies the relationship between EF and PU and proves that the relationship is positive and significant (p < 0.001), therefore H3 is supported. This means that the EF, or the higher education institutes where the academics work, positively affect the PEOU of the learning technologies.

Furthermore, the fourth hypothesis (H4) studies the relationship between EF and PEOU and proves that the relationship is positive and significant (p = 0.040); therefore, H4 is supported. This means that the EF, or the higher education institutes where the academics work, positively affect the PEOU of the learning technologies. The fifth hypothesis (H5) studies the relationship between PEOU and PU and proves that the relationship is positive and significant (p = 0.050); therefore, H5 is supported. This means that the academics in the UAE perceived the usefulness and ease of use of the learning technologies. Nevertheless, the sixth hypothesis (H6) studies the relationship between PU and BI. However, there is insignificant proof of the relationship between these two variables (p = 0.144); therefore, H6 is not supported. Moving forward, the seventh hypothesis (H7) studies the relationship between PEOU and BI and proves that the relationship is positive and significant (p = 0.047); therefore, H7 is supported. This means that the academics' PEOU of the learning technologies affects their BI as regards these technologies. Lastly, the eighth hypothesis (H8) studies the relationship between BI and usage. However, there is insignificant proof of the relationship between these two variables (p = 0.109); therefore, H8 is not supported.

2) SCT analysis

The researchers did not study the whole of SCT in this research, however, they were more interested in integrating SCT with TAM and IDT to organize the variables using the PF and EF elements from the SCT. Nevertheless, the researchers included two hypotheses to test the relationship between PF and EF. Therefore, the ninth hypothesis (H9) demonstrates a positive relationship between EF and PF with p < 0.001, indicating a positive and significant relationship; therefore, H9 is supported. In addition, the researchers tested four sub-hypotheses to study the relationship further, therefore, H9.1 studies the relationship between TA and TS. However, there is insignificant proof of the relationship between these two variables (p = 0.138); therefore, H9.1 is not supported. This means that the higher education institute's TA does not necessarily mean that the academics would have the proper TS to use the learning technologies. However, on the contrary, H9.2 proves that there is a positive and significant relationship between the TIQ in the higher education institutes and the Enjoyment (EN) level while the academics are using the learning technologies (p < 0.001). Additionally, H9.3 proves that there is a positive and significant relationship between the OS provided by the higher education institute and the EN level while the academics are using the learning technologies (p < 0.001). Lastly, H9.4 proves that there is a positive and significant relationship between the OS provided by the higher education institute and the academics' TS (p < 0.001).

On the other hand, the tenth hypothesis (H10) demonstrates a positive relationship between PF and EF with p < 0.001, indicating a positive and significant relationship; therefore, H10 is supported. In addition, the researchers tested four sub-hypotheses to study the relationship further. Hence, H10.1 studies the relationship between the academics' TS and the Trialability (TRIAL) provided by the higher education institute. However, there is insignificant proof of the relationship between these two variables (p = 0.103); therefore, H10.1 is not supported. Furthermore, H10.2 studies the relationship between the academics' teaching Experience (EX) and their SI. However, there is insignificant proof of the relationship between these two variables (p = 0.177); therefore, H10.2 is not supported. Additionally, H10.3 studies the relationship between the academics' EB and the OS received by the higher education institute. However, there is insignificant proof of the relationship between these two variables (p = 0.335); therefore, H10.3 is not supported. On the contrary, H10.4 proves that there is a positive and significant relationship between the academics' SE and the Observability (OBS) in the higher education institute (p < 0.001); therefore, H10.4 is supported.

3) IDT analysis

The last framework that the researchers studied and analyzed was the IDT. Therefore, the last eight hypotheses were dedicated to this purpose. The eleventh hypothesis (H11) studies the relationship between Trialability (TRIAL) and PU and proves that the relationship is positive and significant (p < 0.001); therefore, H11 is supported. This means that the trialability provided by the higher education institutes regarding the learning technology affects the academics' perceptions of the usefulness of these technologies. The twelfth hypothesis (H12) studies the relationship between TRIAL and PEOU. However, there is insignificant proof of the relationship between these two variables (p = 0.076); therefore, H12 is not supported.

Moreover, the thirteenth hypothesis (H13) studies the relationship between Observability (OBS) and PU and proves that the relationship is positive and significant (p < 0.001); therefore, H13 is supported. This means that the level of observability among the higher management at the higher education institutes positively affects the academics' perceptions of the usefulness of these technologies. The fourteenth hypothesis (H14) studies the relationship between OBS and PEOU. However, there is insignificant proof of the relationship between these two variables (p = 0.071); therefore, H14 is not supported.

Moving forward, the fifteenth hypothesis (H15) studies the relationship between RA and PU and proves that the relationship is positive and significant ($p < 0.001$); therefore, H15 is supported. This indicates that the academics who perceived that using learning technologies was better than using traditional techniques also perceived the usefulness of the technologies in teaching. The sixteenth hypothesis (H16) studies the relationship between RA and PEOU. However, there is insignificant proof of the relationship between these two variables ($p = 0.1$); therefore, H16 is not supported.

Furthermore, the seventeenth hypothesis (H17) studies the relationship between compatibility (COMP) and PU and proves that the relationship is positive and significant ($p < 0.001$); therefore, H17 is supported. This means that the compatibility of the learning technologies affects the perception of their use among academics. Lastly, the eighteenth hypothesis (H18) studies the relationship between compatibility (COMP) and PEOU and proves that the relationship is positive and significant ($p < 0.001$); therefore, H18 is supported. This means that the compatibility of the learning technologies affects its PEOU among academics.

C. Academics' Personal Opinions

To add further to this study, the researchers studied the participants' personal opinions and the results show that most of the academics believe that using learning technologies is better than relying on traditional techniques (Mean = 3.49), which is aligned with the findings of a previous study [5]. Additionally, the researchers found that most academics believe that learning technologies increase student collaboration in the classroom (Mean = 3.33), which aligns with the findings of a previous study [50]. Also, the researchers found that most academics believe that the learning outcomes in an online class are the same as those in a face-to-face class (Mean = 2.79), which aligns with the findings of a previous study [8]. Moreover, the researchers found that most academics encourage students to use learning technologies (Mean = 3.97), which aligns with the findings of a previous study [8]. Lastly, most academics believe that learning technologies create further work for them (Mean = 4.01), which also aligns with the findings of a previous study [9].

V. Discussion

This research comprehensively tests the adoption of learning technologies among academics in higher education institutes in the UAE, and its findings contribute to the literature. Many previous researchers have studied the adoption of different learning technologies, especially LMS adoption among academics and students. However, none have combined TAM, SCT, and IDT to study the adoption among academics after completing one academic year of teaching through a hybrid education system. In this study, the researchers provided one validated framework that explains the adoption of learning technologies among academics during the COVID-19 pandemic. This framework allowed the researchers to recognize future research directions to enrich the literature and to offer suggestions for higher education institutions to develop better strategies to accelerate their adoption.

The research findings answered the first research question, which addressed the factors that influence the adoption of learning technologies by academics in higher education institutes in the UAE, through testing different hypotheses. Firstly, the researchers found that the academics' PF positively and significantly affect the degree of their PU and ease of use of the learning technologies that they utilize. Additionally, the EF in the higher education institutes also positively and significantly affect the degree of the academics' perceptions of the usefulness of the learning technologies. However, although the EF positively affect the degree of the academics' PEOU of the learning technologies, it is not as significant. The researchers believe that this could be due to the SI among the academics, the availability of a certain technology's trialability before actual usage, or the observability on the part of higher management. Besides, the researchers also found that the academics' perceptions of the PEOU of the learning technologies positively affects their perception of its usefulness, which was proved in previous literature [1]-[3], [6].

Furthermore, the research findings answered the second question, which addressed the influence of the Personal and EF on the academics' BIs to adopt learning technologies, through testing different hypotheses. Firstly, the researchers found that based on the positive relationship between the first four hypotheses, it was acceptable to study the relationship between the PU and BI and the relationship between the PEOU and BI. The researchers found a positive and significant relationship between the PEOU and BI. However, they found that the relationship between the PU and BI and the relationship between BI and actual usage is insignificant. This insignificance is due to the special circumstances of COVID-19 where the Ministry of Education in the UAE obliged all academics to use learning technologies to deliver their lectures online, whether through video conferencing or any other solution that could help in delivering these lectures. Therefore, regardless of how useful the academics think certain learning technologies are, they still had to use them appropriately.

Moreover, the third research question, which addressed the extent of the effect of PF on EF, was answered through multiple hypotheses. The researchers found that despite some insignificance in some of the sub-hypotheses, there is a positive and significant relationship between the EF and the PF, in general, which aligns with the basics of SCT [44].

Additionally, the research findings answered the last question, which addressed the effect of the IDT elements on PU and PEOU, through testing multiple hypotheses. Firstly, the researchers found a positive and strong relationship between the trialability of certain technologies and the way academics perceive the usefulness of each technology. However, they found an insignificant relationship between the trialability of certain technologies and the way the academics perceive the technology's ease of use, which aligns with previous literature [6].

Likewise, the researchers found a positive and strong relationship between observability and the academics' perceptions of the technology's usefulness, but not between observability and the way academics perceive the technology's ease of use, which also aligns with previous literature [6].

Besides, the researchers found a positive and strong relationship between the RA of certain technologies and the way academics perceive the usefulness of each technology, which again aligns with previous literature [6]. However, the researchers found an insignificant relationship between the RA of certain technologies and the academics' PEOU of these technologies. This finding does not align with previous literature; therefore, the researchers believe that this point requires further exploration.

Furthermore, the researchers found a positive and strong relationship between the compatibility of certain technologies and the way the academics perceive the usefulness of these technologies, which does not align with previous literature; therefore, the researchers believe that this point should be further explored. Lastly, the researchers found a positive and strong relationship between the compatibility of certain technologies and the way the academics perceive the usefulness of each technology, which aligns with previous literature [6].

VI. Conclusion

The research objective was to study the effect of PF and EF on the adoption of learning technologies among academics in the UAE during the COVID-19 pandemic. It highlights that the integration of the three models (TAM, SCM, and IDT) clearly impacts the research outcomes since it found that the adoption of learning technologies does not depend on the academics alone, but on the higher education institutes as well. Therefore, the higher management in the higher education institutes should embrace more effective strategies to accelerate adoption among academics, such as introducing trial versions of the learning technology solutions before their actual implementation and setting clear guidelines on how the results of using learning technologies are observed and recognized by the management.

Additionally, the researchers found that due to the measurements taken in the UAE regarding the education sector, academics were instructed to use learning technologies, regardless of their perception of the usefulness of these tools. Hence, higher education institutes should raise awareness among academics regarding the benefits of learning technologies and ensure that academics are encouraged rather than forced to use the available technologies.

On the other hand, the researchers recommend conducting further studies on the contradicting results mentioned in this research, such as the relationship between RA and PU, and the relationship between the COMP and PEOU. The researchers also recommend comparing adoption among academics during COVID-19 in the UAE against the rates in other countries and studying the views of higher management in relation to the academics' adoption.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

NS collected and analyzed the data and wrote the majority of the paper. HA assisted in the data collection and drafting the literature review; all authors approved the final version.

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Nada Shahin was born and raised in the United Arab Emirates. She completed her bachelor's degree in information systems from Ajman University, UAE in 2016 and she obtained her master's degree in IT management from the University of Wollongong in Dubai, UAE in 2020.

She has over five years of work experience, as she worked at Abdulla Al Ghurair Foundation for Education and is currently a Technical Writer at Ajman University, Ajman, UAE. She also has a paper published in 2020 titled "Deaf and hard of hearing in the United Arab Emirates interacting with Alexa, an intelligent personal assistant" through Technology and Disability. Moreover, Nada was chosen as one of the hundred Arab youth pioneers in 2018. Her research interest includes assistive technologies, educational technologies, and smart cities.

Haneen Alarfaj was born in Baghdad and is currently residing in the United Arab Emirates. She is a senior student in Ajman University, Ajman, UAE majoring in networking and security and is currently working at the same university.

Moreover, she previously worked in part time jobs as a Community Service Agent and Teaching Assistant of Astronomy.

Lastly, Haneen is interested in artificial intelligence and computational medicine.