

## **An e-learning system in a higher education institution in the UAE during the Covid-19 pandemic: a students' perspective**

**Myriam Aloulou† & Rima Grati‡**

Liwa College of Technology, Abu Dhabi, United Arab Emirates†

Zayed University, Abu Dhabi, United Arab Emirates‡

**ABSTRACT:** Higher education institutions in the UAE were forced to shut down during the Covid-19 pandemic and start distance learning to protect students, instructors and staff. This decision has been maintained for almost two academic years. Universities and colleges implemented the necessary internal regulations, obtained the needed tools, and trained instructors and students on using these tools. After almost two years of on-line teaching experience, it is crucial to evaluate the learning acceptance from the learners' perspectives, and draw conclusions that help understand the learners' attitudes during and post the pandemic. Numerous studies emphasise the importance of learner and instructor attributes in improving learning acceptance. However, a thorough examination of the determinants that positively or negatively influence the acceptance of e-learning is still required. Hence, the authors propose a conceptual model that includes several determinants for e-learning. To validate the proposed model, empirical research was conducted including data collection from the Liwa College of Technology, Abu Dhabi, UAE, through an on-line survey questionnaire. The study highlights the different determinants critical to e-learning acceptability and use during and after the pandemic.

**Keywords:** E-learning acceptability, higher education, pandemic, learner perspective

### **INTRODUCTION**

The Covid-19 outbreak is a major global health problem today, hampering how various activities are carried out [1]. To prevent the spread of Covid-19, one-third of the world's population has been isolated at various stages. This action resulted in the closure of numerous organisations and higher education institutions, reducing physical presence and social interactions among people. Covid-19 has impacted educational settings as well, with unprecedented changes necessitating a rapid shift of all teaching and learning activities to entirely on-line learning environments.

Information and communication technology (ICT) has been widely used in educational settings, and e-learning is considered the modern education paradigm.

The global e-learning industry is financially significant. The basic enablers of e-learning are advancements in Internet and multimedia technologies. E-learning is best suited for distance learning and flexible learning, but it can also be used in conjunction with face-to-face classroom instruction. Prior to the pandemic, e-learning was less common in the Liwa College of Technology, Abu Dhabi, UAE, with only a few specific courses offered on-line at that time. When the World Health Organization declared Covid-19 a pandemic on 22 March 2020, UAE authorities imposed a tight lockdown, and all universities suspended on-campus instruction. In the UAE, e-learning has become the only option for ensuring educational continuity.

After almost two years of on-line teaching experience, it is crucial to evaluate the learning acceptance from the learners' perspectives and draw conclusions needed for the post-pandemic era. The perspectives of the learners are critical because they are ultimately the reason for the educational endeavour. They provide invaluable first-hand insights into their experiences and expectations [2]. When new teaching approaches and technologies are introduced, the student perspective is critical. Numerous studies emphasise the importance of learner and instructor attributes in improving learning acceptance [3]. However, as outlined by Bao, *e-learning during the pandemic is more of forced learning than a planned one* [4]. As a result, a thorough examination of the determinants that positively or negatively influence the acceptance of this significant shift toward e-learning is required.

In this study, the problem was addressed by evaluating students' e-learning experiences. The research question that guided this study was: What determinants influence students' willingness to engage in e-learning during the Covid-19

pandemic and even after? To answer the research question, a conceptual model that includes several determinants (instructor attributes, learner attributes) and constructs from the technology acceptance model (TAM) and an external variable, named *contextual information related to Covid-19* was proposed. Empirical research was conducted including data collection through an on-line survey questionnaire, focusing on the students of the Liwa College of Technology, Abu Dhabi, UAE, as the target group (N = 250). The data was analysed through structural equation modelling (SEM) using SmartPLS v. 3.

Henceforth, this article is structured as follows: the second part is an overview of previous studies that examine e-learning adoption in Covid-19 time. In the third part are described the methodology, the key determinants of e-learning and the conceptual model. The next section included the results followed by a section in which the authors discuss the results. The last part concludes the article with an overview of potential future work.

## PREVIOUS STUDIES

Almaiah et al identified the critical challenges and factors of Covid-19 pandemic e-learning system usage. The authors discussed an e-learning system's quality, trust, culture, self-efficacy, financial support issues, change management and technical maintenance in the study, all of which were mentioned as potentially influential factors of e-learning adoption [5].

Nikou and Maslov demonstrated that regardless of how well educational institutions are prepared to promote the use of e-learning systems [6], other Covid-19-related challenges play a critical role in forming students' intentions to participate in e-learning during the Covid-19 pandemic [6]. Furthermore, Abbasi et al stated that during the lockdown, students did not prefer e-teaching over face-to-face teaching and that administration and faculty members must take the necessary measures to improve e-learning during the lockdown [7]. Lapada et al investigated teachers' perceptions of the impact of Covid-19 and community quarantine on distance learning and discovered numerous challenges, as well as individual issues with distance learning readiness [8]. In his article, Brzezinski elaborated on the strengths and weaknesses of the on-line classes that were carried out during two semesters in the Faculty of Architecture at Wrocław University of Science and Technology (FA-WUST) in Wrocław, Poland [9].

## KEY DETERMINATIONS OF E-LEARNING

Based on the literature review, the determinants for e-learning considered in the current research model are detailed as follows:

- Instructor attributes: this item is composed of instructor attitude and interaction.
  - Instructor attitude: this item is an important determinant for an effective e-learning experience. The instructor attitude towards e-learning should help to create a warm classroom climate, to promote enthusiasm, motivation and an interactive teacher-student relationship.

H1.a: Attitude of an instructor will have a positive impact on the instructor attributes.

- Instructor interaction: interaction with students on the e-learning system is a crucial role of instructor qualities, and it is widely acknowledged as a common e-learning technique. The instructor-student interaction is crucial because it may impact student motivation and encourage learning. Many authors demonstrated that instructor-student contact might reduce student dissatisfaction caused by technological glitches or inexperience with technology, which may be prevalent during a pandemic.

H1.b: Instructor interaction will have a positive impact on the instructor attributes.

H4: The instructor attributes in e-learning will have a positive impact on the intention to accept e-learning by the learners during and after the Covid-19 pandemic.

- Contextual information: unlike previously mentioned items extracted from the literature, this item is introduced in this article to capture the situation and circumstances of the learners in the pandemic period and even after. The perceived circumstances of the pandemic may influence the learner attributes while using the e-learning system. These circumstances are due to being alone, which could bring anxiety, sleep disturbances, panic, stress and other kinds of mental illness. Due to this pandemic outbreak, many students have developed psychological problems that affect their academic performance and personal life. Vaccines are now being distributed across the world, slowly but steadily signalling the end of the pandemic. When the danger of Covid-19 is no longer a concern in education, it will be fascinating to observe whether some parts of emergency remote instruction survive. However, new audiences will be attracted to on-line education. Students' expectations are likely to alter thanks to the flexibility and learning opportunities that have developed due to a specific need.

Therefore, dedicated questions were designed to assess the degree to which the pandemic and the lockdown may affect students' experience and satisfaction with the e-learning system.

- H5: Contextual information during Covid-19 will have a negative impact on the relationship between learner attributes and behavioural intention.
- H6: Contextual information during Covid-19 will have a negative impact on the relationship between TAM and behavioural intention.
- Learner attributes: this item includes learner motivation, learner computer anxiety and learner collaboration.
    - Learner motivation: to be successful with any e-learning initiative, it is imperative that learners are ready to be challenged and prepared with the mind-set to successfully navigate this new experience. Many initiatives compared the learner’s motivation in conventional learning with e-learning, concluding that e-learners must be more driven than traditional classroom learners [10].
- H2.a: Learner motivation will have a positive impact on the learner attributes.
- Learner computer anxiety: many learners are hampered in their efforts to learn computer skills due to a syndrome known as computer anxiety [11]. Because it is linked to students’ engagement with computers, computer anxiety is a concept-specific anxiety.
- H2.b: Learner computer anxiety will have a negative impact on the learner attributes.
- Learner collaboration: on-line learning settings, unlike traditional classroom learning environments, encourage extra learning experiences, where learners may engage, contribute and take ownership of their own learning. Understanding relevant research and how learners absorb information on-line is the first step in creating effective collaborative on-line activities. Incorporating collaborative activities into an on-line course results in improved student performance. Active learning, shared information, social contact and a supportive e-learning community are all facilitated through collaborative group interactions. Therefore, learner collaboration in an e-learning environment is a key element of learner attributes.
- H2.c: Learner collaboration will have a positive impact on learner attributes.
- H7: Learner attributes in e-learning will have a positive impact on the intention to accept e-learning during and after the Covid-19 pandemic.
- Technology acceptance: this item refers to the technology acceptance model (TAM) suggested by Davis [12]. TAM explicates a potential individual’s behavioural intentions of using a technological method. In existing e-learning studies, TAM is the most common theory used to understand the intention to accept e-learning. TAM was used by several researchers to measure the acceptability of e-learning in various situations [13][14]. Users’ perceptions of technology adoption in TAM are influenced by perceived ease of use and perceived utility [15].

These two factors are considered in the questionnaire:

- Perceived ease of use: Davis defines the perceived ease of use (PEOU) as: *the degree to which a person believes that using a particular system would be free of effort* [12]. PEOU is considered as a direct determinant of attitude towards using technology in many research studies [16][17]. Based on these studies, a set of questions was defined to assess the perceived ease of use of the used e-learning platforms.
- H3.a: Perceived ease of use of the e-learning system will have a positive impact on the technology acceptance.
- Perceived usefulness: several studies demonstrated that the perceived usefulness of the e-learning system has a positive relation with delivering quality education and developing a positive attitude of students towards a course. Based on these studies, a set of questions was defined to assess the perceived usefulness of the used e-learning platforms.
- H3.b: Perceived usefulness of the e-learning system will have a positive impact on the technology acceptance.
- H8: Technology acceptance of e-learning will have a positive impact on the intention to accept e-learning by the learners during and after the Covid-19 pandemic.
- Behavioural intention: this item presents the dependent variable which is measured by the intention of learners to adopt e-learning after the pandemic.

## CONCEPTUAL MODEL

Figure 1 depicts the conceptual model proposed in this study. This model presents the research hypotheses that needed to be validated. The partial least squares (PLS) method was used to test the proposed model. The PLS-SEM was

selected to assess the hypothesis and research model because of the exploratory nature of the study and the modest size of the sample. PLS-SEM is a valuable method in predicting behaviour. It provides theoretical insights and enables the modelling of complicated models that include formative (causal) and reflecting (consequent) components [18]. The choice of the PLS-SEM model is appropriate, because it allows for the simultaneous examination of several dependency connections, mainly when the model contains both first-order and second-order latent variables. In this study, instructor attitude, instructor interaction, learner motivation, learner computer anxiety, learner collaboration, perceived usefulness and perceived ease of use are the first-order latent variables. These variables are predictors for second-order latent variables, which are instructor attributes, learner attributes and the technology acceptance model.

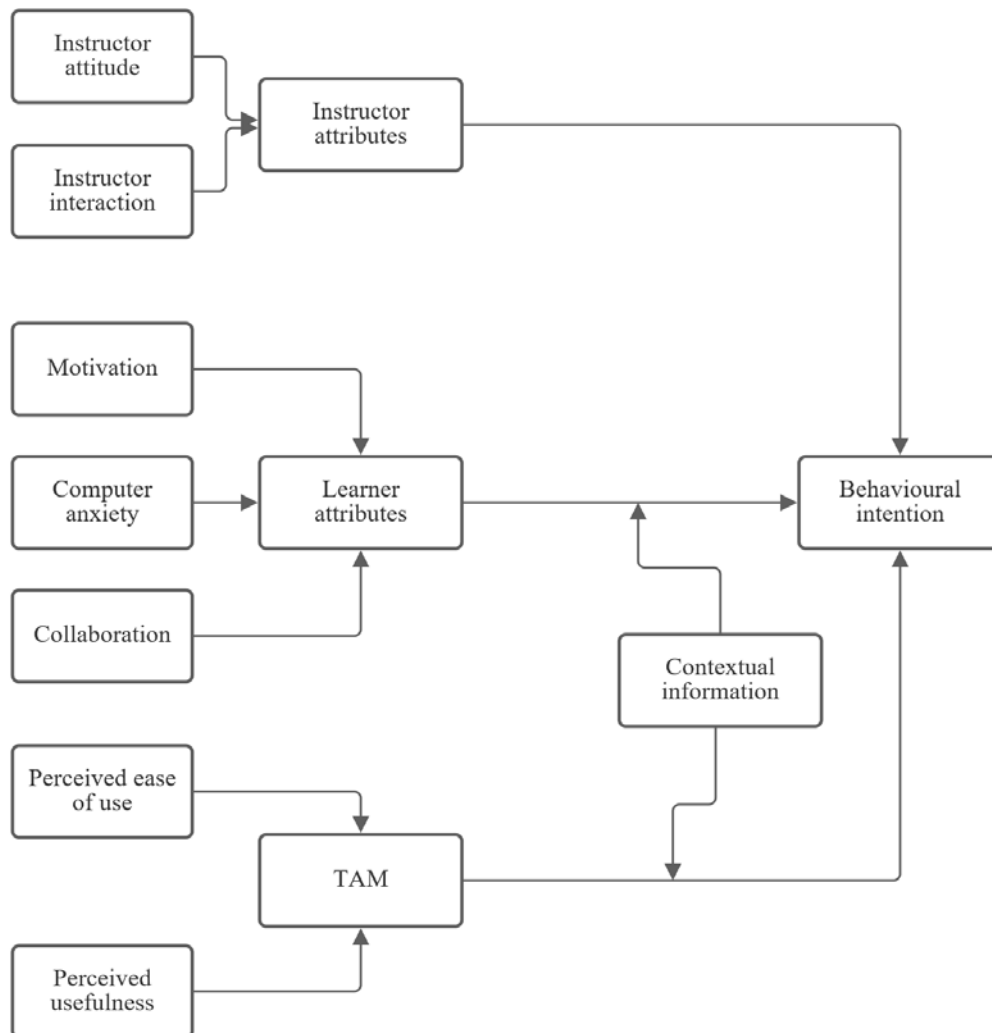


Figure 1: The proposed conceptual model.

Based on Chen et al [19], the stages of the structural equation modelling technique using the partial least squares methodology are built (see Figure 2).

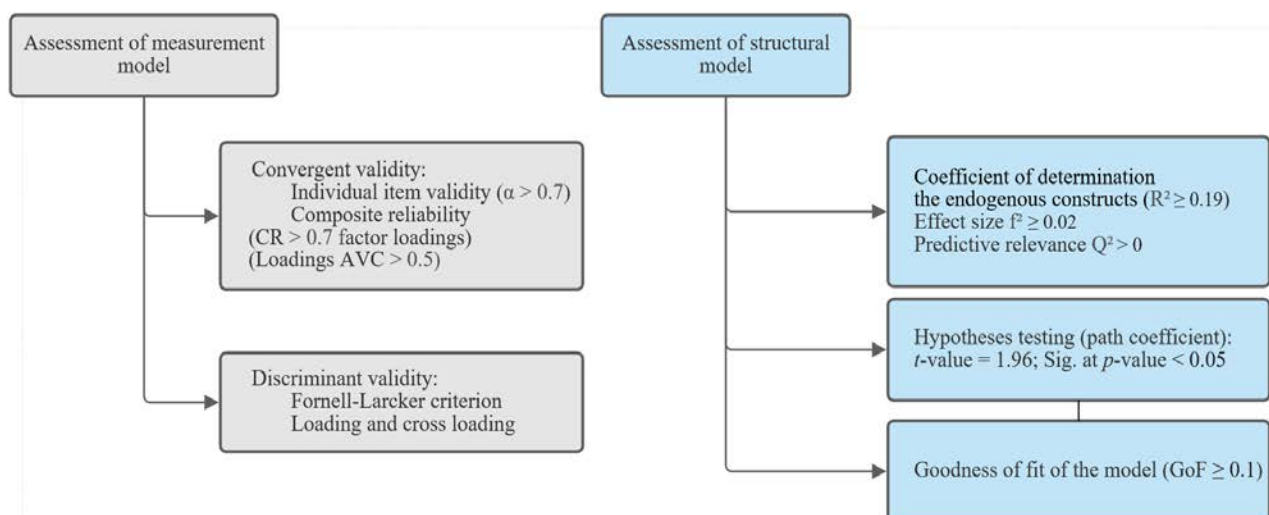


Figure 2: The partial least squares approach steps.

## DATA ANALYSIS AND RESULTS

After obtaining ethical approval from the Liwa College of Technology, Abu Dhabi, UAE, a survey was conducted from February to May 2021. A structured questionnaire was developed using Google Forms and was composed of 35 questions measured with ordinal scales on a 5-point Likert-type scale. The questionnaire contains two main sections.

The first section is a demographic survey, which seeks basic information about the learners, including the age, gender, nationality, level of studies, if they are living in Abu Dhabi, learner's category (regular, working and in military service) and experience of e-learning. The second section of the questionnaire gathers information on the perception and experience of students with e-learning during the Covid-19 outbreak, perceived advantages and disadvantages of e-learning, attitude, and interaction with students using e-learning platforms, and the predictions of the e-learning future in the UAE.

The considered sample consists of both graduate and post-graduate students (N = 250). All respondents are active users of Adobe Connect, Microsoft Teams and Zoom as supportive tools to the courses in which they are enrolled. Invitations to participate were sent via email to the participants. The questionnaire was anonymous to maintain the privacy and confidentiality of all information collected in the study. In addition, the participants' responses were kept blinded until all participants completed the questionnaire. Data were entered into a spreadsheet.

### Descriptive Statistics

As for the participants' attributes, the user group can be defined as young since most of the students were in the age group of 18-25 (50%), followed by the age group of 26-36 (40%), and the rest (10%) were in the age group of 37 and above. Most of the students were females (84%), followed by males (16%); 87% of them were Emiratis, the rest were of other nationalities (13%). The sample was a mix of students who had some experience (40%) in on-line education, while 46% had no experience at all and some had sufficient (14%) experience.

Regarding the used platforms, the most used one was the Zoom platform (157 participants), while the least used was Adobe Connect (17 participants).

A total of 92 participants (36.7%) thought their technical skills were insufficient. while the rest considered that they had the needed IT skills for the e-learning process. The participants were asked to indicate how much the instructor's teaching style influenced their decision to take an e-learning course. The findings revealed that 180 students believed the instructor's teaching style would stimulate and encourage them to utilise e-learning platforms, whereas 70 students said it had no influence on their intention or had a little effect. In addition, half of the participants (50%) described their overall experience with e-learning as very good, 115 (46%) found it to be good, and 10 (4%) thought it was an excellent experience. Learners were also asked about the advantages, disadvantages and limitations of e-learning in Abu Dhabi. Their responses are shown in Table 1.

Table 1: Advantages and disadvantages of e-learning as perceived by learners.

| Advantages and disadvantages of e-learning                        | Percentage (%) |
|---|----------------|
| Advantages of e-learning  |                |
| Flexibility in time and space                                     | 21.8           |
| Improved collaboration and interactivity among students           | 17.9           |
| Possibility of working with e-learning                            | 34.6           |
| Ease and quick share of educational resources                     | 15             |
| Wide and diverse interactions                                     | 10.7           |
| Disadvantages of e-learning                                       |                |
| The discomfort of teaching and learning without face-to-face mode | 27.7           |
| Lack of personal interaction                                      | 24.6           |
| Requires self-motivation and proper time management skills        | 38.1           |
| Focuses more on theory  | 9.6            |
| Limitations of e-learning   |                |
| Limited e-learning skills in students or instructors              | 32.6           |
| Shortage of e-learning training courses                           | 45             |
| Speed of the Internet   | 22.4           |

### Measurement Results

In the following paragraphs, the data analysis at the measurement model is presented, which refers to the assessment of the measures' reliability and their validity.

- Item loadings and internal consistency reliability: all item loadings satisfied the recommended loading values of  $> 0.70$ . Cronbach's alpha and composite reliability ratings for all items exceeded the required level of 0.70. The extracted average variance (AVE) for all constructs exceeds the lower permissible limit of 0.50 [20]. The extracted average variance determines the degree of variance in the items that account for the latent components and is a more conformist assessment of a measurement model's validity. For further details, a table is available in the references section of another publication by the authors [21].
- Structural results: the path coefficients are extracted in the second step of the data analysis to assess the significance of hypothesised relationships in the research model. The instructor attitude ( $\beta = 0.344$ ), as well as the instructor interaction ( $\beta = 0.368$ ) have a significant relationship with instructor attributes. Following these findings, the hypotheses H1.a and H1.b are accepted. Besides, learner motivation ( $\beta = 0.630$ ), learner computer anxiety ( $\beta = 0.115$ ) and learner collaboration ( $\beta = 0.345$ ) have positively significant relationships to learner attributes. Consequently, the hypotheses H2.a, H2.b, and H2.c are accepted. With respect to the technology acceptance model (TAM) of an e-learning system, perceived ease of use ( $\beta = 0.524$ ), as well as perceived usefulness ( $\beta = 0.545$ ) have positive associations. Hence, hypotheses H3.a and H3.b are accepted. For further details, a table is available depicting the results of the hypotheses testing along with path coefficients and path significance for each dependent variable [22].

Furthermore, the hypotheses H4, H7 and H8 are accepted since behavioural intention is impacted by instructor attributes ( $\beta = 0.320$ ), learner attributes ( $\beta = 0.380$ ) and the technology acceptance model (TAM) ( $\beta = 0.245$ ). Regarding contextual information related to Covid-19, the results showed that the interaction between contextual information and the learner attributes, as expected, negatively impact the intention to participate in e-learning ( $\beta = -0.075$ ); therefore, H5 was supported by the model. Results also showed that contrary to what was predicted by the hypothesis H6, the interaction between contextual information and TAM has a positive relationship with the intention. Hence, the hypothesis H6 is rejected. This implies that contextual information related to the Covid-19 influences learner attributes and has increased acceptance of technology for e-learning, which would not have occurred in a normal situation.

## DISCUSSION

Based on the findings, a conclusion prove that instructor attributes significantly impact students' willingness to use an e-learning system during the pandemic and even after (see Figure 3).

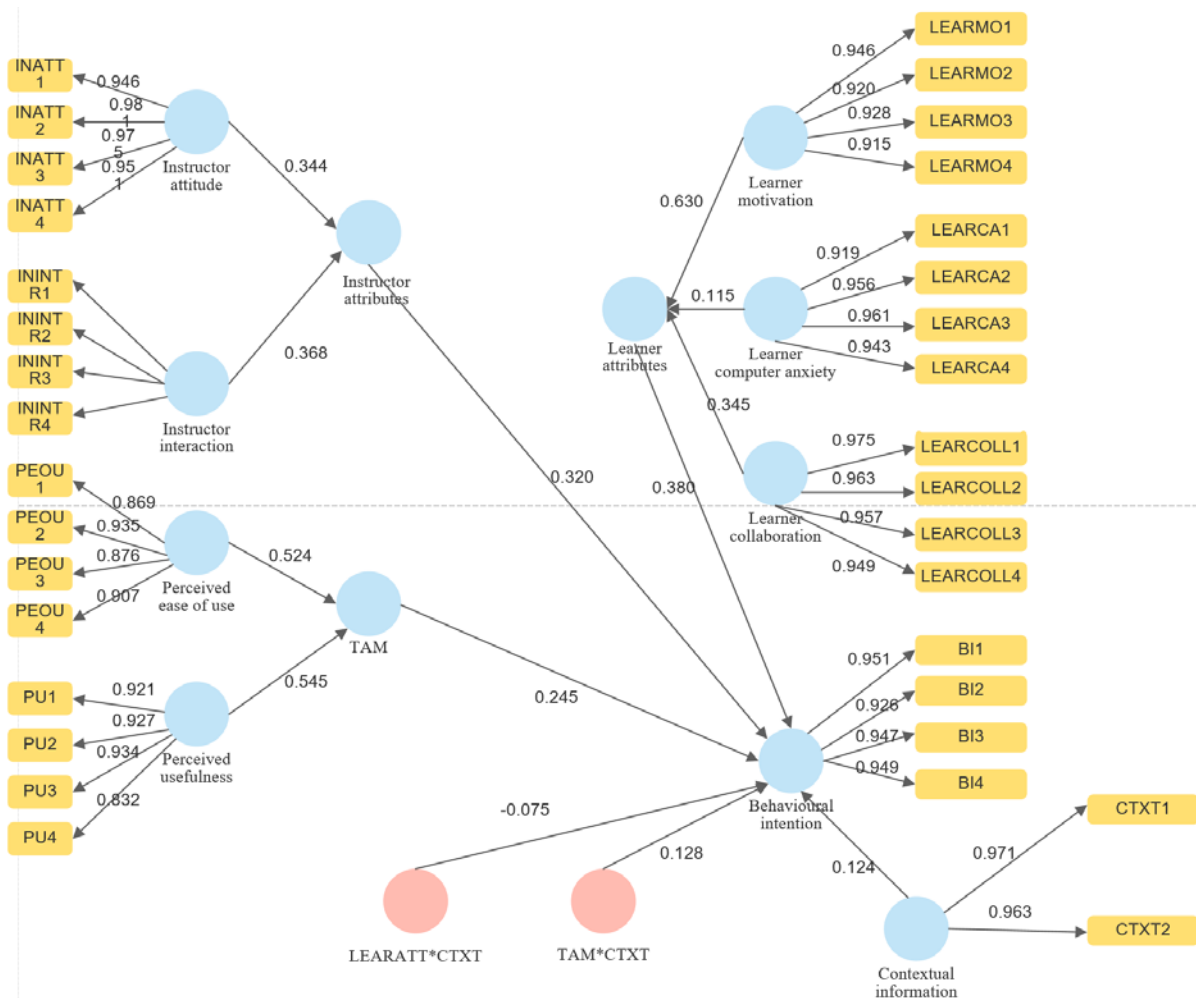


Figure 3: The PLS-SEM measurements.

During the Covid-19 pandemic when students were in lockdown or had to stay at home due to social distancing norms, an instructor with a positive attitude and energy could help alleviate some of the stress. Students prefer instructors who are friendly and enthusiastic because they make learning fun and easy. Hence, the instructor's attitude toward students significantly impacts the instructor's attributes because it reflects the instructor's preferences and style.

Student motivation is a critical success factor in on-line education, as demonstrated by this study and previous research findings [23].

Perceived ease of use and perceived usefulness appear to be essential components in the e-learning acceptance model, as suggested by the technology acceptance model (TAM). The current study added an external variable named contextual information, which negatively correlated with learner attributes and had a strong positive correlation with the TAM-intention interaction. In this study, unlike previous studies, the authors demonstrate that the perceived circumstances related to Covid-19 negatively impacted learner attributes to pursue e-learning during the pandemic. However, these circumstances contributed to the acceptance of the technology and the benefits of on-line education, especially for working students who want more flexibility in course scheduling. Thus, contextual information related to Covid-19, while discouraging students from adopting e-learning during the pandemic, established a new model of education that is difficult to reverse and aided in a better understanding of the utility of technology than usual. Education was continued thanks to technology, and every stakeholder in the learning process recognised the value of the technology.

## CONCLUSIONS

Starting from the spring of 2020, the outbreak of Covid-19 forced higher education institutions in the UAE to close the campuses and imposed them to initiate on-line teaching. In this article, the authors focus on the Liwa College of Technology's on-line education case and aimed to contribute to the literature on the student experience of e-learning. Based on an extensive literature review, the authors propose a conceptual model that introduces several determinants for e-learning.

Empirical research including data collection through an on-line survey questionnaire from the Liwa College of Technology students to validate the conceptual model was conducted. The data were analysed using the partial least square structural equation modelling (PLS-SEM) approach. The findings of this study revealed the most potent determinants for e-learning acceptance and insights into the impact of the contextual information related to Covid-19 into the e-learning experience. The results of this study will be helpful to all stakeholders who have already moved into e-learning during the current crisis.

One disadvantage of the present study is the small sample size, which can be increased to achieve more generalisable results. As a future endeavour, the authors plan to investigate what motivates students to engage in more e-learning and the impact of education institutions' preparedness on higher intention to engage in e-learning.

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## BIOGRAPHIES



Dr Myriam Aloulou has been an assistant professor in economics at Liwa College of Technology, Abu Dhabi, in the United Arab Emirates, since 2011. She previously worked at a high management institute in Tunisia between 2008 and 2010. She provided training in healthcare economics. In 2007, she worked in an export department in the confectionery industry. She received her PhD in economic sciences from the University of Sfax (FSEGS) in Tunisia. Her current research activities include knowledge economy, poverty and education.



Dr Rima Grati is an assistant professor in the College of Technological Innovation at Zayed University, Abu Dhabi, in the United Arab Emirates. She has received her PhD in computer science in Tunisia from the University of Sfax (FSEGS). She also holds a Master's degree in information systems. Her current research activities include Web service, cloud computing, business process and quality of service, as well as education.