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The Mediation Role of Technology Systems in the Relationship Between Education Technology Antecedents on Student Satisfaction

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ABSTRACT

The purpose of this paper is to explore the influence of education technology antecedents and perceptions of usefulness and ease of use of educational technology systems on attitudes towards computer-based teaching in Egyptian universities. The study is built upon on deductive quantitative approach where structured questionnaires were designed and distributed to the students in Egyptian universities. Results based on SEM analysis identify that the technology dimension partially affects the design dimension, as well there is a partially significant association between the technology dimension and attitude towards technology-based teaching. While the design dimension does not have a significant association with attitude towards technology-based teaching, attitude towards technology-based teaching does not have a significant relationship with student satisfaction. Furthermore, there is a partially significant association between course dimensions and student satisfaction.

KEYWORDS

Computer-Based Teaching, Ease of Use, Education Technology, Educational Technology Systems, Perceptions of Usefulness

It became crucial to use information technology (IT) in higher education settings and online academic programs. Additionally, universities have always worked hard to develop and integrate IT usage into the curriculum and to encourage undergraduates to use IT tools like the Internet, computers, laptops, and educational technology tools in their learning processes regardless of the time as it is considered necessary (Alao & Brink, 2023). All of this has been made possible thanks to the current government's encouragement. In addition, the quick worldwide innovation, financial advancement, and economic development put an incredible investment into education (Verma, 2022; Lubua et al., 2017).

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Higher education is acknowledged as a major pillar of the knowledge economy due to its crucial role in the development of society and the expansion of its knowledge skills. It is also closely related to the need to concentrate on quality assurance and improvement, which was historically the domain of a select few highly esteemed universities on a global scale. Quality assurance in these institutions is a recent entry adopted by the developed countries to then reach the third world countries due to globalization and the openness of universities to global competition to keep pace with technological development and progress, and thus keep pace with advanced and distinguished universities (Arokiasamy et al., 2024; Casado et al., 2022; Al-Shboul et al., 2017).

It is essential to pay attention to this at a time when educational systems, particularly in developing nations, are going through considerable changes in all of their many components because of the data and communication technology revolution. Higher education institutions are growing their use of data and communication techniques in the classroom and view it as a critical component in improving the process' quality (Boulmaiz et al., 2022; Alotaibi et al., 2022; Castro et al., 2021).

Therefore, this paper evaluates the critical factors that inspire Egyptian universities' attitudes to using educational technologies in their classrooms and courses. This paper throws light on technology dimensions and course dimensions, student satisfaction, design dimensions, and attitudes toward technology-based teaching. Notably, no research has previously studied the correlation between educational technology antecedents and perceptions of the utility and usability of educational technology systems on attitudes toward computer-based teaching using these dimensions for each variable. Additionally, relatively few literary evaluations highlight such a crucial subject. This paper involved examining the influence of education technology antecedents and perceptions of usefulness in addition to ease of use regarding educational technology systems on attitudes towards computer-based teaching through an applied study on students in Egyptian universities. Since a significant portion of previous investigations were conducted in affluent nations such as the United States and China, rising nations, particularly those in Africa, have gotten less attention when this subject has been addressed.

LITERATURE REVIEW

Information technology in higher education is the technology related to the storage, retrieval, circulation, and dissemination of information with the production of oral, pictorial, textual, and digital data by electronic means through the integration between electronic computers and visual communication systems (Sabando et al., 2018). Student satisfaction is linked to a set of factors associated with the educational process, especially the educational system followed, where students' satisfaction and response to the traditional education system differs from the modern education system, as each system is based on achieving high rates of student satisfaction and a high proportion of the educational service quality that results in the attainment of a high level of student satisfaction (Almaiah and Alyoussef, 2019).

The Relationship Between Technology Dimensions and Design Dimensions

John (2015) indicated the effect of technology anxiety on perceived ease of use and perceived usefulness among 116 electronic spreadsheet users, and it was proved that individuals with high technology anxiety perceive computer-based applications are less easy to use. The study found that there was a significant effect of technology anxiety on perceived ease of use and perceived usefulness. Ozturk et al. (2016) investigated the effect of technology self-efficacy and compatibility on perceived ease of use and perceived usefulness in the mobile hotel booking field. 396 questionnaires were collected from travelers from the United States who used to book via their mobile devices a hotel room during the previous six months. The finding found that there was no significant relationship between self-efficacy and perceived ease of use. While there was a positive significant impact of compatibility on both perceived ease of use and perceived usefulness.

Shah and Attiq (2016) examined the impact of technology quality on perceived ease of use and perceived usefulness. Primary data was used by collecting 1338 questionnaires, which were gathered from students in 3 universities in Pakistan that offer education through e-learning. The results showed that there was a positive relationship between the use of technology and perceived ease of use and perceived usefulness.

The Relationship Between Technology Dimensions and Attitudes Toward Technology-Based Teaching

Yeşilyurt et al. (2016) investigated the impact of technology self-efficacy and compatibility on attitudes toward technology-based teaching. A questionnaire was collected from 323 teachers in the faculty of education in Turkey. The findings proved that self-efficacy had an impact on technology self-efficacy. The results also showed that technology self-efficacy and compatibility had a significant effect on attitude towards technology-based teaching. Alia (2017) examined the technology acceptance model in the Kuwait University environment and explored the external factors that affect the attitude toward e-learning. A questionnaire, semi-structured and unstructured interviews, and focus group discussions were created and the targeted population was all instructors at Kuwait University. The results indicated that technology self-efficacy had a significant effect on attitude toward e-learning. Alfalah (2018) investigated the impact of relative advantage, compatibility, complexity, trial-ability, and observability on attitudes toward technology. A questionnaire was created and distributed amongst IT teaching staff in a University in the Middle East. The study found that there was a significant impact of relative advantage, compatibility, complexity, trial-ability, and observability on attitude towards technology.

The Relationship Between Design Dimensions and Attitudes Toward Technology-Based Teaching

Calisir et al. (2014) examined the effect of perceived ease of use and perceived usefulness on attitudes toward the use of web-based learning systems. Primary data was collected using 546 questionnaires gathered from 1,500 blue-collar workers who used to take training sessions held in the training center of Mercedes-Benz Turk A.S. in Turkey. The results indicated that perceived usefulness was the strongest factor that affected attitudes towards using a web-based learning system. Govender et al. (2015) investigated the relationship between perceived usefulness, perceived ease of use, and attitude towards technology-based teaching. A questionnaire was distributed among first-year students at the faculty of science in South Africa. The findings indicated that there was a positive relationship between perceived ease of use and perceived usefulness and attitudes toward technology-based teaching. Mahmodi (2017) clarified the factors that affected attitudes towards technology-based teaching. A survey was distributed among e-learning postgraduate students at Payam Noor University in Iran. The findings proved that perceived ease of use and perceived usefulness had a positive effect on attitude towards technology-based teaching.

The Relationship Between Attitudes Toward Technology-Based Teaching and Student Satisfaction

Maican et al. (2019) investigated the attitude toward tech-based technology of applications, and the impact of these applications on teaching work. A questionnaire using a personalized email was prepared and the participants were 1816 university teachers from 13 Romanian universities. The findings demonstrated that the use of online communication and collaboration applications was part of the factors predicting the teachers' and researchers' success in academic life. Rahman et al. (2020) examined the impact of attitudes toward technology on student satisfaction in Bangladesh. A questionnaire was distributed to 500 randomly selected students to collect the data. The findings revealed attitude toward had a significant impact on student satisfaction in the public universities in Bangladesh. HOANG and DANG (2021) indicated the influence of technology adoption e-learning

on student satisfaction. A questionnaire method was used to examine students' perceptions and levels of technology use in the classroom. The findings showed that there was a positive significant relationship between technology adoption of e-learning and student satisfaction.

The Relationship Between Course Design and Student Satisfaction

Sahin and Shelley (2008) investigated the impact of online courses on student satisfaction. The data were collected from 195 undergraduate students of the College of Education at an Anatolian university in Turkey through a questionnaire method. The results found that student satisfaction was significantly affected by online courses. Yukselturk and Yildirim (2008) clarified the impact of online courses on student satisfaction. An online questionnaire was used to gather data on student satisfaction with the program and the sample consisted of 30 participants who enrolled in the program. The results showed that online courses could affect student satisfaction significantly. Harsasi and Sutawijaya (2018) analyzed online how tutorials affected student satisfaction. The data was collected using a survey and 152 questionnaires were gathered from students enrolled in online learning for four core courses in the Department of Management curriculum. The results showed that the course structure, online tutorial flexibility, and technology quality affected student satisfaction, while online tutorial quality did not affect student satisfaction.

RESEARCH METHODOLOGY

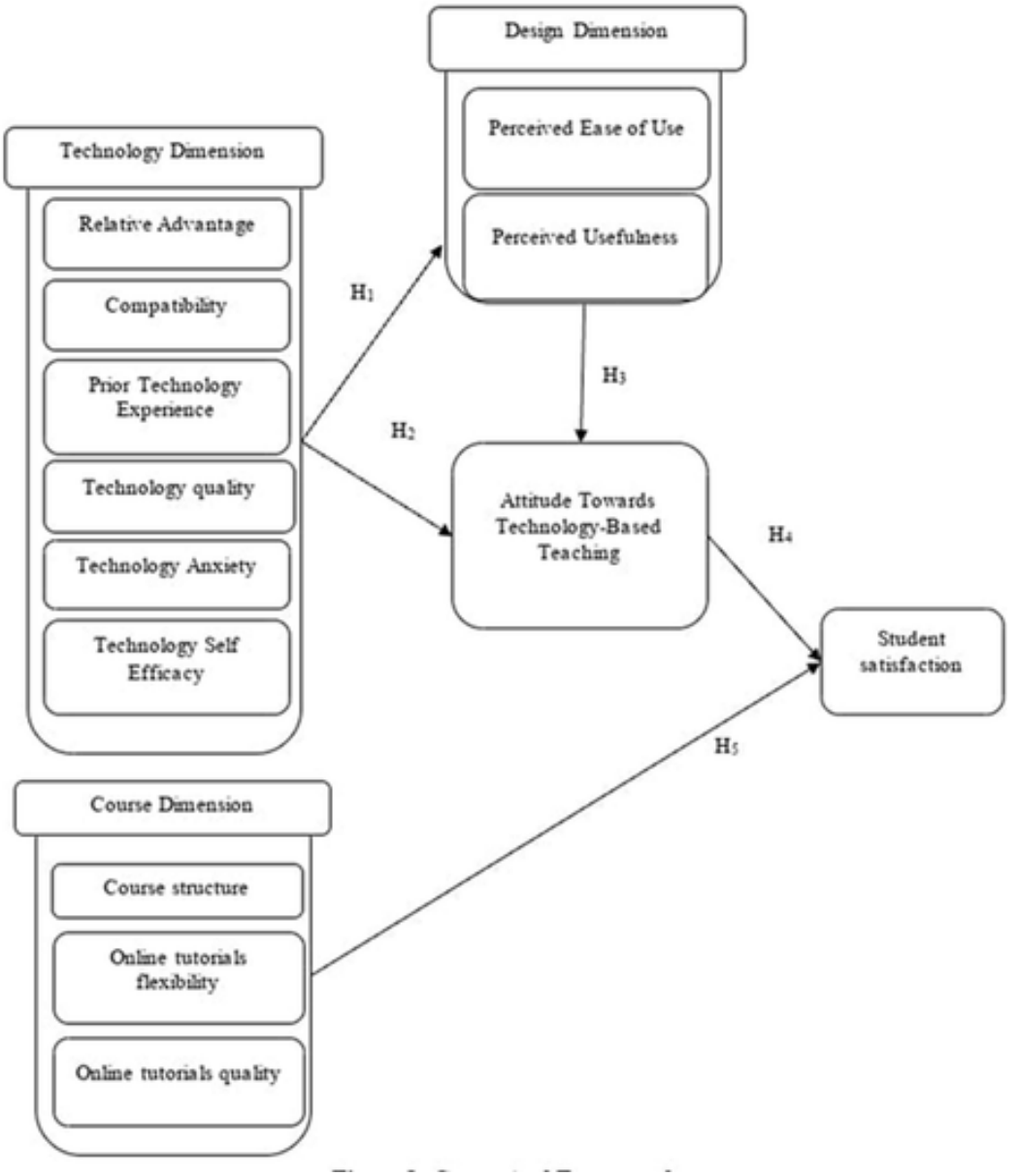
This paper adopts the deductive quantitative approach to identify the critical factors that influence Egyptian universities' attitudes to using educational technologies in their classrooms and courses. The study variables are classified as follows:

- **Dependent variable:** Student Satisfaction.
- **Mediator variables:** Design Dimension (perceived ease of use and perceived usefulness) and Attitude Towards Technology-Based Teaching.
- **Independent variables:** Technology Dimension (technology self-efficacy, technology anxiety, relative advantage, compatibility, prior technology experience and technology quality) and Course Dimension (course Structure, online tutorial flexibility and online tutorial quality).

Thus, the study hypotheses could be stated as follows:

H_1: There is a significant relationship between Technology Dimension and Design Dimension
$H_{1.1}$: There is a significant relationship between Technology Self Efficacy and Design Dimension
$H_{1.2}$: There is a significant relationship between Technology Anxiety and Design Dimension
$H_{1.3}$: There is a significant relationship between Relative Advantage and Design Dimension
$H_{1.4}$: There is a significant relationship between Compatibility and Design Dimension
$H_{1.5}$: There is a significant relationship between Prior Technology Experience and Design Dimension
$H_{1.6}$: There is a significant relationship between Technology Quality and Design Dimension
H_2: There is a significant relationship between Technology Dimension and Attitude towards Technology-Based Teaching
$H_{2.1}$: There is a significant relationship between Prior Technology Experience and Attitude Towards Technology-Based Teaching
$H_{2.2}$: There is a significant relationship between Technology Self Efficacy and Attitude Towards Technology-Based Teaching
$H_{2.3}$: There is a significant relationship between Technology Anxiety and Attitude Towards Technology-Based Teaching

Figure 1. The study conceptual framework could be expressed using



$H_{2.4}$: There is a significant relationship between Relative Advantage and Attitude Towards Technology-Based Teaching

$H_{2.5}$: There is a significant relationship between Compatibility and Attitude Towards Technology-Based Teaching

$H_{2.6}$: There is a significant relationship between Technology Quality and Attitude Towards Technology-Based Teaching

H_3: There is a significant relationship between Design Dimension and Attitude towards Technology-Based Teaching

$H_{3.1}$: There is a significant relationship between Perceived Ease of Use and Antecedents of Education Technology
$H_{3.2}$: There is a significant relationship between Perceived Usefulness and Antecedents of Education Technology
H_4: There is a significant relationship between Attitude towards Technology-Based Teaching and Student Satisfaction
H_5: There is a significant relationship between Course Dimension and Student Satisfaction
$H_{5.1}$: There is a significant relationship between Course structure and Student Satisfaction
$H_{5.2}$: There is a significant relationship between Online tutorials flexibility and Student Satisfaction
$H_{5.3}$: There is a significant relationship between online tutorials quality and Student Satisfaction
H_6: There is a mediating role of Perceived Ease of Use, Perceived Usefulness and Attitude between Technology Dimension and Student Satisfaction

A questionnaire was designed and distributed to the students in Egyptian universities. The research variables were measured according to the adopted questionnaire from the studies of Aulawi (2021), John (2015), Alsabawy et al. (2016), and Harsasi and Sutawijaya (2018), with a 5-point Likert scale, as shown in Table 1.

Consequently, the sample size for the questionnaire was distributed among students in Egyptian universities, so the sampling technique is a non-probability sampling technique where the sample is selected according to the easy access to respondents. According to Saunders et al. (2016), the sample size is calculated according to the 95% confidence level for a large population size, where a minimum of 385 respondents are selected for the sample.

Therefore, 421 questionnaires were collected and found valid for the analysis. Consequently, the research process involved the following analysis of technique; descriptive statistics, reliability and validity, correlation, regression, and SEM were utilized to justify the proposed research model with the dependent variable (student satisfaction) and independent factors (technology dimension (technology self-efficacy, technology anxiety, relative advantage, compatibility, prior technology experience and technology quality) and course dimension (course Structure, online tutorial flexibility and online tutorial quality) through SPSS and AMOS which used for checking the validity and reliability of the data.

RESULTS AND FINDINGS

Validity and Reliability Test

Validity is measured by the two main factors. First, the Average Variance Extracted (AVE) should be greater than 0.5 to imply adequate validity. Second, the factor loading for each statement should be greater than or equal to 0.4.

To examine reliability, each factor is measured using a group of statements, indicating how stably and consistently the instrument taps the variable which can be examined by Cronbach's Alpha, the most commonly used test of reliability. The range of the Alpha coefficient comes between 0 and 1, the higher the score the higher the reliability. If Alpha coefficients are greater than or equal to 0.7, it implies adequate reliability.

Table 2 shows the results of the validity and reliability test of the research data, as it could be observed, all values of the KMO, AVE, Cronbach's Alpha, and Factor Loadings are at acceptable levels.

Normality Testing for the Research Variables

Table 3 shows the normality test, where it could be shown that some of the skewness and kurtosis values are at the acceptance level of ±1, which means that the data under study are approximately normal. Consequently, parametric tests are used to describe the relationships between the research variables.

Table 1. Research Variables Measurement

Variables	Measurement
Prior Technology Experience	1. Sending and receiving emails Using the internet and various websites Operate a web application
	2. Operate interactive learning programs
	3. Operate a mobile application
	4. Operate a presentation, smartboard
Technology Self Efficacy	1. I can effectively use technology as an instructional tool
	2. I can extend my instructional options by using computers and the internet
	3. I can extend my instructional options by using the internet
	4. I could complete my learning process using technology if someone could show me how to do it
Technology Anxiety	1. I feel apprehensive about using technology It scares me to think that
	2. I could cause the technology to destroy a large amount of information and data
	3. I hesitate to use technology for fear of making mistakes that I can't correct
	4. Mobile applications and Internet technologies are somewhat intimidating to me.
	5. Using online services and related technologies to teach makes me feel uncomfortable
	6. The challenge of learning about Information Technologies are exciting
Relative Advantage	1. I am able to scale up my requirement when required
	2. I can access information from any time from any place
	3. I can access share resources placed on application
	4. Performance of the application does not decrease with growing user base
Compatibility	1. Using Information Technology enhances is compatible with all aspects of my job
	2. Using Information Technology enhances is completely compatible with my current situation
	3. I think that using Information Technology fits well with the way I like to learn
	4. I think that using Information Technology fits into my work to learn
Technology Quality	1. I can access online learning anywhere
	2. I do not experience any problems when learning online
	3. I do not encounter any difficulty in responding to the discussion
	4. I do not see any difficulty when uploading task
	5. I feel that technology for online learning is easy to use
	6. I feel that technology for online learning have useful functions
	7. I feel that technology for online learning is very helpful for learning the materials
	8. I feel that technology for online learning facilitate communication with tutors or other students
Perceived Ease of Use	1. I found our online education resources (Learning Management Systems, Online Course Management Tools, Websites, etc.) to be easy to use.
	2. It is easy for me to become more skillful in using IT for my learning
	3. Overall, I believe that Information Technology including the internet is easy to use.
Perceived Usefulness	1. The use of E-learning makes learning activities feels easier
	2. The use of E-learning improves my performance
	3. E-learning improves speed in running learning process.

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Table 1. Continued

Variables	Measurement
Attitude Towards Technology-Based Teaching	1. I think technology can be effectively implemented as instructional tools
	2. Course material is presented in a well structure
	3. The learning objectives in the online tutorial has been conveyed properly
	4. The material in the online tutorial has been arranged in a logical sequence and understandable
Course Structure	1. The structure of the material in online tutorial already covers all the material I need to learn in one subject
	2. Learning through online tutorial gave me the flexibility to adjust my learning time
	3. Learning through online tutorial benefit me
	4. Learning through online tutorial made me have the flexibility to divide their time between learning activities / other jobs
Online Tutorial Flexibility	1. There is no disadvantage I get to learn through online tutorial
	2. Learning through online tutorial lets me manage my time more effectively
	3. Learning through online tutorial makes me save time rather than having to attend to class
	4. Learning through online tutorial made I would not miss material than if I do not attend class because I can learn the material at any time
	5. Learning through online tutorial make me able to improve my learning quality
	6. Online tutorial as a whole has a good quality
	7. The appearance of online tutorial is interesting
Online Tutorial Quality	1. I have no difficulty using the features in online tutorial
	2. The appearance of online tutorial is up to date
	3. The material shown in the online tutorial has good quality
	4. The interaction between students and tutors are well established
	5. I am satisfied with the whole system of online learning
	6. Overall, online learning system is already well
	7. Overall, online learning has been successfully
Student Satisfaction	1. Learning through online learning system enable me to learn independently
	2. I will keep learning through the online learning system in the future
	3. I can access online learning anywhere
	4. I do not experience any problems when learning online
	5. I do not encounter any difficulty in responding to the discussion
	6. Overall, I find the e-learning system useful to my study
	7. Learning with technology offer real advantages over traditional methods of instruction
	8. I like using technology for my learning process
	9. I think students and teachers should use technology in all subject matters

Testing Research Hypotheses

The SEM testing is used as it is a neutral test and it does not require the normality distribution of the data under study. Table 4 shows the SEM analysis for the impact of the research variables. It could be observed that:

- The first hypothesis **"There is a significant relationship between Technology Dimension and Design Dimension",** consist of six sub hypotheses and the results are as follow,

Table 2. Validity and Reliability Test

Variables	Items	Factor Loading		KMO		AVE		Cronbach's Alpha	
Prior Technology Experience	PTE1	.806	> 0.4	.856	> 0.5	79.745	> 50%	.915	> 0.7
	PTE2	.767	> 0.4						
	PTE3	.801	> 0.4						
	PTE4	.816	> 0.4						
Technology Self Efficacy	TSE1	.774	> 0.4	.848	> 0.5	78.647	> 50%	.909	> 0.7
	TSE2	.847	> 0.4						
	TSE3	.774	> 0.4						
	TSE4	.751	> 0.4						
Technology Anxiety	TNX1	.818	> 0.4	.931	> 0.5	82.339	> 50%	.957	> 0.7
	TNX2	.858	> 0.4						
	TNX3	.893	> 0.4						
	TNX4	.867	> 0.4						
	TNX5	.863	> 0.4						
	TNX6	.641	> 0.4						
Relative Advantage	RAD1	.807	> 0.4	.860	> 0.5	82.595	> 50%	.930	> 0.7
	RAD2	.867	> 0.4						
	RAD3	.846	> 0.4						
	RAD4	.784	> 0.4						
Compatibility	COMP1	.747	> 0.4	.860	> 0.5	86.550	> 50%	.948	> 0.7
	COMP2	.901	> 0.4						
	COMP3	.913	> 0.4						
	COMP4	.901	> 0.4						
Technology quality	TQ1	.902	> 0.4	.897	> 0.5	85.219	> 50%	.975	> 0.7
	TQ2	.851	> 0.4						
	TQ3	.897	> 0.4						
	TQ4	.852	> 0.4						
	TQ5	.802	> 0.4						
	TQ6	.852	> 0.4						
	TQ7	.844	> 0.4						
	TQ8	.817	> 0.4						
Perceived Ease of Use	PEU1	.912	> 0.4	.777	> 0.5	91.167	> 50%	.951	> 0.7
	PEU2	.910	> 0.4						
	PEU2	.913	> 0.4						
Perceived Usefulness	PUS1	.923	> 0.4	.881	> 0.5	90.716	> 50%	.966	> 0.7
	PUS2	.903	> 0.4						
	PUS3	.907	> 0.4						

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Table 2. Continued

Variables	Items	Factor Loading		KMO		AVE		Cronbach's Alpha	
Attitude	ATT1	.792	> 0.4	.814	> 0.5	74.907	> 50%	.886	> 0.7
	ATT2	.781	> 0.4						
	ATT3	.581	> 0.4						
	ATT4	.843	> 0.4						
Course Structure	CS1	.931	> 0.4	.885	> 0.5	93.718	> 50%	.978	> 0.7
	CS2	.930	> 0.4						
	CS3	.943	> 0.4						
	CS4	.944	> 0.4						
Online tutorial flexibility	OTF1	.824	> 0.4	.951	> 0.5	80.778	> 50%	.959	> 0.7
	OTF2	.855	> 0.4						
	OTF3	.917	> 0.4						
	OTF4	.901	> 0.4						
	OTF5	.879	> 0.4						
	OTF6	.828	> 0.4						
	OTF7	.450	> 0.4						
Online tutorial quality	OTQ1	.811	> 0.4	.942	> 0.5	79.393	> 50%	.956	> 0.7
	OTQ2	.833	> 0.4						
	OTQ3	.871	> 0.4						
	OTQ4	.879	> 0.4						
	OTQ5	.857	> 0.4						
	OTQ6	.640	> 0.4						
	OTQ7	.666	> 0.4						
Student Satisfaction	STF1	.807	> 0.4	.956	> 0.5	70.812	> 50%	.948	> 0.7
	STF2	.738	> 0.4						
	STF3	.808	> 0.4						
	STF4	.829	> 0.4						
	STF5	.622	> 0.4						
	STF6	.638	> 0.4						
	STF7	.664	> 0.4						
	STF8	.633	> 0.4						
	STF9	.635	> 0.4						

- For the first sub hypothesis of the first hypothesis **"There is a significant relationship between Technology Self Efficacy and Design Dimension"**, it could be observed that there is an insignificant Technology Self Efficacy on Perceived Ease of Use as the p-value is more than 0.05. However, there is a significant positive effect of Technology Self Efficacy on Perceived Usefulness, as the P-value is less than 0.05, and the estimate is 0.274.
- For the second sub hypothesis of the first hypothesis **"There is a significant relationship between Technology Anxiety and Design Dimension"**, it could be observed that there is an insignificant Technology Anxiety on Perceived Ease of Use as the p-value is more than 0.05. Also, there is an insignificant effect of Technology Anxiety on Perceived Usefulness, as the P-value is more than 0.05.

Table 3. Normality Test for Research Variables

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Prior Technology Experience	421	-.751	.119	.212	.237
Technology Self Efficacy	421	-.655	.119	.082	.237
Technology Anxiety	421	-.504	.119	.106	.237
Relative Advantage	421	-.351	.119	-.170	.237
Compatibility	421	-.419	.119	.000	.237
Technology quality	421	-.609	.119	.142	.237
Course Structure	421	-.284	.119	.036	.237
Online tutorial flexibility	421	-.363	.119	-.017	.237
Online tutorial quality	421	-.357	.119	.145	.237
Perceived Ease of Use	421	-.588	.119	.344	.237
Perceived Usefulness	421	-.519	.119	-.139	.237
Attitude	421	-.448	.119	-.122	.237
Student Satisfaction	421	-.462	.119	-.029	.237

- For the third sub hypothesis of the first hypothesis **"There is a significant relationship between Relative Advantage and Design Dimension"**, it could be observed that there is a significant positive effect of Relative Advantage on Perceived Ease of Use as the P-value is less than 0.05, and the estimate is 0.094. Moreover, there is a significant positive effect of Relative Advantage on Perceived Usefulness, as the P-value is less than 0.05, and the estimate is 0.145.
- For the fourth sub hypothesis of the first hypothesis **"There is a significant relationship between Compatibility and Design Dimension"**, it could be observed that there is an insignificant effect of Compatibility on Perceived Ease of Use as the P-value is more than 0.05. Also, there is an insignificant effect of Compatibility on Perceived Usefulness, as the P-value is more than 0.05.
- For the fifth sub hypothesis of the first hypothesis **"There is a significant relationship between Prior Technology Experience and Design Dimension"**, it could be observed that there is an insignificant effect of Prior Technology Experience on Perceived Ease of Use as the P-value is more than 0.05. Also, there is an insignificant effect of Prior Technology Experience on Perceived Usefulness, as the P-value is more than 0.05.
- For the sixth sub hypothesis of the first hypothesis **"There is a significant relationship between Technology Quality and Design Dimension"**, it could be observed that there is a significant positive effect of Technology Quality on Perceived Ease of Use as the P-value is less than 0.05, and the estimate is 0.875. Moreover, there is a significant positive effect of Technology Quality on Perceived Usefulness, as the P-value is less than 0.05, and the estimate is 0.368. Therefore, the first hypothesis **"There is a significant relationship between Technology Dimension and Design Dimension"** is partially supported.

- The second hypothesis **"There is a significant relationship between Technology Dimension and Attitude Towards Technology-Based Teaching",** consist of six sub hypotheses and the results are as follow,
  - For the first sub hypothesis of the second hypothesis **"There is a significant relationship between Technology Self Efficacy and Attitude towards Technology-Based Teaching"**,

there is a significant positive effect of Technology Self Efficacy on Attitude, as the P-value is less than 0.05, and the estimate is 0.181.

- For the second sub hypothesis of the second hypothesis **"There is a significant relationship between Technology Anxiety and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Technology Anxiety on Attitude, as the P-value is more than 0.05.
- For the third sub hypothesis of the second hypothesis **"There is a significant relationship between Relative Advantage and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Relative Advantage and Attitude, as the P-value is more than 0.05.
- For the fourth sub hypothesis of the second hypothesis **"There is a significant relationship between Compatibility and Attitude towards Technology-Based Teaching"**, there is a significant positive effect of Compatibility on Attitude, as the P-value is less than 0.05, and the estimate is 0.214.
- For the fifth sub hypothesis of the second hypothesis **"There is a significant relationship between Prior Technology Experience and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Prior Technology Experience on Attitude, as the P-value is more than 0.05.
- For the sixth sub hypothesis of the second hypothesis **"There is a significant relationship between Technology Quality and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Technology Quality on Attitude, as the P-value is less than 0.05. Therefore, the second hypothesis **"There is a significant relationship between Technology Dimension and Attitude towards Technology-Based Teaching"** is partially supported.

- The third hypothesis **"There is a significant relationship between Design Dimension and Attitude Towards Technology-Based Teaching",** consist of two sub hypotheses and the results are as follow,
  - For the first sub hypothesis of the third hypothesis **"There is a significant relationship between Perceived Ease of Use and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Perceived Ease of Use on Attitude, as the P-value is more than 0.05.
  - For the second sub hypothesis of the third hypothesis **"There is a significant relationship between Perceived Usefulness and Attitude towards Technology-Based Teaching"**, there is an insignificant effect of Perceived Usefulness on Attitude, as the P-value is more than 0.05. Therefore, the third hypothesis **"There is a significant relationship between Design Dimension and Attitude towards Technology-Based Teaching"** is not supported.
- The fourth hypothesis **"There is a significant relationship between Attitude towards Technology-Based Teaching and Student Satisfaction",** there is an insignificant effect of Attitude on Student Satisfaction, as the P-value is more than 0.05. Therefore, the fourth hypothesis **"There is a significant relationship between Attitude towards Technology-Based Teaching and Student Satisfaction"** is not supported.
- The fifth hypothesis **"There is a significant relationship between Course Dimension and Student Satisfaction",** consist of three sub hypotheses and the results are as follow,
  - For the first sub hypothesis of the fifth hypothesis **"There is a significant relationship between Course structure and Student Satisfaction"**, there is an insignificant effect of Course structure on Student Satisfaction, as the P-value is more than 0.05.
  - For the second sub hypothesis of the fifth hypothesis **"There is a significant relationship between online tutorials flexibility and Student Satisfaction"**, there is a significant positive effect of Online tutorials flexibility on Student Satisfaction, as the P-value is less than 0.05, and the estimate is 0.662.
  - For the third sub hypothesis of the fifth hypothesis **"There is a significant relationship between online tutorials quality and Student Satisfaction"**, there is an insignificant effect of online tutorials quality on Student Satisfaction, as the P-value is more than 0.05. Therefore,

Table 4. SEM Analysis for the Research Variables

			Estimate	P	R^2
Perceived Ease of Use	<---	Relative Advantage	.094	.008	.976
Perceived Ease of Use	<---	Compatibility	.028	.524	
Perceived Ease of Use	<---	Prior Technology Experience	-.042	.375	
Perceived Ease of Use	<---	Technology quality	.875	***	
Perceived Ease of Use	<---	Technology Self Efficacy	.004	.927	
Perceived Ease of Use	<---	Technology Anxiety	-.019	.587	
Perceived Usefulness	<---	Relative Advantage	.145	.019	.578
Perceived Usefulness	<---	Compatibility	.009	.907	
Perceived Usefulness	<---	Prior Technology Experience	-.018	.823	
Perceived Usefulness	<---	Technology quality	.368	***	
Perceived Usefulness	<---	Technology Self Efficacy	.274	.001	
Perceived Usefulness	<---	Technology Anxiety	.121	.054	
Attitude	<---	Relative Advantage	.084	.393	.733
Attitude	<---	Compatibility	.214	.002	
Attitude	<---	Prior Technology Experience	.064	.459	
Attitude	<---	Technology quality	1.007	.201	
Attitude	<---	Technology Self Efficacy	.181	.022	
Attitude	<---	Technology Anxiety	.043	.466	
Attitude	<---	Perceived Ease of Use	-.871	.315	
Attitude	<---	Perceived Usefulness	.075	.085	
Student Satisfaction	<---	Relative Advantage	-.007	.890	.912
Student Satisfaction	<---	Compatibility	.087	.051	
Student Satisfaction	<---	Prior Technology Experience	.084	.051	
Student Satisfaction	<---	Technology quality	.105	.758	
Student Satisfaction	<---	Technology Self Efficacy	.051	.273	
Student Satisfaction	<---	Technology Anxiety	.014	.660	
Student Satisfaction	<---	Perceived Ease of Use	-.045	.902	
Student Satisfaction	<---	Perceived Usefulness	.013	.648	
Student Satisfaction	<---	Attitude	-.001	.992	
Student Satisfaction	<---	Course Structure	-.066	.249	
Student Satisfaction	<---	Online tutorial flexibility	.662	***	
Student Satisfaction	<---	Online tutorial quality	.007	.914	

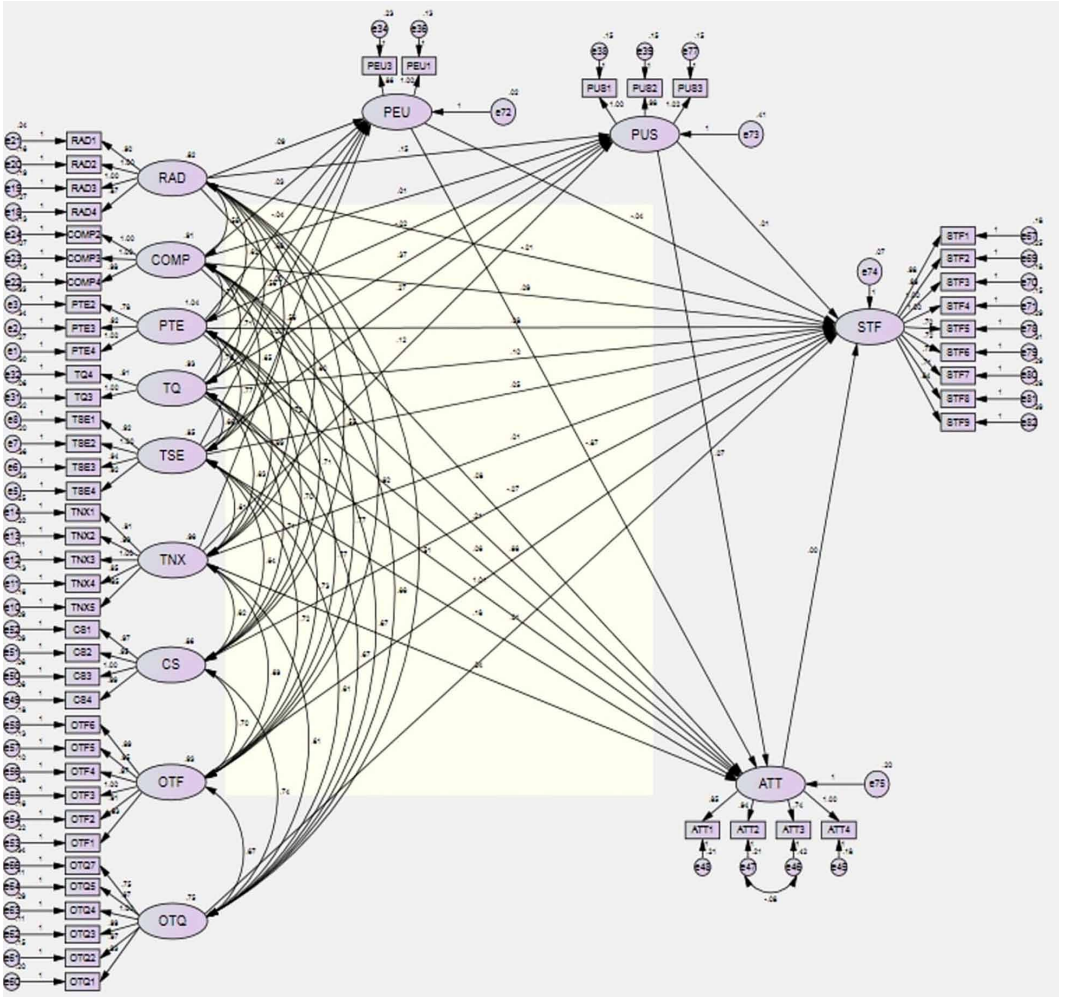
the fifth hypothesis **"There is a significant relationship between Course Dimension and Student Satisfaction"** is partially supported.

- The sixth hypothesis **"There is a mediating role of Perceived Ease of Use, Perceived Usefulness, and Attitude between Technology Dimension and Student Satisfaction."** Based on the previous results, it could be observed that there is an insignificant effect of Perceived Ease of Use, Perceived Usefulness, and Attitude on Student Satisfaction, thus, Perceived Ease of Use, Perceived Usefulness, and Attitude could not mediate the relationship between Technology Dimension and Student Satisfaction.

The model fit indices; CMIN/DF = 1.612, GFI = 0.844, CFI = 0.971, AGFI= 0.824, and RMSEA = 0.038 are all within their acceptable levels. The SEM model conducted for the effect of the research model is illustrated in Figure 2.

The results of this study align with certain trends observed in the existing scientific research literature on education technology. The partial support for the relationship between the Technology Dimension and Design Dimension with perceived ease of use and usefulness resonates with

Figure 2. SEM for the Research Variables



prior studies that acknowledge the multifaceted nature of these constructs. Similarly, the study's identification of factors influencing attitudes towards technology-based teaching is consistent with a body of literature that recognizes the complex interplay of technological dimensions in shaping pedagogical perceptions. However, it is essential to note the divergences between the current findings and the broader scientific research literature. While the study partially supports the relationship between the Technology Dimension and attitudes towards technology-based teaching, it presents conflicting results regarding the Design Dimension. This incongruence with some existing literature suggests the need for further exploration and validation of these relationships.

The lack of support for the hypothesized link between attitude towards technology-based teaching and student satisfaction contrasts with certain studies that have reported a positive association between positive attitudes toward technology and enhanced learning outcomes. This incongruity emphasizes the importance of considering contextual factors and the specific nuances of the educational environment. The partial support for the relationship between Course Dimension and Student Satisfaction aligns with some literature acknowledging the impact of course design and content on student contentment. However, the partial nature of this support implies that other unexplored variables may contribute to student satisfaction, warranting further investigation. In summary, while the study's findings generally align with certain trends in the scientific research literature on education technology, the nuanced and partial nature of the relationships identified underscores the complexity of these dynamics, prompting the need for continued research and refinement of existing frameworks.

CONCLUSION

In conclusion, this study successfully addressed its objectives, contributing valuable insights to the understanding of the interplay between education technology antecedents and various outcomes. The investigation revealed a partial relationship between the Technology Dimension and Design Dimension, underscoring the complexity of their impact on perceived ease of use and usefulness. Moreover, the study shed light on the nuanced factors influencing attitudes towards technology-based teaching, emphasizing the partially supported relationship with the Technology Dimension but contradicting findings concerning the Design Dimension. The effort to develop a framework for influencing factors in academic learning uncovered mixed results, with a lack of support for the hypothesized link between attitude towards technology-based teaching and student satisfaction. However, the partial support for the relationship between Course Dimension and Student Satisfaction suggests that certain aspects of educational technology may indeed contribute to overall student contentment. Overall, these findings underscore the intricate nature of the relationship between education technology components and academic outcomes, highlighting the need for further research to refine and expand upon the identified patterns.

RESEARCH RECOMMENDATIONS

The study provides some recommendations for decision-makers in education sector and these recommendations are as follows:

1. Universities managers are recommended to employ effective instructional technology courses that promote practical applications as opposed to general basic knowledge.
2. Training on the use of computers and computer-based programs in the learning environment should be provided to university professors and teachers.
3. Universities managers and teachers at Egyptian universities are also recommended to work on improving more strategies in order to enhance educational technology, as well as to provide universities with a competitive advantage over their counterparts.

4. Enhancing the perceptions of usefulness and ease of use of technology system in universities is helpful to facilitate usefulness and attitude toward using computer-based teaching.
5. University educators should have a deeper knowledge of the realities of students' interactions with digital technology.
6. It is necessary to legitimise alternative contexts for teaching and learning where alternative (perhaps more active, more participatory, or more creative) applications of digital technology will actually "use" and "help".
7. Universities should keep expanding their digital resource repositories, enhance the reliability and "user-friendliness" of learning management systems, and increase the accessibility and availability of other key technologies.
8. Universities managers are recommended to adopt the use of its learning management system to the fullest. In order to achieve good and efficient technology access, there must be financial support from the university. Therefore, the top management must believe in the learning management system in order to help students learn.
9. Universities should consider how institutional cultures and assumptions about curriculum, assessment, accreditation, and other expectations for technologically facilitated learning.

LIMITATIONS AND FUTURE WORK

It has been known that most empirical studies include some limitations that might impact the research findings and prevent the generalization of the outcomes. The study limited its research to Egypt only as a developing country, but the research was limited to taking into consideration more countries rather than one country, if the study sample was larger, the results of the study would be more accurate. In addition, limited variables are analyzed in this study to determine their effect on attitude.

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