Attitude of Students Towards E-Examination System: an Application of E-Learning

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Abstract: Information communication technology (ICT) is the buzzword of the 21st century. The letter 'E' appears in the words e-commerce, e-government, e-banking and etc. In essence, the said letter reflects the ICT component that is utilized in providing more 'reach' in addition to making more effective and efficient commercial transactions, government transactions and financial transactions to name a few. An e-based system will be utilized when there are supportive factors that collectively encourage its use. The perspective of the user is an undeniably important component. Universities being institutions that stimulate learning and research are not immune to the affects of ICT. Examinations inevitably play a role in such an environment as one of the many ways available to assess student learning outcome. Thus this study was conducted in an Iranian university to explore the students' intention to use an electronic examination system (e-examination system) that was currently in place. Part of the Technology Acceptance Model (TAM) was utilized in a sample size comprising 230 students. It was discovered that students' intention to use an e-examination system was influenced by computer literacy whereby the said relationship was mediated by perceived usefulness.

Keywords: Electronic Examination System, Perceived Usefulness, Computer Literacy, Intention of Use

1. Introduction to Information and Communication Technology

Recent developments in science and technology in general and expansions in the field of information technology, in particular, have infinitely influenced the concept of collection development and have brought in extensive changes in information collection, storage, and dissemination.

Vajargah, Jahani and Azadmanesh (2010) had been defined information communication technology (ICT) as a diverse set of technological tools and resources used for creating, storing, managing and communicating information [16]. Such a definition is in alignment with Zare-ee (2011) who asserts that the term ICT is a manifestation of communications technology that is embracive of computers, videos, associated hardware, networks and software [17]. ICT had changed the way consumers interact or transact with government or businesses. It has enabled such interactions or transactions to become more effective and efficient. At the core of ICT lies information that can be translated to usable knowledge [17].

Given the fact that education is a minefield of information, it is only natural that ICT should make inroads into the arena of education. Education at the tertiary level is dynamic as it encompasses the fundamentals of teaching, learning and research [5]. Vajargah et al. (2010) argued that ICT at the tertiary level enables efficiency in the educational process, makes more effective the learning process, enables problem-solving activities, promotes new ways to learn and work, encourages collaborative learning and research and promotes new ways of interacting [16].

However, for ICT applications to take root in higher education, in Iran in particular, a collection of facilitative factors must be in place (government ICT policy, infrastructure, financial muscle, systematic training and development programs, well-coordinated government agencies responsible for policy/strategy formulation and implementation and a decentralized higher education system) as alluded to by Vajargah et al. (2010) [3]. Zare-ee (2011) is of the view that as far as Iran is concerned the state of ICT application is, "a combined feeling of hope and despair".

Nevertheless, he asserts that universities in Iran have somewhat paved the ground for ICT use in the current learning and teaching activities [17].

Zare-ee (2011) makes a pertinent observation regarding ICT's effect on education: ICT's effect on education is not uniform across societies [17]. The prevalence of an ICT gap between Arab countries and the developed world in Abouchedid and Eid (2004) for instance is supportive of this fundamental fact [1]. Given Iran's current state of affairs in terms of ICT application in higher education much still needs to be learned about types of applications that are in use and the factors that are supportive of or militate against their continuity [33]. Thus this paper bears evidence that an ICT application in the form of an electronic examination system (e-examination system) is currently in use at a university level in Iran. In the said universities, the use of the e-examination system is not mandatory whereby students have a choice whether to use the e-examination system or otherwise.

E-Examination System

At the tertiary level, examinations take many forms: written exam, oral exam or practical exam [4]. Written exams take varied forms as well: multiple choice questions, short structured questions or essay type questions. These forms are not mutually exclusive, and at times a cocktail of varied examination types are offered depending upon the nature and content of the course [18]. Examinations at the university level, when conducted and managed the traditional way, consume time (preparing questions, marking answer scripts) and human resources (invigilators) from the time exam questions are formulated until the time the results are released especially when class sizes are large [14].

E-examination systems enable the simplification of this process as the e-examination system would manage the time-consuming acts and the security features built into the system can reduce the need for invigilators [20]. This method has many advantages, including that a person can quickly be aware of the test result and his position in comparison with those of others. The waste and disposal of paper and other national wealth are also prevented. Moreover, according to the principle that in this test system, each person has different orders in the questions from their nearby examines the possibility of cheating is reduced [21]. Among the factors that determine the stability of this method as an alternative to traditional tests are desire and satisfaction level of the examinees. Other main benefits of using E-examinations are; all students will be treated equally, because the system will be bought once, the running cost of papers photocopy is high, the examinations will be prepared to a high standard, all the same format, no one will be able to cheat because the examination process will be the same for all students but the questions are going to be displayed randomly, The system will display the result immediately [19]. So the system will save the time of correcting the examinations, and the results are going to be 100% accurate without any mistakes of the manual correction, and all the exams are going to be clear and using the same format, the students will be more comfortable answering computerized examinations [14-18-20].

However, it must be acknowledged that such a system is feasible for multiple choice questions or short structured questions. These types of questions when developed well enable students' to be tested in multiple areas; in essence, it provides breadth [3]. In addition, they allow for regular assessment of the students' understanding of subject matter provided class size is manageable when examinations or assessments are carried out the traditional way [3].

The Ministry of Education in Iran has advocated the application of varied types of ICT in all educational institutions. Thus many types of software have been developed for the conducting of examinations electronically. For example, the Microsoft Certified System Engineer (MCSE) exam that is executed every year under the purview of the Ministry of Science Research and Technology; and the Cisco Certified Network Associate (CCNA) exam which can be executed by any private or public institute in Iran (that is certified by Cisco) are conducted electronically [3]. Thus it is not unusual for a university such as the one involved in this study to have adopted the e-examination system. Initially, four universities adopted the e-examination system. Currently, only one university in Iran is using the e-examination system. Continuity of use of an ICT application is a challenge. The findings of this study would enable the discernment of users' intention to use (students' perspective) the e-examination system and whether computer literacy impacts intention to use mediated by perceived usefulness. It is hoped that the findings would be of help to university administrators who have to make decisions pertaining to adoption and maintenance/continuance of e-examination systems and software developers in the improvement of their product.

2. Literature Review

Past research evidences a positive relationship between perception of the usefulness of ICT and intention of actually using any form of ICT [14]. Teo et al., (2008) in their study comprising students and teachers discovered a positive relationship between perceived usefulness and actual usage of computer software that was developed only for educational purposes [15]. Allan et al., (2004) and Badamas (2010) discovered the same although the type of ICT and user type were different [2].

A person with sufficient information technology (IT) (computer literacy) must be able to understand basic ideas regarding computer programs, computer's components (hardware and software), and have a positive attitude toward computers and electronic systems technologies [4]. Past research also evidences a positive relationship between computer/IT literacy; IT training and intention to use any form of ICT [15-10-7]. It is argued that IT or computer training acts as a proxy for IT/computer literacy [10].

Computer literacy and its proxy computer training had many effects toward the perception of the usefulness of an

ICT based application and eventually lead to the intention to use or reject the use of an ICT based application [7-20]. In short, knowledge affects the perception of usefulness and influences behavior (to use or not to use ICT application) [7]. Past research by Teo et al. (2008) and Hsu et al. (2007) are reflective of the mediating effect of perceived usefulness [15-9].

Petrogiannis (2010) discusses the self-efficacy or social cognitive theory [12]. This theory defines intention or behaviour as a direct function of attitude. Positive behaviours or negative ones can influence the way that students and teachers may react when they have been exposed to a newly implemented ICT-based system [13]. In addition, Park (2009) asserts that teachers with the low level intention of using computers (negative attitude toward using computers), may not be able to encourage their students to work with a new ICT-based system [13-21]. Thus in an educative environment, the intention to use a new ICT-based system must be reposed in the teachers and the students especially when the use of the ICT-based system is not mandatory [19]. However, in this paper, the focus is on giving the users of the e-examination system who are students a voice and to discern whether their intention to use the ICT-based system is affected by computer literacy mediated by their perception of the usefulness of the e-examination system.

The research objectives are to determine the effect of computer literacy and perceived usefulness on intention to use the e-examination system; and the mediating affect of perceived usefulness. The research questions are as follows:

Do computer literacy and perceived usefulness affect students' intention of using the e-examination system?

Does perceived usefulness mediate the relationship between computer/IT literacy and students' intention of using the e-examination system?

3. Research Methodology

A questionnaire survey was conducted and data was collected over a period of one month. The sample size was 230 comprising students of the only university in Iran using the e-examination system. All the students in the sample had experienced using the e-examination system. The unit of analysis for this study is the individual and type of sampling method used was in the nature of convenience sampling given the time and resource constraints faced by the researcher. Thus the sampling group may not necessarily be representative of the population [5].

Figure 1 is illustrative of the three main variables used in this paper: perceived usefulness, computer/IT literacy and intention to use.
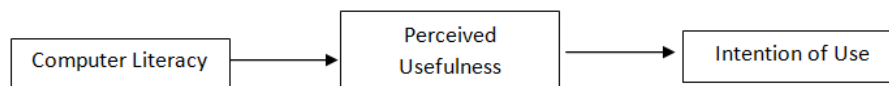

Figure 1. Three main variables used in this research.

The items used to measure the three variables are stated in Table 1. Computer/IT literacy was measured via 5 items adapted from [11]. Perceived usefulness and intention to use were measured by 5 items and 3 items respectively; whereby all items were adopted from [3]. Every item was measured using a Likert scale ranging from 1-5 (1 = strongly disagree; 5=strongly disagree). All items measuring a particular variable were summated and averaged creating a scale for perceived usefulness, computer/IT literacy and intention to use.

Table 1. Items measuring perceived usefulness, computer/IT literacy and intention to use.

Perceived Usefulness	Using this e-examination system makes the examination process easier (in the sense that I don't need to bring to the exam hall things like pens, pencils, erasers, calculators and etc.)
	Using this e-examination system allows me to focus more on the exam and the questions
	By using this e-examination system I can modify or change my answers easily
	Using this e-examination system saves a lot of my time (in the sense that I can finish up my exam faster than doing the exam manually)
	Using this e-examination system minimizes the exam stress that I feel
Computer Literacy	The concepts of hardware and software are clear to me
	I have knowledge of and can work with standard operating systems (windows XP, windows Vista, windows 7)
	I can install and run software easily
	Working with external memories (like Flash drive, External Hard drive, CD, DVD) is easy for me
	I can work with standard operating system's function (such as copy, create backup, print and etc.) easily
Intention to Use	I intend to continuously use this e-examination system instead of the manual exam system
	I recommend using this e-examination system instead of the manual examination system to others
	If I assume that this e-examination system will be available to me in the future, I predict that I will use this e-examination system

In order to determine whether the items used measured a particular construct reliability analysis was conducted. The results are displayed in Table 2. Cronbach's Alpha values for all three variables registered 0.7 and above. Thus in line with [6], it was concluded that all the items within a construct measured the way that was anticipated.

Table 2. Results of reliability analysis for variables used in the study.

Variables	Number of Items	Cronbach's Alpha
Computer Literacy	5	0.838
Perceived Usefulness	5	0.856
Intention to Use	3	0.741

4. Results and Analysis

A total of 230 completed questionnaires were used for this study. The data was analysed using the statistical software package SPSS version 17.

4.1. Sample Profile

Table 3 displays the respondents' profile. From the said table it appears that a significant majority of the respondents (>55%) are female, between the ages 21-30 years, originate from Tehran, are majoring in computer and mechanical related courses, are in years 1 and 2 and have utilized the e-examination system between 3-6 times.

***Table 3.** Profile of the respondents.*

Demographic Variables		Frequency	Percentage
Gender	Male	91	39.6%
	Female	139	60.4%
Age	< 20 years	16	7.0%
	21-30 years	169	73.5%
	>30 years	45	19.65
Place of Origin	Tehran	181	78.7%
	Others	49	21.3%
Major	Computer & Mechanical	137	59.6%
	Physics, Mathematics, Chemistry & Architecture	93	40.4%
Year of Study	Year 1	67	29.1%
	Year 2	84	36.5%
	Year 3	40	17.4%
	Year 4	39	17.0%
Frequency of E-examination System Use	< 3 times	11	4.8%
	3 – 6 times	189	82.2%
	>6 times	30	13.0%

As it has been demonstrated in table 3 above, the majority of respondents were female with the count of 139 compare to 91 male respondents. The age group was mostly filled by students between the ages of 20 to 30 years old which were 169. 16 of the students in the research respondents pool were under 20 and 45 students were above 30 years old. Most of respondents were original came from Tehran and the dominants major of study amongst them was computer science and mechanical engineering. The majority of respondents had interacted with the e-examination system between 3 to 6 times.

4.2. Impact of Computer Literacy and Perceived Usefulness on Intention to Use

In determining whether computer/IT literacy (CL) and perceived usefulness (PU) would impact intention to use (ITU) e-examination system multiple regression analysis (MRA) was executed. Prior to running MRA statistical tests were executed to determine compliance with certain assumptions: normality, linearity, independence of error term, homogeneity of variance [8]. In determining the mediating effect of the variable PU between CL and ITU regression techniques were used and the aforesaid assumptions were tested for compliance as well. All assumptions were met before MRA and Regression Analysis techniques were executed.

In order to determine whether computer/IT literacy and perceived usefulness affected intention to use, Multiple Regression Analysis was executed. ITU was entered as the dependent variable (DV) and regressed against CL and PU that were entered as independent variables (IVs). Table 4-6 display the results of the MRA. It shows that CL and PU explain 78.3% of the variance in ITU (R square=0.783); and that both the IVs have significant positive relationships with ITU ($p< 0.05$) with the variable PU being a more significant contributor (p=0.001) compared to CL (p=0.031).

***Table 4.** Results of multiple regression analysis: ITU regressed against CL and PU.*

Selected Variables	Beta coefficients	t-value	Sig.	Tolerance	VIF
Computer Literacy (CL)	0.208	6.050	0.031	0.540	1.352
Perceived Usefulness (PU)	0.579	14.108	0.001	0.319	1.026
R square	0.783				
Adjusted R square	0.718				

***Table 5.** Results of multiple regression analysis: PU regressed against CL.*

Selected Variables	Beta coefficients	t-value	Sig.	Tolerance	VIF
Computer Literacy (CL)	0.302	11.032	0.039	0.537	1.317
R square	0.701				
Adjusted R square	0.685				

Table 6. *Results of multiple regression analysis: ITU regressed against CL.*

Selected Variables	Beta coefficients	t-value	Sig.	Tolerance	VIF
Computer Literacy (CL)	0.421	9.011	0.011	0.331	1.000
R square	0.813				
Adjusted R square	0.803				

Table 7. *Mean values of selected variables.*

Selected Variables	Mean values
Computer Literacy (CL)	3.81
Perceived usefulness (PU)	3.7
Intention to Use (ITU)	4.07

In accordance to the mean values measured for the components of the study (Table 7), the results demonstrate that Intention to Use from students' perspective carries the most significant mean values equal to 4.07 and students' perception of usefulness among three components carries the least mean value equal to 3.7.

4.3. Impact of Perceived Usefulness as a Mediator in the Relationship Between Computer Literacy and Intention to Use

The Sobel's test was used to determine PU's mediating effect. Based on [8] these steps were followed: (a) ITU was regressed against PU (beta coefficient=0.579) and CL (beta coefficient=0.208) whereby both were significant positive predictors of ITU as p values were < 0.05 (Table 4); (b) PU was regressed against CL whereby CL had a significant positive impact on PU (beta coefficient=0.302) whereby CL has a significant positive impact on PU as p values were < 0.05 (Table 5);

5. Discussion

The findings show that computer literacy has an impact on intention to use. It appears to be consistent with research by Teo et al. (2008) in their sample comprising teachers in Malaysia and Singapore who discovered that computer/IT literacy had a profound impact on the acceptance of new technology [15]. Kumar (2008) in his study that also involved teachers from Malaysia discovered that when teachers were given sufficient training they were more amenable to working with new software [10]. Ceobanu et al. (2010) also cement the importance of computer/IT literacy or ICT related training in influencing the level of satisfaction or even intention toward using a new pack of software [7]. Based on the findings of this research, students who have a low level of computer literacy would be unable to use the e-examination system effectively and thereby they are more likely to reject such a system. Sufficient training can be administered by the university or the software developers to increase the level of computer literacy among students as well as lecturers who are party to the said e-examination system.

The findings also show that perceived usefulness mediates the relationship between computer/IT literacy and intention to use. When students are computer/IT literate they would be able to better assess the benefits of an e-examination system as the fear and ignorance of an ICT based application has been overcome via knowledge. Their perception of perceived usefulness of the e-examination system may then affect their decision to utilize the said e-examination system. These findings are also supported by past research that holds the same [14-9].

6. Conclusion

The mean values of all the variables have been displayed in Table 7. The mean values of CL and PU fall on the high end of a medium scale. From the perspective of university administrators, it can be appreciated that the level of computer literacy is on the high end of the medium scale and that this augurs well for the continuity of the e-examination system that is already in place and perhaps the introduction of any other ICT based system. Perhaps the university administrators would want to make mandatory the use of such an e-examination system. However, the mean value for perceived usefulness is lower than the mean value for computer literacy. From the perspective of the software developer, it can be argued that perhaps there are avenues for them to improve on the perceived usefulness of the said e-examination system while at the same time ensuring that the level of computer literacy is high among the intended users (the students) and third parties (lecturers). By looking at mean value of Computer literacy and perceived usefulness it is safe to assume that level of literacy and usefulness among participants in this research is high, yet since sampling method for collecting data was convenience sampling it might have bios of not covering all range of students in that certain university and therefore it would be advisable to universities' administration that level of computer literacy must be set to a standard level among all students from different background as well as lecturers. Also by looking at intention to use mean value, since it is referred that most of the participants are likely to use the software again, then software developers may want to focus more on security issues and user interface of the software thus these two factors can have a great impact on students and lecturers perception of software usefulness and thereby they are more likely to work with it in future. Given the fact that the use of the e-examination system is optional software developers need to ensure that the perspectives of the lecturers match the perspectives of the students in a positive manner. It would be of no benefit if students' perception of the usefulness of e-examination system and intention to use the said system are high but such fervour is not matched by the lecturers.

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