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ARTICLE



## Examination of behavioral intention toward E-learning: a case of University of the Third Age students

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### ABSTRACT

This study was aimed at determining the factors that affect the intentions of University of the Third Age (UTA) students toward e-learning systems by using Structural Equation Modeling. For this purpose, factors such as Self-Efficacy, Experience, Social Norms, Enjoyment, and Anxiety, suggested as external factors in the General Extended Technology Acceptance Model for E-Learning (GETAMEL) model, were included in the UTATAM model developed within the scope of this research. The research was carried out with a total of 210 students studying at The University of the Third Age at Akdeniz University and Ege University. The results of the study indicate that the Experience factor has a strong effect on Anxiety, Self-efficacy, and Perceived Enjoyment. In addition, it was found that Anxiety, Self-efficacy, and Social Norms were effective on perceived Ease of Use, while Perceived Enjoyment and Social Norms were effective on Perceived Usefulness. On the other hand, while the mean scores of Perceived Usefulness and Social Norms were higher in favor of female, the mean scores of Experiences were higher in favor of male. The results indicated that participants' age and lifestyle did not affect the mean scores of individuals in terms of all factors. In terms of Behavioral Intentions, the average population of countries has been increasing rapidly in recent years. The results of this research study are crucial for shedding light on educational institutions and other relevant institutions in order to determine the factors that affect the intentions of UTA students toward the use of e-learning systems.

### Introduction

Globally, the share and the number of older adults in the total population are growing rapidly because of the increasing levels of life expectancy and decreasing levels of fertility. It was reported that there were 727 million (9.3%) people aged 65 and over in the world in 2020. Between 2020 and 2050, it is expected that the global population aged 65 years and over will increase from 9.3% to 16% (United Nations, 2020). In Turkey, the share of the older adults population in 2020 was reported at 7.953.555 million (9.5%) people. Between 2020 and 2050, it is expected that the population aged 65 years and over will increase from 9.5% to 20.2% (Population Statistics 2021). Technology is frequently postulated as a means of supporting aging. Given that the share and the number of older adults in the total population are growing rapidly and they will be active users of technology, understanding issues about aging and information technology are critically important (Czaja & Lee, 2009).

The rapidly increasing older adults population creates a need for actions that can improve the quality of life for older adults. The University of the Third Age (UTA) is a socio-cultural center where older adults can acquire new knowledge or validate their knowledge (Formosa, 2012). Since its

foundation in 1972, it has become one of the most successful institutions for older adults (Formosa, 2014). Many studies have emphasized the physical, mental, and social benefits of the University of the Third Age and lifelong learning for the older adults and society in many countries (Dench & Regan, 2000; Narushima, 2008; Pincas, 2007; Portero & Oliva, 2007; Purdie & Boulton-Lewis, 2003; Russell, 2008; Swindell, 1993). In Turkey, UTA was first founded in 2016 at Akdeniz University. In a short time, it started to become widespread due to the interest it received throughout Turkey. In UTA, students are able to take lessons on biology, law, history, music, sports, English, maintenance, knitting, cooking, and many more areas of interest. Within the scope of Covid 19 measures, UTA students continued their education entirely in the form of e-learning.

E-learning is the use of electronically asynchronous and synchronous communication for the aim of thinking and learning. There are two primary applications of e-learning: online learning and blended learning (Garrison, 2011). Online learning is defined as learning synchronously or asynchronously via different devices (computers, laptops, smartphones, tablets, etc.) with internet access (Dhawan, 2020). Blended learning is an educational system that combines multiple learning methods, including face-to-face learning with asynchronous and/or synchronous online learning (Wu et al., 2010). Because of the COVID-19 pandemic, most governments have turned traditional face-to-face education into online education (Sobaih et al., 2020). Thus, e-learning has become a mandatory component of all educational institutions in the world due to the pandemic (Radha et al., 2020). Learning centers for seniors were also closed down during the pandemic, and many of them adopted the mode of online education (Lee & Hsu, 2021). Although e-learning is not new for the young, it brings a whole new experience to the older adults. However, e-learning has some deficiencies such as the weakness of online teaching infrastructure, the inexperience of teachers, the complex environment at home, and so on (Ali, 2020). Therefore, there is a need for research that explains learners' perceptions, attitudes, and intentions to use e-learning to minimize the impact of these deficiencies and improve learning (Park, 2009).

Technology Acceptance Model (TAM) is one of the models used to determine the acceptance and intention to use the technology of individuals. TAM was first proposed by Fred D. Davis to explain the effect of system characteristics on user acceptance processes of information systems (Davis, 1985). TAM represents a theoretical framework for how users accept and use information technology. In other words, TAM is a valid model used to predict how individuals adopt new technology and its future use. The main goal of TAM-based studies is to explain and predict users' adaptation and intention to use new technology systems (Walldén et al., 2016). Also, Abdullah and Ward (2016) developed General Extended Technology Acceptance Model for E-Learning (GETAMEL) by doing a meta-analysis to identify the most used external factors of TAM in the context of e-learning adoption. In this study, 107 studies using the TAM model in the context of e-learning and 152 external factors used in these studies were examined. The results showed that self-efficacy, subjective norm, enjoyment, computer anxiety, and experience were the most used external factors of TAM in the context of e-learning.

Self-efficacy is defined as a person's belief in his or her capability to do a particular task or behavior (Bandura, 1982). On the basis of computer usage, computer self-efficacy refers to a belief in a person's capability to use a computer (Compeau & Higgins, 1995). Based on the relationships between the five most used external factors and students' PEOU and/or PU of e-learning systems, they proposed GETAMEL that identifies key external factors for e-learning acceptance. Subjective norm is based on TRA, and it is a major determinant of behavioral intention to use (Abbas, 2016). Subjective norm is defined as a "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Venkatesh & Davis, 2000). Perceived enjoyment is a basic intrinsic motivation that indicates pleasure and enjoyment that can acquire from using a system (Chao, 2019; Praveena & Thomas, 2014). Perceived enjoyment is defined as 'the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use' (Park et al., 2012). Computer Anxiety is defined as

'the tendency of an individual to be uneasy, apprehensive, or fearful about the current or future use of computers in general' (Igbaria & Parasuraman, 1989). Experiences, on the other hand, produce a meaningful effect on the person by shaping the learner according to the learning theory and affect subsequent experiences (Mezirow, 1997). In addition, thanks to the experiences, learners' analysis skills develop with the help of reflecting and evaluating their experiences and recreating them in the light of previous experiences. For this reason, new knowledge gained from the experiences should contribute to the next learning and change the quality of learning (Dewey & Authentic, 1938). However, Dewey stated that experiences that prevent or hinder the development of other rich learning experiences are not educational experiences. In terms of e-learning, as experience increases, learning outcomes such as the perception of ease of surfing the Internet, the ability to use communication technologies, and online activities improve.

TAM was used in this study to determine the acceptance and use levels of UTA students for e-learning systems. For this reason, these five factors specified in the GETAMEL Model were included in the TAM model used in this study. Thus, the UTATAM scale was developed to determine the acceptance and use levels of UTA students for e-learning systems. The most important innovation of this research is that it reveals that experience, social norms and anxiety have a very strong effect on the usage intentions of older adults toward e-learning systems. In addition, this study revealed that anxiety and perceived ease of use were important predictors of the enjoyment.

## Related works

Studies about older adults and technology have mostly focused on understanding the adoption of a specific technology or the use of computers and the Internet by the older adults (Bai et al., 2020). Gelderblom et al. (2010) aimed to establish the mobile phone adoption degree of the older adults and determine to what extent existing technology adoption models can capture mobile phone adoption by the older adults. Neves and Amaro (2012) investigated the use and perception of ICT (mobile phones, computers, and the Internet) among older adults. In another study, Ramón-Jerónimo et al. (2013) attempted to explain the Internet use and acceptance capturing the heterogeneity across gender. Similarly, Ozsungur and Hazer (2018) analyzed the acceptance of information and communication technologies (ICT) (mobile phone/smartphone, e-mail usage, and computer and Internet usage) among older adults. Guner and Acarturk (2020), in their study, aimed to establish a model to analyze the use and acceptance of ICT technologies by older adults and compare it with young adults.

Another body of literature focused on older adults's use and adoption of healthcare technologies. Chou et al. (2013) evaluated the attitudes toward telecare service of older adults and investigated the effect of telecare service on the quality of life. Hsiao and Tang (2015) investigated the acceptance of mobile healthcare devices by older adults. Similarly, Zhou et al. (2019) explained the behavioral intentions of chronically ill older adults patients to use telemedicine systems in their study. Ha and Park (2020) investigated the acceptance of ICT by older adults that have multiple chronic health conditions and examined the factors associated with technology acceptance.

Older adults are suggested to be intertwined with e-learning services and not separated from other age groups (Bai et al., 2020). Moreover, to increase the level of technology usage and user adoption, factors that affect technology acceptance and behavior of users should be understood and explained (Taherdoost, 2019). However, previous studies in the field of e-learning have focused on the young age group (Lee et al., 2009; Moghadam & Bairamzadeh, 2009; Park, 2009; Pituch & Lee, 2006). There are a limited number of studies in the literature about the adoption of e-learning systems by older adults (Bai et al., 2020; Chu, 2010; Dorin, 2007; Githens, 2007; Morrison & McCutcheon, 2019; Pappas et al., 2019).

## Theoretical background

### *Technology acceptance model (TAM) factors*

TAM is a derivation of the theory of reasoned action (TRA) (Lai, 2017). TRA argues that the most important effect on the behavior of the individual is the behavioral intention of the individual which is determined by two main factors: attitude and subjective norm (Leone et al., 1999). On the other hand, TAM argues that perceived usefulness (PU) and perceived ease of use (PEOU) are the two main determinants that affect users' behavioral intention toward using information technology (Brezavšček et al., 2017; Buabeng-Andoh, 2018; Venkatesh & Davis, 2000). PU is defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance,' and PEOU is defined as 'the degree to which a person believes that using a particular system would be free of effort' (Davis, 1989). PU and PEOU are the most important determinants of TAM, and they explain 40% of an individual's intention to use new technology in a variety of contexts (Venkatesh & Davis, 2000). Based on the findings of the original TAM and previous research, we assume the following hypotheses.

- H1. Usefulness has a positive and significant effect on BI.
- H2. Ease of Use has a positive and significant effect on BI.
- H3. Ease of Use has a positive and significant effect on Usefulness.

### *TAM model factors and external factors (self efficiency, anxiety, and enjoyment)*

The enjoyment perceived by the individual for the technology use is directly proportional to the number of experiences and the quality of the experience (Do et al., 2020). Increasing successful experience significantly reduces the user's anxiety about technology use and increases the perception of self-efficacy. On the other hand, perceived self-efficacy and anxiety are crucial predictors of perceived ease of use. Because when individuals interact with computers, positive attitudes can motivate students to master technical skills quickly, but negative attitudes such as anxiety can cause difficulties in acquiring these skills (Teo & Noyes, 2008). Therefore, users could spend more effort to master technical skills, which will create a cognitive load on the student in the moment of anxiety about the technology use (Drobisz, 2017). That is, since our brain cannot focus on different tasks at the same time and the user's attention will be directed to the use of the system, learning will slow down. In this case, the perceived benefit and enjoyment by the user from the system will decrease (Hogg, 2015; Strehler, 2008). Schafer and Kaufman (2018) underlined that ease of use is a key factor in eliminating cognitive load. Otherwise, a high perception of ease of use will create an excessive cognitive load on the individual while learning will slow down, which will negatively affect the motivational elements of the person such as perceived enjoyment and satisfaction (Paas et al., 2010). However, as expertise develops in terms of technical skills, the perception of self-efficacy will increase, and the perceived ease of use will increase as anxiety decreases. A high level of perceived ease of use will positively affect the motivational elements of the person such as perceived enjoyment and satisfaction since it will ensure the emergence of a successful experience (Renkl & Atkinson, 2003). Therefore, high perceived enjoyment will have a positive effect on the perceived benefit of using the system because motivation and emotion prevent or expand a person's cognitive capacity (Young et al., 2014). In addition, students with high motivation will spend more effort in mental activities (Strehler, 2008). For this reason, the following hypotheses have been proposed.

- H4. Self-efficacy perception has a direct and positive effect on perceived usefulness.
- H5. Self-efficacy perception has a direct and positive effect on perceived ease of use.
- H6. Anxiety has a direct and negative effect on perceived ease of use.
- H7. Perceived ease of use has a direct and positive effect on perceived enjoyment.
- H8. Anxiety does not have a direct effect on perceived usefulness.
- H9. Perceived enjoyment has a direct and positive effect on perceived usefulness.

### ***TAM model factors and external factors (social norms and experience)***

It has been demonstrated in previous studies that Social Norm (SN) and Social Impact (SI) are similar, and both are related to the impact of social factors on technology use (Venkatesh et al., 2003). The effect of SN/SI, which is the perception that people who are important to the individual should or should not do the behavior in question on e-learning, was examined in 32 of the previous studies, and 27 of these studies showed that it had a positive effect (Abdullah & Ward, 2016). Social impact has a significant effect on perceived usefulness and ease of use, especially for an individual who transfers the beliefs of other people influential in his/her inner world to his/her belief system. Another important factor affecting intention is experience. As experience increases, individuals' perception of self-efficacy against technology use increases, while computer anxiety decreases. Emotional attitudes that emerge as a result of learning experiences can facilitate or prevent learning. Abdullah and Ward (2016) stated that most of the previous research studies were conducted with K-12 and university students. Similarly, it can be said that Social Norms have a direct effect on the intention to use e-learning management systems since generation Y and Z have a lot of experience in using distance education systems. On the other hand, individuals who do not have sufficient experience in using technology should have experience such as using the internet and computer in order to use e-learning management systems. Also, social norms are a strong belief that drives the individual to perform the behavior. In this respect, it can be said that social norms have a significant effect on the experience factor, especially on older individuals. In addition, individuals who do not have sufficient experience in using technology are expected to have high anxiety and low self-efficacy perceptions. In this respect, the increase in the experience of UTA students in using the internet and computer skills necessary for using e-learning technologies will both reduce the anxiety of these individuals about technology use and increase their self-efficacy perception. Therefore, in this study, it was assumed that Social Norms do not have a direct effect on intention, but that social influence has a strong effect on the experience. For this reason, the following hypotheses have been proposed.

- H10. Social norms have a direct and positive effect on perceived usefulness.
- H11. Social Norms have a direct and positive effect on perceived ease of use.
- H12. Social Norms have a direct and positive effect on the experience.
- H13. Experience has a direct and negative effect on computer anxiety.
- H14. Experience has a direct and positive effect on the perception of self-efficacy.
- H15. Experience has a direct and positive effect on perceived enjoyment.

### **Method**

The aim of this study is to determine the UTA students' intention to use e-learning platforms and the factors affecting it. For this purpose, the Technology Acceptance Model (TAM), which is widely used in the literature, was used and the variables of the GETAMEL model were adapted for the external variables of the model. The UTATAM scale was developed to determine the usage intentions of individuals studying at The University of the Third Age.

### ***Developing the UTATAM scale***

Feedback was obtained from the individuals studying at The University of the Third Age, Akdeniz University, by using the TAM model scale developed within the scope of this research. The UTATAM scale was developed as a result of this study, as well as the GETAMEL scale proposed by Abdullah and Ward, while the Technology Acceptance Model and Theory were obtained from the relevant literature (Table 1). The questionnaire was translated to Turkish by the researchers. After translation, we asked

**Table 1.** Previous studies supporting research hypotheses

Hypothesis			Supporting
H1	PU → BI	Al-Adwan, 2020; Ang et al., 2021; Ching-Ter et al., 2017; Shao, 2018; Hu & Lai, 2019; Chao, 2019; Cheng & Yuen, 2018; Hwang et al., 2021; Cheng, 2020a; Liu et al., 2021; Cicha et al., 2021; Kanwal et al., 2020; Wang et al., 2020; Kumar et al., 2020.	
H2	EU → BI	Al-Adwan, 2020; Ang et al., 2021; Ching-Ter et al., 2017; Sánchez-Prieto et al., 2017; Hu & Lai, 2019; Shao, 2018; Liu et al., 2021; Balouchi & Samad, 2021.	
H3	EU → PU	Ang et al., 2021; Sánchez-Prieto et al., 2017; Nguyen et al., 2021; Hu & Lai, 2019; Shao, 2018; Cheng & Yuen, 2018; Jere, 2020; Islam & Sheikh, 2020; Liu et al., 2021; Kanwal et al., 2020; Cheng, 2019.	
H4	SE → PU	Al-Adwan, 2020; Altalhi, 2021; Ang et al., 2021; Islam & Sheikh, 2020; Liu et al., 2021; Cicha et al., 2021; Kanwal et al., 2020.	
H5	SE → EU	Al-Adwan, 2020; Altalhi, 2021; Ang et al., 2021; Ching-Ter et al., 2017; Shao, 2018; Islam & Sheikh, 2020; Armenteros et al., 2017; Liu et al., 2021; Cicha et al., 2021; Barclay et al., 2018; Kanwal et al., 2020; Kumar et al., 2020.	
H6	CA → EU	Arpaci & Basol, 2020; Ching-Ter et al., 2017; Sánchez-Prieto et al., 2017; Liu et al., 2021; Matarirano et al., 2020; Tick, 2019.	
H7	EU → EJ	Do et al., 2020; Wang et al., 2016; Hossain et al., 2019.	
H8	CA → PU	Ching-Ter et al., 2017; Tick, 2019.	
H9	EJ → PU	Ching-Ter et al., 2017; Chao, 2019; Hanif et al., 2019; Cheng, 2020b; Zhao et al., 2021; Liu et al., 2021; Cicha et al., 2021; Balouchi & Samad, 2021.	
H10	SN → PU	Ang et al., 2021; Ching-Ter et al., 2017; Jere, 2020; Liu et al., 2021; Cicha et al., 2021; Barclay et al., 2018; Kumar et al., 2020; Hanif et al., 2018.	
H11	SN → EU	Ang et al., 2021; Nguyen et al., 2021; Shao, 2018; Liu et al., 2021; Barclay et al., 2018; Pho et al., 2020;	
H12	SN → XP	Ching-Ter et al., 2017; Nguyen et al., 2021; Yang & Su, 2017; Jere, 2020; Pho et al., 2020; Matarirano et al., 2020; Kharma, 2019; Cheng & Yuen, 2019.	
H13	XP → PU	Armenteros et al., 2017; Ching-Ter et al., 2017; Cheng, 2020a; Cheng, 2020b; Liu et al., 2021; Cicha et al., 2021; Chen et al., 2021; Kharma, 2019.	
H14	XP → EU	Ang et al., 2021; Armenteros et al., 2017; Liu et al., 2021; Ching-Ter et al., 2017; Cicha et al., 2021; Kanwal et al., 2020; Kharma, 2019.	
H15	XP → SE	Bervell & Umar, 2018; Kumar et al., 2020.	
H8	XP → EJ	Cheng, 2020a; Cheng, 2020b; Dakduk et al., 2018.	

five experts to evaluate the questionnaire. A pilot study was conducted with the questionnaire obtained from expert corrections. The pilot study was done with six participants, three females and three males. The final version of the questionnaire was formed after the pilot study.

Within the scope of this research study, the UTATAM scale was developed based on the GETAMEL scale factors. The UTATAM scale consists of 30 items using a seven-point Likert type ranging from 1 (strongly disagree) to 7 (strongly agree). The questionnaires were first developed in English and then translated into Turkish (students' mother tongue). After factor analysis, eight items were removed from the scale. The final scale consists of 22 items and eight dimensions. Usefulness (PU), Anxiety (CA), Perceived Ease of Use (EU), Enjoyment (EJ), Self-Efficacy (SE), and Experience (×P) dimensions were measured with three items. Behavioral Intention (BI) and Social Norms (SN) were measured with two items. All of the items asked in the questionnaire are presented in [Table A1](#) in the Appendix A.

### Confirmatory factor analysis

Confirmatory factor analysis is a type of structural equation modeling that examines whether the scale obtained as a result of an adaptation process and the findings obtained from the data collected from individuals are compatible with the theoretical structure of the scale. Confirmatory factor analysis has an important value in scale adaptation studies.

### Structural equation modeling

Structural Equation Modeling is a statistical approach used to represent, predict, and test the network of relationships between observed and unobservable variables. The purpose of the structural equation model is to understand the correlation or covariance patterns between a set of variables and to explain the specified model and its variances.

## Data analysis

The data analysis process consists of two stages. In the first step, confirmatory factor analysis was used to evaluate the validity of the constructs and to test the model fit. In the second step, the structural equation modeling was used to test the relationships between the independent and dependent variables. In addition, Cronbach's alpha values of the scale and all dimensions of the scale were calculated to determine the internal consistency of the scale structure.

## Data collection

Data were collected from Akdeniz and Ege UTAs, which continue their education on the Zoom platform due to the COVID-19 pandemic. Data were collected via an online survey form between February 2021 and May 2021. The sample of the study contains 226 (126 surveys from the Akdeniz UTA and 90 surveys from the Ege UTA) surveys, and 16 surveys were excluded from the study due to missing data. Finally, the study sample contains 210 surveys. The demographic information of participants is shown in Table 1.

## Sample

The sample of this research study consists of 210 students studying at The University of the Third Age, Akdeniz University and Ege University. Table 2 shows the distribution of the people participating in this research study.

## Results

We analyzed the survey data by using the Structural Equation Model (SEM) to test the research hypotheses and the model fit after collecting the data. The widely used AMOS software to control structural equation modeling was chosen for this purpose (Byrne, 2001). Based on the maximum likelihood method, suggested and actual values of some fit indices related to SEM were defined (Table 3).

**Table 2.** Demographic profile

(N = 210)	Category	Frequency	Percentage %
Gender	Female	142	67.6
	Male	68	32.4
Employment Status	Working full time	14	6.7
	Homemaker	18	8.6
	Retired	178	84.8
With whom do you live?	Alone	46	21.9
	With partner or family	164	78.1
Age	55–60	14	6.67
	61–65	66	31.43
	66–70	86	40.95
	>70	44	20.95

**Table 3.** Fitness indices for SEM.

Fit indices	$\chi^2$	DF	$\chi^2/df$	RMSEA	SRMR	TLI	CFI	NFI
Result	245.64	198	1.241	0.034	0.082	0.982	0.984	0.924
Criterion			<2.00	<0.08	<0.09	0.900	0.900	0.900

$\chi^2/df$  is the ratio between Chi-square and degrees of freedom; RMSEA is the Root Mean Square Error of Approximation; SRMR is the Standardized Root Mean Square Residual; CFI is Comparative Fit Index; NFI is Normed Fit Index.



As seen in [Table 3](#), the fit indices of the measurement model were consistent with the fit index criteria ranges and provided the measurement estimates. This result theoretically confirmed the possibility of the structural model. The fit of the first survey model was estimated by using a maximum likelihood estimation method. The first structural model in [Table 4](#) fitted the data well ( $\chi^2/df = 1.241$ ; RMSEA = 0.034, CFI = 0.984, NFI = 0.924, TLI = 0.982). These values are above the recommended thresholds for the acceptable model fit, and therefore, it can be said that the measurement model has a good fit. [Table 4](#) shows the constructs, Convergent Validity, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha.

As shown in [Table 4](#), Internal consistency coefficients were evaluated using three criteria: (i) standardized factor loading should be significant for an item (Hair et al., 2006); (ii) Cronbach's Alpha (CR) must be greater than 0.70 (Hair et al., 2006); and (iii) the Average Variance Extracted (AVE) for a structure should be greater than 0.50 (Fornell & Larcker, 1981).

As shown in [Table 4](#), the Cronbach's alpha internal consistency coefficients of the subscales of the model ranged from 0.70 to 0.93. All standardized factor loads were statistically significant and greater than 0.50. The Cronbach's Alpha (CR) of each construct exceeded 0.70, and all subtracted mean variance (AVE) values ranged from 0.50 to 0.76 and were greater than 0.50. These results showed that all factors in the measurement model were sufficient for validity.

Discrimination was tested according to the Fornell-Larcker criterion (Fornell & Larcker, 1981) by comparing the square root of the AVE for each factor and the correlation coefficients between each pair of factors. Distinctive validity can be accepted if the square root of the AVE for a construct is greater than the correlation between the factor and all other factors in a measurement model (Fornell & Larcker, 1981). The Discriminant validity result of the measurement model for this study is presented in [Table 5](#).

As seen in [Table 5](#), all constructs fit the Fornell-Larcker criterion, which indicates that the square root of AVE for each construct is greater than the correlation. Therefore, it can be said that there is good discriminant validity between the factor and all other constructs in the model. Within the scope of this research, 15 hypotheses were tested. The acceptance/rejection of each research hypothesis is summarized in [Table 6](#). Examination of the Standardized Coefficient values in [Table 6](#) indicates that twelve of the fifteen hypotheses, excluding H3, H4, and H8, are significant at 0.01 or 0.001 level. Path coefficients and significance levels are shown in [Figure 1](#).

**Table 4.** Internal consistency coefficients of the scale

Factor	Item	Mean	Standardized Loading	Alpha	CR	AVE
Perceived Usefulness (PU)	PU5	5.395	.902	0.928	0.903	0.757
	PU4	5.514	.884			
	PU6	5.633	.823			
Perceived Ease of Use (EU)	EU6	5.329	.731	0.876	0.756	0.508
	EU1	5.467	.720			
	EU2	5.248	.687			
Enjoyment (EJ)	EJ3	5.433	.840	0.905	0.867	0.685
	EJ2	5.676	.835			
	EJ1	5.510	.808			
Computer Anxiety (CA)	CA2	2.652	.839	0.843	0.863	0.677
	CA3	2.729	.833			
	CA4	2.757	.795			
Social Norms (SN)	SN2	5.219	.885	0.703	0.831	0.711
	SN1	5.514	.697			
Self-Efficiency (SE)	SE2	5.576	.873	0.926	0.873	0.697
	SE3	5.538	.841			
	SE1	5.386	.788			
Experience (XP)	XP4	4.910	.799	0.723	0.721	0.502
	XP3	4.876	.765			
	XP2	5.514	.530			
Behavioral Intention (BI)	I1	5.681	.817	0.848	0.741	0.589
	I2	5.748	.715			

**Table 5.** Discriminant validity of the measurement model.

Factor	(PU)	(EU)	(EJ)	(CA)	(SN)	(SE)	(XP)	(BI)
Usefulness (PU)	<b>0.870</b>							
Ease of Use (EU)	.381**	<b>0.713</b>						
Enjoyment (EJ)	.517**	.532**	<b>0.828</b>					
Computer Anxiety (CA)	-.180**	-.503**	-.345**	<b>0.823</b>				
Social Norms (SN)	.383**	.484**	.417**	-.267	<b>0.843</b>			
Self-Efficiency (SE)	.264**	.677**	.408**	-.460**	.259**	<b>0.835</b>		
Experience (XP)	.220**	.593**	.431**	-.469**	.395**	.601**	<b>0.709</b>	
Behavioral Intention (BI)	.641**	.502**	.445**	-.342**	.381**	.398**	.366**	<b>0.767</b>
Mean	16.543	16.043	16.619	8.138	10.733	16.500	15.300	11.287
SD	3.054	3.371	3.339	4.113	2.357	3.720	3.531	1.919

\*\*0.01 significance level.

**Table 6.** Results of hypotheses test.

Hypothesis	Path		Unstandardized Coefficient (B)	Standardized Coefficient ( $\beta$ )	Results	
H1	PU	→	BI	.53	.55**	Supported
H2	EU	→	BI	.34	.37**	Supported
H3	EU	→	PU	.00	.04	Not Supported
H4	SE	→	PU	.06	.08	Not Supported
H5	SE	→	EU	.41	.48**	Supported
H6	CA	→	EU	-.17	-.20**	Supported
H7	EU	→	EJ	.61	.61**	Supported
H8	CA	→	PU	-.05	.06	Not Supported
H9	EJ	→	PU	.42	.45**	Supported
H10	SN	→	PU	.23	.21**	Supported
H11	SN	→	EU	.45	.40**	Supported
H12	SN	→	XP	.59	.58**	Supported
H13	XP	→	CA	-.92	-.70**	Supported
H14	XP	→	SE	.94	.71**	Supported
H15	XP	→	EJ	.36	.39	Supported

\*\*0.01 significance level, \*0.05 significance level.

According to [Figure 1](#), Perceived Usefulness ( $\beta = .55$ ) and Perceived Ease of Use ( $\beta = .37$ ) were found to be direct predictors of Behavioral Intention. These results support H1 and H2. Self-efficacy ( $\beta = .08$ ) and Perceived Ease of Use ( $\beta = .004$ ) were not found to be predictors of Perceived Usefulness, while Computer Anxiety ( $\beta = .06$ ) was not found to be a direct predictor of Perceived Usefulness. For this reason, H3, H4, and H8 were rejected. On the other hand, Self-efficacy ( $\beta = .48$ ) has a direct positive effect on Perceived Ease of Use, while Computer Anxiety ( $\beta = -.20$ ) has a direct negative effect. These results support H5 and H6.

Perceived Enjoyment was found to be the strongest predictor of Perceived Usefulness ( $\beta = .45$ ), while Perceived Ease of Use had a direct positive effect on Perceived Enjoyment ( $\beta = .61$ ). These results supported H7 and H9. In addition, Social Norms were found to be a direct ( $\beta = .58$ ) predictor of Perceived Usefulness ( $\beta = .21$ ), Ease of Use ( $\beta = .40$ ), and Experience. These results supported H10, H11, and H12. On the other hand, Experience had a direct and strong positive effect on Self-Efficacy ( $\beta = .71$ ) and Perceived Enjoyment ( $\beta = .39$ ), while it had a strong and negative effect on Computer Anxiety ( $\beta = -.70$ ). Therefore, H13, H14, and H15 were supported. According to these results, the updated version of the AMOS path diagram is presented in [Figure 2](#).

Arithmetic means and independent samples *t*-test were used to examine whether gender played a role in TAM subscale levels. The averages of the subscales by gender are given in [Table 7](#).

[Table 7](#) shows that there was a statistically significant difference between the Perceived Usefulness and Social Norms mean scores of the UTA students in favor of female according to gender ( $p < .05$ ). On the other hand, mean scores of Experience were found to be higher in males than females ( $p < .05$ ). However, no statistically significant difference was found between the mean scores of UTA students' Perceived Ease of Use, Perceived Enjoyment, Computer Anxiety, Self-efficacy, and

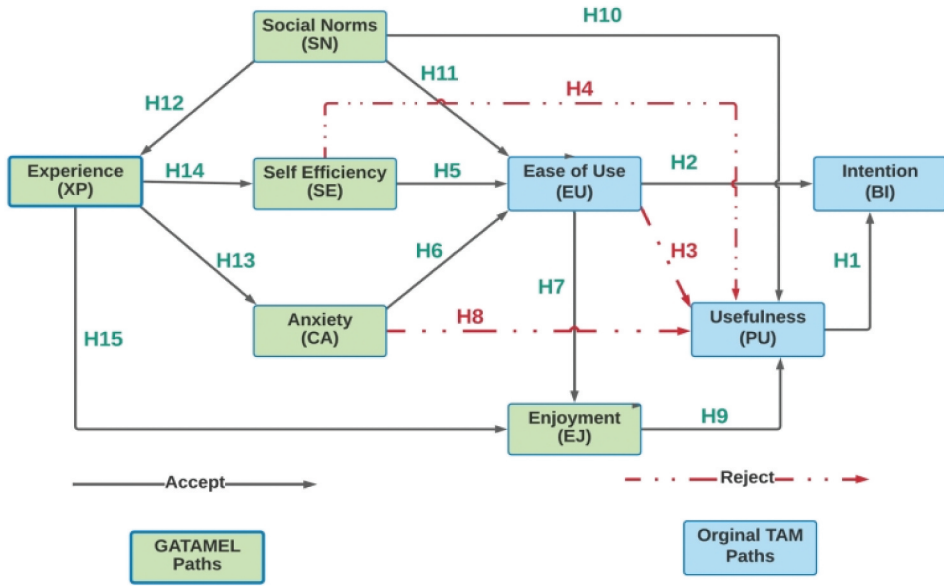


Figure 1. Hypothesis results.

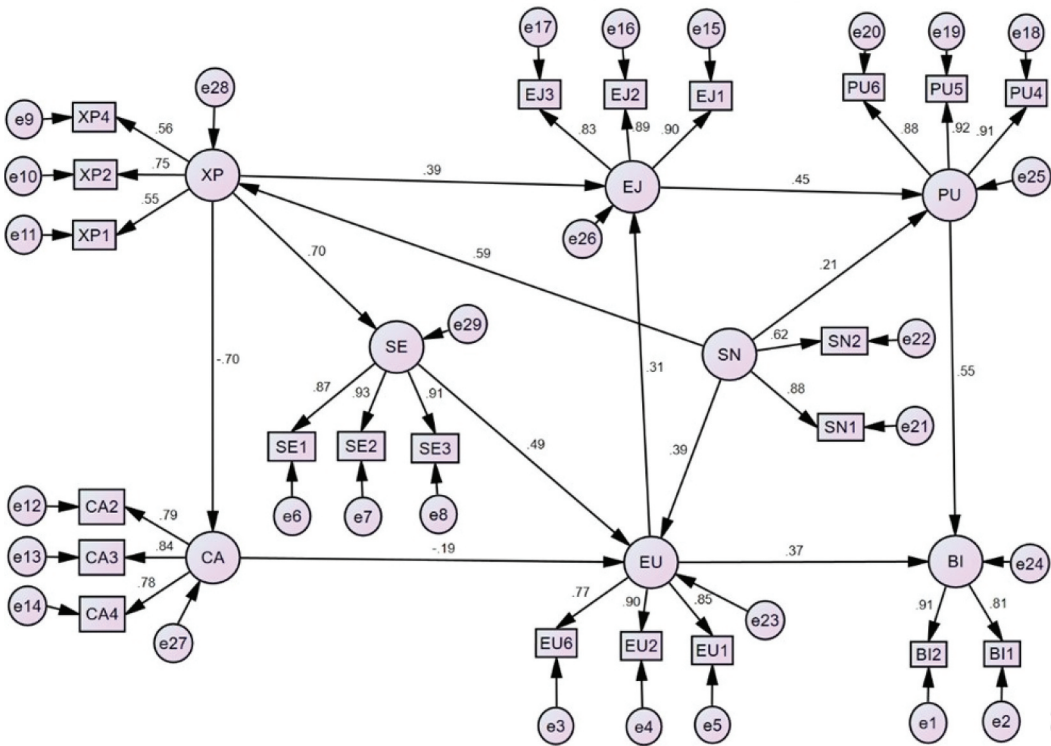


Figure 2. The AMOS SEM result graph.

**Table 7.** The mean of the subscales according to gender

	Mean ( $\bar{X}$ )		t	p
	Female(N=142)	Male(N=68)		
Usefulness (PU)	16.90	15.79	2.488	.014*
Ease of Use (EU)	16.07	15.99	.171	.865
Enjoyment (EJ)	16.92	15.99	1.916	.057
Computer Anxiety (CA)	7.91	8.61	-1.170	.243*
Social Norms (SN)	10.97	10.25	2.073	.039*
Self-Efficacy (SE)	16.29	16.94	-1.190	.235
Experience (XP)	14.93	16.07	-2.217	.028*
Behavioral Intention (BI)	11.47	11.35	.394	.694

\*\*0.01 significance level, \*0.05 significance level.

Behavioral Intention ( $p > .05$ ). In addition, it was found that age and lifestyle (Family or Alone) did not have any effect on the mean scores obtained from the sub-factors of the UTAMEL scale ( $p > .05$ ).

## Discussion

The main purpose of this research is to determine the intentions of UTA students toward e-learning systems through the Technology acceptance model. For this purpose, the UTATAM model, which is a new research model, was developed by including the Self-Efficacy, Experience, Social Norms, Enjoyment, and Anxiety factors suggested in the GETAMEL model, which was created after the meta-analysis of Abdullah and Ward (2016). In this context, hypotheses regarding the directional connections between the variables in the research model were tested. The following results were found regarding the TAM factors and the directional connections between them.

- Ease of Use (EU) and Usefulness (PU) were found to be important predictors of Behavioural Intention (BI) together. Also, the effect of PU on BI is greater than that of the EU. Therefore, H1 and H2 were supported. This result showed that behavioral intention was positively affected as UTA students found the use of e-learning systems easy and beneficial. This result is consistent with most of the previous research findings (Al-Adwan, 2020; Ang et al., 2021; Ching-Ter et al., 2017; Hu & Lai, 2019; Liu et al., 2021; Shao, 2018; Sánchez-Prieto et al., 2017). However, few studies are inconsistent with the results (Jere, 2020; Nguyen et al., 2021; Pho et al., 2020; Wang et al., 2019).
- EU had no direct effect on PU. For this reason, H3 was rejected. Previous studies have stated that as age increases, perceived ease of use decreases, and as perceived ease of use increases, students spend more time on cognitive activities and positively affect perceived usefulness. However, in this study, the results indicated that perceived ease of use did not have a direct effect on perceived usefulness but had an indirect effect on perceived enjoyment. While these results are consistent with the results of some studies (Cheng & Yuen, 2018; Ching-Ter et al., 2017; Cicha et al., 2021; Hanif et al., 2018; Kanwal et al., 2020; Shifia Nisafani et al., 2017), they are also inconsistent with the results of most studies (Al-Adwan, 2020; Ang et al., 2021; Estriegana et al., 2019; Hu & Lai, 2019; Liu et al., 2021; Shao, 2018; Singh & Sharma, 2021; Sánchez-Prieto et al., 2017; Tick, 2019).

The following results were found regarding the directional connections between the factors in the TAM model and the External Variables;

- It was found that while self-efficacy perception had a direct and positive effect on EU, it did not have a direct effect on PU. For this reason, H5 was supported while H4 was rejected. It is consistent with previous research results that self-efficacy has a positive effect on EU but not on

PU (Armenteros et al., 2017; Barclay et al., 2018; Ching-Ter et al., 2017; Kumar et al., 2020; Salloum et al., 2019; Shifia Nisafani et al., 2017). This result showed that the high self-efficacy perceptions of UTA students towards computer and internet use motivated the users to use e-learning systems, and thus, the perceived ease of use was positively affected by mastering technical skills more easily. However, the fact that self-efficacy perception did not have a direct effect on perceived usefulness indicated the existence of different variables that had a stronger effect on perceived usefulness. As a matter of fact, in this research, it was seen that social norms and perceived enjoyment had a stronger effect on perceived usefulness.

- It was found that while CA had a direct and negative effect on EU, it did not have a direct effect on PU. For this reason, H6 was supported while H8 was rejected. These research results are in line with previous research results showing that CA is effective on EU (Arpaci & Basol, 2020; Ching-Ter et al., 2017; Liu et al., 2021; Matarirano et al., 2020; Sánchez-Prieto et al., 2017; Tick, 2019), but not on PU (Cicha et al., 2021). Previous research shows that emerging anxiety makes it difficult to master both motivation and technical skills. Therefore, this research finding supports previous research results. On the other hand, this study revealed that anxiety had a direct and negative effect on perceived enjoyment as well as ease of use. This finding was interpreted as the effect of anxiety on perceived usefulness was indirect due to perceived enjoyment.
- EU had a direct and positive effect on perceived enjoyment. It was found that perceived enjoyment had a direct and positive effect on perceived usefulness. For this reason, H7 and H9 were supported. These research results are in line with previous research results showing that EU is effective on EJ (Do et al., 2020; Hossain et al., 2019; Wang et al., 2016), and EJ is effective on PU (Balouchi & Samad, 2021; Cheng, 2020b; Ching-Ter et al., 2017; Cicha et al., 2021; Hanif et al., 2019; Liu et al., 2021; Salloum et al., 2019). This finding was interpreted as the greater perceived ease of use was, the more the users mastered technical skills easily, and the higher their perceived enjoyment was. On the other hand, the increase in the perceived enjoyment was interpreted as both the cognitive effort spent for learning, and the motivation had a direct and positive effect on the perceived usefulness.

The following results were found regarding the directional connections between the External Variables;

- It has been found that social norms had a direct and positive effect on EU and PU. Its effect on PU was higher than EU. For this reason, H10 and H11 were supported. These research results are consistent with previous research results showing that SN is effective on both EU and PU (Ang et al., 2021; Barclay et al., 2018; Liu et al., 2021). Previous research has shown that individuals who transfer the beliefs of other people influence their inner world to their own belief system. These research results supported previous research results. Accordingly, it was interpreted that social norms had a strong effect on both UTA students' perceived ease of use and perceived usefulness. On the other hand, it can be said that individuals transfer their beliefs about the usefulness of the system to their own belief system much easily.
- Social Norms were found to have a direct and positive effect on the experience. Therefore, the H12 was supported. Previous research results show that XP is more effective on SN and SN is effective on BI (Cheng, 2019; Ching-Ter et al., 2017; Jere, 2020; Kharma, 2019; Matarirano et al., 2020; Nguyen et al., 2021; ang & Su, 2017; Pho et al., 2020). However, in this study, it was found that SN had a direct and positive effect on XP. Since most of the previous research was conducted with individuals with sufficient prior experience, SN had a direct impact on BI. Previous research shows that social norms have a strong effect on behavioral intention. However, almost all of these studies were conducted with K12 and university students. For this reason, it can be said that due to the high level of readiness of these people for the use of the system, they directly transform the beliefs of others into behavioral intentions. However, if the users are not at a sufficient level of readiness, they must fulfill the requirements such as internet use and basic computer use in order

to use the e-learning system. This result was interpreted as UTA students tended to gain sufficient experience before directly transforming their perceptions of social norms into behavioral intentions.

- It was found that experience had a negative effect on computer anxiety and a direct positive effect on self-efficacy and enjoyment (Wang et al., 2019). Consequently, H13, H14, and H15 were supported. This result was interpreted as the successful experience increased, as the person's self-efficacy perception was also positively affected. On the other hand, the increase in successful experience was interpreted as it helped to reduce anxiety and had a direct effect on the perceived enjoyment by facilitating users' mastery of technical skills.

## Conclusion

This study was aimed to determine the factors that affect the acceptance intentions of UTA students toward the e-learning system. In addition to the TAM model, the Self-Efficacy, Experience, Social Norms, Enjoyment, and Anxiety factors in the GETAMEL model, which was created after a meta-analysis of Abdullah and Ward, were included in the UTATAM model developed within the scope of this research. Unlike the GETAMEL model, in this study, the Experience factor was added as an external factor to Self-Efficacy, Enjoyment, and Anxiety factors, which are defined as cognitive perceptions as well as Social Norms. In addition, unlike GETAMEL, perceived ease of use was included in the model as a predictor of the enjoyment factor. The results revealed the strong effect of the experience factor on cognitive factors. It has also been determined that social norms have a strong effect on the ease of use and usefulness perception as well as the experience. The other important finding is that the ease-of-use perception has no direct effect on the usefulness perception, but there is an indirect effect over the perception of enjoyment. On the other hand, there was a significant difference in favor of female according to the mean scores obtained from the usability and social norm sub-factors of the UTATAM scale, while a significant difference was found in favor of male in terms of the experience factor. In terms of other subscale scores, it was found that both age and lifestyle did not have any effect. The conclusion of this research were presented in detail below.

The results of the research showed that the experience factor had a strong effect on the cognitive perceptions of UTA students. While the experience factor had a negative and strong effect on anxiety, it had a positive and strong effect on self-efficacy. On the other hand, it was found that the experience factor was effective on the perceived enjoyment together with the ease-of-use factor. This result indicated that experience had a strong effect on the cognitive perceptions of UTA students, and therefore the importance of using basic information technologies such as internet use, computer use, and filing functions. Thus, in this study, it is recommended to include basic information technology courses in the curriculum of UTA students.

The present study revealed that if UTA students had sufficient experience, their anxiety decreased significantly, and their self-locality levels increased with experience. Moreover, these two factors together were found to be important predictors of perceived ease of use. On the other hand, perceived ease of use was found to be an important predictor of experience and perceived enjoyment. Accordingly, it can be said that as the experience of UTA students on the use of e-learning systems increases, perceived ease of use will increase. As perceived ease of use increases, it will have a positive effect on perceived enjoyment. For this reason, in this research, it is recommended to carry out activities to reduce anxiety, to implement orientation programs for system use, to determine individual needs in terms of basic information technologies, and to develop readiness levels before e-learning so that UTA students can use e-learning systems more easily.

In the study, it was revealed that social norms had a direct effect on both perceived usefulness and perceived ease of use. This result shows that UTA students directly transfer the beliefs of others to their own belief system and have critical importance on behavioral intention. Therefore, it is recommended to encourage group activities such as discussion and forums as well as cooperative learning during

e-learning. In addition, since teacher perceptions and behaviors will have an impact on students' belief systems, it is recommended that they exhibit a good guidance service both in terms of technical skills and for the effective use of the system.

It was found that perceived usefulness and perceived ease of use had a strong effect on behavioral intention. This result was interpreted as – the easier the users used the system, the stronger the motivation would be, and the behavioral intention would continue with increased motivation. In addition, since perceived usefulness is an important factor in the continuation of behavioral intention, it has been interpreted that the use of the system will increase with increasing motivation. Thus, the knowledge obtained from the e-learning system will increase, and perceived usefulness will increase and affect the behavioral intention. For this reason, it is recommended for researchers/teachers to continuously measure the sensory and cognitive learning outcomes obtained to increase the usefulness expectations of UTA students for the use of the e-learning system and to provide customized learning according to individual needs through smart agents.

In this study, Self-Efficacy, Experience, Social Norms, Enjoyment, and Anxiety factors were included in the UTATAM model. It is recommended to researchers to include Hedonic Motivation and satisfaction factors in the model, to examine the changes in beliefs toward the adoption of the e-learning system in the process, to make a comparative analysis with K-12 and other university students, to examine the effects of gender, age, cultural and individual differences on technology acceptance in their future studies.

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No potential conflict of interest was reported by the author(s).

## Ethics statement

The study protocol was approved by Akdeniz University Ethical Committee of Medicine Faculty (Approval date: 13.01.2021; Approval number: KAEK-39).

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## Appendix A

**Table A1.** Measurement of the variables.

Construct	Items	Items Descriptions	Source
Usefulness (PU)	PU1	Using the e-learning would enhance my effectiveness in learning.	Davis (1989)
	PU2	Using the e-learning would make learning easier.	
	PU3	I would find the e-learning useful in my learning	
Ease of Use (EU)	EU1	Learning to use the e-learning would be easy for me	Davis (1989), and Venkatesh et al. (2003)
	EU2	I would find it easy to get the e-learning to do what I want it to do.	
	EU3	I would find the e-learning easy to use.	
Enjoyment (EJ)	EJ1	I enjoy using computers.	Abdullah and Ward (2016)
	EJ2	I am comfortable using the Internet.	
	EJ3	I enjoy using e-mail.	
Computer Anxiety (CA)	CA1	Working with a e-learning makes me nervous.	Venkatesh and Bala (2008), and Abdullah and Ward (2016)
	CA2	e-learning make me feel uncomfortable.	
	CA3	e-learning make me feel uneasy.	
Social Norms (SN)	SN1	People who influence my behavior would think that I should use the e-learning.	Venkatesh et al. (2003), and Abdullah and Ward (2016)
	SN2	People who are important to me would think that I should use the e-learning.	
Self-Efficiency (SE)	SE1	I am confident of using the e-learning even if there is no one around to show me how to do it	Abdullah and Ward (2016)
	SE2	I am confident of using the e-learning even if I have never used such a system before	
	SE3	I am confident of using the e-learning even if I have only the software manuals for reference.	
Experience (XP)	XP1	I enjoy using computers.	Abdullah and Ward (2016)
	XP3	I am comfortable using the Internet.	
	XP4	I enjoy using e-mail.	
Behavioral Intention (BI)	BI1	Assuming I had access to the e-learning, I intend to use it.	Venkatesh and Bala (2008), Abdullah and Ward (2016), and Venkatesh and Davis (2000)
	BI2	Given that I had access to the e-learning, I predict that I would use it.	