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RESEARCH ARTICLE

Predicting university students' attitude towards e-learning based on computer self-efficacy and computer anxiety

Faranak Omidian[1], Hamid Kamarzarrin[2], *Mohamad khaledian[3], Khaton Pourmaveddat[3]

1. Assistant Professor, Department of Education, Dezfoul Branch , Islamic Azad University, Dezfoul, Iran.
2. Assistant Professor, Department of psychology, Payame Noor University,Tehran, Iran.
3. Department of psychology, Payame Noor University,Tehran, Iran.

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Abstract

Attitude of student towards application of information technology is one of the most effective factors. Studies demonstrated that computer self-efficacy and computer anxiety are as the best predictors of attitude towards e-learning. This research aimed to investigate the effect of computer self-efficacy and computer anxiety on university students' attitude towards e-learning. The population of this study consisted of all the postgraduate students who were studying in Panjab University, Chandigarh as well as University of Tehran in India and Iran respectively. The results of this study showed that the Computer self-efficacy had a significant positive effect on total scores of students attitude towards e-learning. In addition, the higher the students computer anxiety scores, the lower their attitude towards e-learning.

Introduction

E-learning

Many believe that the application of advancing ICT in education might help overcoming challenges such as increasing need for more diversified and flexible types of higher education, including lifelong learning, corporate training, etc. (Shirley, 2001) . Information and communication Technology (ICT) encompasses the effective use of equipment and programs to access, retrieve, store, organize, manipulate and present data and information (Gay & Blades, 2005). E-Learning has the potential to overcome some of the limitations of traditional learning, including, most importantly, the fixed times and locations for learning. It allows for a synergy between advances in information and communication technologies and twenty-first century learning needs or skills, each giving the other a push to explore what is possible and what may ultimately be achieved. Holmes and Gardner (2006) .

Along with the term information communication technology, e-learning covers a wide set of ICT technology based applications and processes, including computer–based learning, web-based learning, virtual classrooms, and digital collaboration and networking (Islam & Selim, 2006) . In the Corporate E-Learning report, e-learning has been defined as "a wide set of applications and processes including computer-based learning, Web-based learning, virtual classroom, and digital collaboration" (WR Hambrecht & Co, 2000). Dunstan and Dick (2004) also shared that, definitions of e-learning are abound: computer –based instruction (Coppola & Myre, 2002; Zahm, 2000), online or web-based training (Volery & Lord, 2000), virtual learning environments (Hiltz, 1988; Piccoli et al., 2001) distance learning (Hall & Snider, 2000; Webster & Hackley, 1997). Naidu (2003) concluded that the term e-learning comprises a lot more than online learning, virtual learning, distributed learning, networked or web-based learning. As the letter "e" in e-learning stands for the word "electronic", e-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices. Therefore, various types or modalities of e-learning activity are can be used in universities .

However, higher education institutions in developing countries often have problems keeping up-to-date with advances in international science and technology factors (Yaghoubi et al., 2008; Gulati, 2008 ; Nawaz, 2012; Khalil et al., 2012) . Considering student's attitude toward e-learning is important in successful development of e-learning in higher education, since attitude of user towards application of information technology is one of the most effective factors. Studies demonstrated that the extent to which students' attitude towards e-learning system can be predicted by computer self-efficacy and computer anxiety .

Computer self- efficacy

Ellis et al (2009) discovered significant strong positive correlations between the deep approaches, the e-learning variables, perceptions of the quality of e-learning and achievement. Attitudes towards computer knowledge associated with a concept known as computer self-efficacy (Delcourt and Kenzie, 1993), which, in turn, has proven to be a factor in understanding the frequency and success with which individuals use computers (Bandura, 1986; Compeau and Higgins, 1995) .

Computer self-efficacy examines users' beliefs regarding their ability to perform specific tasks using a software package (Dishaw et al., 2002). Compeau and Higgins (1995) defined computer self-efficacy as "a judgment of one's capability to use a computer". It is not concerned with what one has done in the past, but rather with one's judgments of what could be done in the future. Moreover, it does not refer to simple component sub skills, like formatting diskettes or entering formulas in a spreadsheet. Rather, it incorporates judgments of the ability to apply those skills to broader tasks. Computer self-efficacy has a major impact on individuals expectations of the outcomes of using computers, their emotional reactions to computers (affect and anxiety), as well as their actual computer use. Miura (1987) has suggested that self-efficacy may be an important factor related to the acquisition of computing skills. Computer self-efficacy is a specific type of self-efficacy which is defined as belief in one's ability to "mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Bandura & Wood 1989).

Thus, computer self-efficacy is a belief of one's capability to use computer (Compeau & Higgins, 1995) and participants with little confidence in their ability to use computers might perform more poorly on computer – based tasks. It provides an important psychological construct that is specially related to computer usage. A substantial studies of computer self-efficacy have been conducted on students in e-learning settings (Roth and Karsten, 1998; Agarwal et al., 2000; Henderson et al., 2001; James, 2002; Durndell and Haag, 2002; Mary et al., 2004; Barbeite and Weiss, 2004; Deng et al., 2004; Johnson and Wardlow, 2004; Hayashi et al., 2004; Mcilroy et al., 2007; Munro and Conrad, 2008; Hasan, 2008).

Computer anxiety

Computer anxiety, defined by Raub (1981), is "the complex emotional reactions that are evoked in individuals who interpret computers as personally threatening". One study (Mcdonald, 1983) estimated that approximately 30 to 35% of all computer users experience some level of anxiety when they first encounter computer technology. Computer anxiety manifests itself in many forms and results in a number of common fears. Users are afraid that they will break the computer or destroy vital information. They feel awkward and fear looking stupid. Research has established firmly that stress and anxiety reduce performance effectiveness. Elder et al., (1987), Howard and Smith (1986) and Igbaria and Chakrabarti (1990) suggested that computer anxiety and stress may cause some individuals to avoid using computers completely .

Brown and Coney (1994) revealed that the best predictive of attitude toward computers were computer anxiety, self-rated skills, typing ability, maximal frequency of prior computer use and computer ownership. Aziz's (2004) research identified a positive correlation between knowledge and attitude and negative correlation between anxiety and attitude. Brown 's study (2006) concluded anxiety was a significant influential factor in an individual's e-Learning experience. Computer anxiety, oral communication apprehension, and e-mail familiarity explained 68% of the variance in e-mail anxiety. E-mail anxiety accounted for 22% of the variance in e-mail use. According to Torkzade, Cha-Jan Chang and Demirhan (2006) students with 'low' computer anxiety improved their self-efficacy significantly more than respondents with 'high' computer anxiety. The interaction effect between attitude and anxiety was significant for computer self-efficacy scores but not for internet self-efficacy scores. A 2008 study tungab and Changa found computer anxiety had a negative effect on the behavioral intention to use online courses . Computer self-efficacy had a positive effect on the behavioral intention to use online courses . Papastergiou (2008) also discovered students who were more experienced in computer and internet use had greater computer and Internet self-efficacy, more positive computer attitudes and less computer anxiety. Saade and Kira (2009) concluded that as student anxiety increases, the perception of ease of use of the learning management system decreases or vice versa.

It thus becomes reasonable to conduct separate linear regression analysis for total sample of two countries, India and Iran to distinguish whether student's attitude towards e-learning can be predicted by computer self-efficacy and anxiety. The following hypotheses were tested :

H1: There is no significant effect of computer self-efficacy on Indian and Iranian students' attitude towards e-learning.

H2: There is no significant effect of computer anxiety on Indian and Iranian students' attitude towards e-learning.

H3: There is no significant effect of computer self-efficacy on Indian students' attitude towards e-learning.

H4: There is no significant effect of computer anxiety on Indian students' attitude towards e-learning.

H5: There is no significant effect of computer self –efficacy on Iranian students' attitude towards e-learning.

H6: There is no significant effect of computer anxiety on Iranian students' attitude towards e-learning.

Methodology

Tools

The following tools were used in the present study:

1. Attitude scale towards e-learning (developed by investigators).
2. Computer self-efficacy scale by Embi (2007)
3. Computer anxiety scale by Embi (2007)

Scale of attitude towards e-learning

In order to assess the students attitude towards e-learning, 92 items of attitude towards e-learning through consultation with the experts in the filed of educational technology in panjab university of India was developed on a five point scale. For positive items, score of 5 was given for strongly agree, 4 for agree, 3 for undecided, 2 for disagree and 1 for strongly disagree. On the contrary for negative items, score of 1 was given for strongly agree, 2 for agree, 3 for undecided 4 for disagree and 5 for strongly disagree. Six domains as Perceived usefulness, Intention to adopt e-learning, Ease of e-learning use, Technical and pedagogical support, E-learning stressors and Pressure to use e-learning. The scale was also administered to 200 University students from two countries (India and Iran) for the Try-out of the scale.

The total scores for the 100 students from India and 100 students from Iran were arranged in a descending order. 27% of the high scores and 27% of the low scores were identified. Then, for each of the 92 items, a t-ratio was computed for the higher and the lower groups to find out the discriminating power of each item. On the basis of the value of t-ratio, 9 items were rejected as they did not discriminate even at 0.05 level of confidence. The reliability of the attitude scale was computed by the method of internal consistency and Cronbach's alpha for both Indian students (N=50) and Iranian students (N=50) of sample separately. The reliability of the total test was .834 which is considered very well (Hair et al. 1998). In addition, Table 1 shows the reliability of the measurement scale for each subscale.

Table 1. Cronbach's alpha reliability for different domains of Attitude towards e-learning.

Country	Domain	Cronbach's alpha	Total (Reliability between domain and total)
India	Perceived usefulness of e-learning	0.70	0.61
	Intention to adopt e-learning	0.65	0.60

	Ease of e-learning use	0.65	0.59
	Technological and pedagogical support	0.60	055
	E-learning stressors	0.84	0.70
	Pressure to use e-learning	0.65	0.56
Iran	Perceived usefulness of e-learning	0.80	081
	Intention to adopt e-learning	060	0. 55
	Ease of e-learning use	068	0. 57
	Technological and pedagogical support	0.60	0.55
	E-learning stressors	0.68	0.57
	Pressure to use e-learning	0.77	0.55
Total	Perceived usefulness of e-learning	0.75	0.69
	Intention to adopt e-learning	0.74	0.68
	Ease of e-learning use	070	0.65
	Technological and pedagogical support	0.61	0.56
	E-learning stressors	0.79	0.66
	Pressure to use e-learning	071	0.57

Face validity and content validity of the scale was ensured through consultation with faculty members from different departments of Panjab university, Computer Science, Mass Communication, Correspondence Education, Education, English from the first draft till the last draft of the scale of attitude towards e-learning.

Computer self-efficacy scale

Computer self-efficacy scale by Embi (2007) was used in this study which was based on Durndell and Haag (2000) scale with slight modifications. In the pilot test, questionnaire was distributed among 20 faculty members at UITM in Malaysia. The overall reliability coefficient of the scale was 0.94.

The instrument is comprised of 29 items consisting of three domains as Beginning skills, File and software skills and advanced skills. All the 29 items of the scale are positively worded items and are given a score of "1", "2", "3", "4" for strongly disagree, moderately disagree, moderately agree and strongly agree. The sum of these values gives the student's computer self-efficacy score for the subject. The total score varies from 29 to 116, showing least computer self-efficacy to highest computer self-efficacy. High scores indicate respondents 'high level of computer self-efficacy in using computers and vice-versa. The reliability of the overall scale and it's different domains has been derived by employing Cronbach's alpha for both Indian students (N=50) and Iranian students (N=50) of sample separately by researcher as demonstrated in Table 2.

Table 2. Cronbach's alpha reliability for different domains of computer self- efficacy.

Country	Domain	Cronbach's alpha
India	Beginning skills	0.93
	File and software skills	0.92
	Advanced skills	0.87

	Total computer self-efficacy scale	0.90
Iran	Beginning skills	0.92
	File and software skills	0.93
	Advanced skills	0.87
	Total computer self-efficacy scale	0.90
Total	Beginning skills	0.92
	File and software skills	0.90
	Advanced skills	0.89
	Total computer self-efficacy scale	0.91

Computer anxiety Scale

This study used Computer Anxiety Scale by Embi (2007) who slightly modified the version of the Computer Anxiety Scale (CARS) developed by Hienssen Glass and Knight (1987). In the pilot test, questionnaire was distributed among 20 faculty members at UITM in Malaysia. The overall reliability coefficient of the scale was .74. The reliability of the overall Computer Anxiety Scale and it's domains has been derived by employing Cronbach's alpha for both Indian student (N=50) and Iranian students (N=50) separately by the researcher as demonstrated in Table 3.

Table 3. Cronbach's alpha reliability for different domains of computer anxiety

Country	Domain	Cronbach's alpha
India	General anxiety about ability to use computers	.70
	Confidence in ability to learn about computers	.68
	Motivation/necessity to learn about computers	.78
	Power and control of computers	.69
	Total computer anxiety scale	.81
Iran	General anxiety about ability to use computers	.78
	Confidence in ability to learn about computers	.67
	Motivation/necessity to learn about computers	.76
	Power and control of computers	.70
	Total computer anxiety scale	.84
Total	General anxiety about ability to use computers	.73
	Confidence in ability to learn about computers	.67
	Motivation/necessity to learn about computers	.77
	Power and control of computers	.71
	Total computer anxiety scale	.83

Sample

The population of this study consisted of all the postgraduate students who were studying in Panjab University, Chandigarh as well as University of Tehran in India and Iran respectively. 800 post-graduate students of different faculties and departments of Panjab University (PU) and University of Tehran (UT) were the sample of the present study. Therefore, the sampling technique at this level was purposive-cum random. Stratified sampling technique was also employed in the present study. Firstly , two faculties from Panjab University and two faculties from University of Tehran (UT) namely , arts , science were randomly selected respectively. Secondly, from each selected faculty, five departments were randomly selected. 40 students questionnaire were distributed in each department randomly. Care was taken that female and male students were equally selected to answer questionnaires.

Data Collection

Data was collected in the year 2009. It took about six months to collect data from 800 Indian and Iranian students. Before collection of the data selection of faculties and departments was done on the basis of randomization technique. It was necessary to take permission in some departments from the chairperson. Then, students of different sections of class in a particular department were selected randomly. It was also taken care to select both female and male students equally in each department. Rapport was established with them and standardized instructions were read out for each tool. Students were encouraged to give correct information and were assured that these are to be used only for research purpose and will remain confidential. Participants took between 15 and 25 minutes to complete the questionnaires. It was checked that they have answered all the statements.

Data Analyses

In testing hypothesis 1 and 2 a multiple regression equation was computed that included all predictor variables simultaneously to determine the joint effect of these variables on student's attitude towards e-learning .

Table4. Regression results for H1and H2

Variables	Standardized Coefficients B	T	P	R Square	F	Sig
Computer self-efficacy	.225	5.972	0.0001	.171	82.153	0.0001
Computer anxiety	-.249	-6.594	0.0001			

The results in Table 4 show that computer self-efficacy and anxiety significantly (F= 82.153; P<.0001) and predict 17.1% of variations in total students' attitude toward e-learning. Table 3 reveals that the R2 value for total students' attitude toward e-learning was .171. It means that 17.1% of the total students' attitude toward e-learning (India and Iran) was explained by the independent variables of above mentioned. Further, As indicated in Table3 , computer self-efficacy had a significant positive effect on total scores of students' attitude towards e-learning (B= .225 , t=5.972, P<0.0001). Hence H1 was supported. As shown in Table 3, computer anxiety had a significant negative effect on total scores of students' attitude towards e-learning (B=-.249, t=-6.594 , P<0.0001). Hence H1 was supported.

Table5. Regression results for H3 and H4

Variables	Standardized Coefficients B	T	p	R Square	F	Sig
Computer self-efficacy	.200	3.577	0.0001	.134	30.633	0.0001
Computer anxiety	-.216	-3.875	0.0001			

Hypothesis 3 and Hypothesis 4 were tested by regression both computer self-efficacy and anxiety on Indian students' attitude towards e-learning. Table 5 provided results from the regression analysis for both H3 and H4 . The results revealed that computer self efficacy and anxiety contribute significantly (F=30.633; P<.0001) and predict 13.4% of variations in Indian students' attitude toward e-learning. Further, the results show that computer self-efficacy (B=.200 , t= 3.577, P<0.0001) and computer anxiety (B=-.216 , t= -3.875 , P<0.0001) are key Indian students' attitude shapers. Accordingly, H3 and H4 are both supported.

Table 6 . Regression results for H5 and H6

Variables	Standardized Coefficients B	T	p	R Square	F	Sig
Computer self-efficacy	.263	5.053	0.0001	.213	53.611	0.0001
Computer anxiety	-.267	-5.142	0.0001			

As shown in Table 6, Hypothesis 5 and Hypothesis 6 were tested through a third regression model. The results in Table show that computer self-efficacy and anxiety significantly (F=53.611 ; P<.0001) predict 21.3% of variations in total students 'attitude toward e-learning. Further, the results show that computer self-efficacy (B =.263, t=5.053 , P<0.0001) had significant effect positive on Iranian students' attitude towards e-learning. It is also observed that there is an inverse relationship between computer anxiety and Iranian students' attitude towards e-learning (B =-.267, t=-5.142 . P<0.0001).

Conclusion

Studies advocated that students' attitude towards e-learning can be predicted by computer self-efficacy and computer anxiety. According to the results of this study, as students become more confident or less anxious in using computers, their attitudes may change. In other words, students with high computer self–efficacy and low computer anxiety have more positive attitudes towards e–learning. Further research should be conducted to determine the reasons for this and to suggest possible solutions. In addition , this study only focus on the postgraduate students at universities, but not the faculty members. Further research could be conducted to study faculty member's attitude towards e-learning in relation to their computer self-efficacy and anxiety in comparison with the results of the current study.

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