Evaluation of Effective Factors on Electronic Learning and Satisfying Learners in Virtual Universities of Tehran

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Abstract

In our country, considering the large number of scholars, the lack of training places and students who are employed, electronic training and learning could be considered the most significant instructional procedure, especially in higher education. On the other hand, there are a lot of institutes and universities that are finally defeated, in spite of wide investment in electronic learning and plentiful advertisement. In other words students haven’t been satisfied with these courses or dropped out. Therefore, evaluation of effective factors on electronic learning acceptance by users and investigation of their satisfaction are very important. So, in this research, we investigated the relationship between electronic learning and satisfaction (according to research model).

Methods used in this paper are descriptive-analytical and they're of applied type, in terms of purpose. The correlation coefficient was used to study the relationship between components - instructor characteristics, design of learning content, teaching materials and playfulness- and electronic learning, separately and their relationship with satisfaction. Then, the effect of electronic learning components on satisfaction (main hypothesis) was predicted using the linear regression equation. Population of the study is the students of K.N.Toosi university of Technology, Amirkabir university of Technology, Iran University of science and Technology. Estimated sample size is 145 persons. Cronbach's α coefficient was calculated as 0.91. After the final analysis derived from the questionnaire, researcher concluded that effective factors on electronic learning in order of their effect are: instructor characteristics, design of learning content, teaching materials and playfulness. And at the end, it was found that design of learning content has the most effect on the satisfaction of learners and then teaching materials, instructor characteristics and playfulness are the next effective factors (in order of their effect).

Keywords: Electronic Learning, Satisfaction, Virtual University, Learners, Internet

1- Introduction

The expanse of personal computers and the development of the internet facilitate rapid changes in societies. Electronic communications and digital networks alter our activity methods and transform our personal communications and entertainments into a new form. This evolution has a deep effect on learning opportunities and needs. The shift pattern, however, which is still dominant over education, has changed a little. In the present era, E-learning courses make up an important part of higher education and many institutes have huge investments to integrate and maintain E-learning systems.

E-learning is described as an innovative approach to present an equipped, well-designed, interactive, and learner-based learning environment for everyone in everywhere and every time to create a free and flexible environment through applying resources and specifications of different digital technologies along with other pedagogical methods (Doli, 2005, p.2). E-learning possesses 3 specifications. Learning is a network and it is
possible to update, store, recover and expand information inside it; it is feasible using computers and applying
global standard of the Internet, and involves the advanced approach of learning (including transfer of knowledge
and information along with behavioral changes and performance improvement) (Karimi, 2006, p.2).
Development of E-learning has found its places in Iran's higher education as a necessity and a main requirement
to realize goals of The Fourth Development Plan (knowledge-based development), so that more universities
enter this area every year. There are numerous reasons for why it is important to respect the growth in applying
and implementing E-learning systems the most significant of which is to reduce the cost of education. In
addition to thrust in costs, advantages such as more rapid development, updating courses and fields, creating
more rapid education, accessibility in every place and every time, external learning opportunities, incitement,
morale and implementing strategic arguments are achievable through executing and implementing E-learning
system (Kamalian & Fazel, 2009, p.15). With huge and extended investments in this area, if users do not use the
system then the capital wastes and becomes useless. The full understanding of effective factors on the system's
effectiveness (from user point of view) helps universities and institutes to lead their investments toward
effective factors and omit or redesign ineffective ones. It is necessary for every organization or university tended
to implement E-learning to be familiar with its success factors in order reduce the failure risk.
Therefore, the evaluation of effective factors on accepting E-learning (from user point of view) the investigation
of their satisfaction is of great importance. Hence, the present paper examines the relationship between E-
learning and its components (instructor characteristics, design of learning content, teaching materials and
playfulness) and learners' satisfaction (based on research model) to provide the area for an E-education
consistent with learners' needs through proper investment.

2- A Review on Theoretical Literature

The evolution of information technology influences all parts of a society, including education. This effect is
not the same for all cases since societies have different characteristics and infrastructures and they benefit from
knowledge and technology differently, in many cases. One of the problems of applying E-learning and E-
education in the area of higher education is the lack of a compromised definition of these concepts. In fact, no
official and scientific authority has presented a certain and reliable definition of these concepts and the available
descriptions are partly different:
"Education" includes any pre-planned activity or design which tends to develop learning in learners. "Learning"
means developing a relatively permanent change in learner's potential behavior, provided that the change occurs
through experience (Darab, 2009, p.4). E-learning concerns benefiting from modern communication and
information technologies in order to present education in digital world and browser-based systems and involves
educations through all electronic media including Internet, Extranet, satellite broadcasting, audio and video
tapes, etc (Govindasmy, 2002, p.287). Some researchers describe E-learning as delivering pedagogical content
through electronic media such as Internet and Extranet, satellite programs, audio and video tapes, interactive
television and CD ROM (Engelbrecht, 2005, p.218). Others consider E-learning as a web based learning and
say that web based communications teach individuals and organizations to coordinate, transfer knowledge and
increase value (Kelly & Bauer, 2004, p.513).
Studies show that technology, technical skills, incitement, instructor characteristics and student characteristics
are factors that influence learning effectiveness (Dillon et al, 1995). Other investigations focus on more varied
factors effective on E-learning acceptance by students, such as design of learning and facilitators for students to
use E-learning (Martinez et al, 2007, p.148). Also, some other studies have shown that the experience of using a
computer is affected by playfulness (Hackbarth et al, 2003, p.224).
The important issue is to specify and assess effective factors on using E-learning by students in order to identify
what is effective on their satisfaction and provide them with it. Hence, factors effective on E-learning and
satisfaction are described below.

1. Instructor characteristics: This factor relates to key characteristics of the instructor in the environment
of E-learning and refers to assistance, attention and coordination of the instructor with students. In
other words, the instructor must present a clear and high quality teaching and provide required
information for learning process. Also, he (she) has to be fair in measuring students' performances and create incentives for them to learn.

2. Teaching material: This means the media used in E-learning and here refers to the Internet.

3. Design of learning content: This means the design of learning subjects that must be consistent with student’s needs. Furthermore, content difficulty level and timing plan must be proper and flexible, respectively. The timing plan should also provide individual learning management and a variety of learning methods.

4. Playfulness: Includes the extent to which applying a computer system is personally enjoyable, regardless of material value of the technology.

Finally, the present paper examines learners' satisfaction of E-learning: Satisfactions is described as the identification and understanding of learners behavior. In recent years, this subject is more investigated as an emotional category (Alvani, 2006, p.112). In fact, it is one of the most important factors in learning process. Satisfaction of learners in each course leads to an increase in incentives to learn and improvement of learning. This issue is examined through conducting questions about the environment and system facilities, presented content, interaction in the system, the extent of personalized learning environment consistent with individuals' characteristics and trends.

3- Research Background

- In an article titled "Desired characteristics of students and members of scientific board in E-learning in Iran higher education", "Yaghubi et al" studied the characteristics of students and members of the scientific board. Results showed that self-confidence and responsibility, participation and innovation, skills in information technology, and incentive factors are the most prior characteristics of students of virtual courses. Form respondents' point of view, management and encouragement, virtual interaction, support students, electronic commitment, creating an interactive environment and positive approach to E-learning are the most important desired characteristics of the scientific board members. Also, considering the results, factors effective on education system and E-learning could be divided into 2 categories: 1) support factors, and 2) contents and teaching material (Yaghubi et al, 2008, pp.159-173).

- In an article titled "Factors effective on E-learning: studying students' viewpoint", "Selim et al" identified and measured effective factors on learning from students point of view. In that research he examined 4 factors of instructor characteristics, students characteristics, technologic infrastructure and university support through a survey from 538 university students. Results showed that instructor characteristics is them most effective factor on method success and afterwards come technologic infrastructure and university support in order. Student characteristics have the least effect on E-learning success (Selim et al, 2007, p.157).

- In an article titled "generalization of knowledge through E-learning system: identification of the role of self-efficiency and enthusiasm mediators in understanding of usage simplicity"," Tai et al" studies cognitive and individual aspects of E-learning. Findings showed that, from the user's point of view, self-efficiency and enthusiasm to computer are mediators of the effect of personal innovation (through IT and playfulness of the computer) and the percept usage simplicity. The important point is that playfulness is a useful requirement of adults' learning and designing digital learning environments may emphasize on theoretical bases of learning and playfulness. Playfulness includes elements which relate to creative, social, emotional and learning inputs and thus increase incentives to learn (Tai et al, 2011, pp.71-83).

- In an article titled "Validation of E-learning factors effective on education effectiveness", "Llim et al" argued the effective E-education. The research studied tow issues: 1) detection of determinant factors of effective online education, and 2) how these factors affect learning performance and its transfer. Finally, it was concluded, from empirical data, that there is a significant and meaningful relationship between individual and organizational concepts and design of online education and education effective concepts (learning and transfer performance) (Lim et al, 2007, pp.22-35)
4- Conceptual Framework of the Research

The theoretical framework is a conceptual pattern based on theoretical relationship between some factors that are considered important about studies issues. The theoretical framework flows logically through investigating research backgrounds in the scope of the research problem. Respecting presented definitions and previous studies, the following model in presented here, which is based on the model of "Chan Lee et al" in an articles titled "Acceptance of E-learning by learners in South Korea, Theories and findings" (Chan Lee et al, 2009, pp.1320-1329).

![Diagram of Conceptual Framework]

Figure 1: The relationship between satisfaction and E-learning and its components

Following hypotheses are considered in the present paper, respecting the presented pattern:

The main hypothesis is: "There is a relationship between E-learning and Learners' satisfaction".

Other hypotheses include:
1. There is a relationship between instructor characteristics and E-learning.
2. There is a relationship between teaching material and E-learning.
3. There is a relationship between design of learning content and E-learning.
4. There is a relationship between playfulness while learning electronically and E-learning.

5- Research Methodology

In terms of purpose, the present research is of applied type. Data gathering method is descriptive and research is a field study. Also, library studies are used to enrich theoretical principles of the research. In order to achieve required data to test proposed hypotheses, questionnaires were used as the main data gathering tool. The questionnaires were distributed among students of BS, MS and virtual courses. The questionnaire conducted for the present research has to parts, in terms of content. The first part relates to gather general information of respondents. This part is composed of 5 questions (about gender, age, education, university, and the major of respondents). The second part includes 37 questions related to the variables (dependent and independent) of the research (Table 1).
Table 1: Questions of the questionnaire related to variables of E-learning and learners' satisfaction

<table>
<thead>
<tr>
<th>Rank</th>
<th>Variable</th>
<th>Components</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E-learning</td>
<td>Instructor charac.</td>
<td>(1-6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teaching material</td>
<td>(7-9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design of content</td>
<td>(10-13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>playfulness</td>
<td>(14-17)</td>
</tr>
<tr>
<td>2</td>
<td>Learners' satisfaction</td>
<td></td>
<td>(18-37)</td>
</tr>
</tbody>
</table>

In order to evaluate reliability a preliminary sample of 30 questionnaires was pre-tested. Then, using gained data from questionnaires, the confident coefficient of 0.91 (Cronbach's Alpha) was calculated for the whole questionnaire. This figure indicates that the questionnaire is reliable. Moreover, the content method was used to test the validity of the questionnaire so that after its conduction, the guide professor, the consultant professor and other experts and specialists commented on it. They proposed some points for modification and after exerting their comments, the final questionnaire was conducted. The population of this research is composed of all BS and MS and virtual courses students of Technical University of Amir Kabir, Technical University of K. N. Toosi and the University of Science and Technique. The reason for this selection is that, for the first time in Iran, E-learning system was implemented in these universities and they have the most activities and students in field of E-learning. The method the researcher employed, respecting the available knowledge about studied population, is eventual sampling (random-categorical).

Respecting the mass population (1735 individuals) and the research topic, the researcher calculated the sample size by a proper method (assessment of sample size using success proportion), as follows:

\[
n = \frac{N \cdot Z_{\frac{\alpha}{2}}^2 \cdot p \cdot (1-p)}{\varepsilon^2 (N-1) + Z_{\frac{\alpha}{2}}^2 \cdot p \cdot (1-p)}
\]

As a result, the sample size is

\[
n = \frac{1735 \times 1/96^2 \times 0/5 \times (1-0/5)}{0/07^2 \times 1734 + 1/96^2 \times 0/5 \times (1-0/5)} = 5409 \approx 541
\]

From 1735 members of the population, 475, 750 and 510 individuals were studying in virtual courses of BS and MS in the University of Science and Technique, Technical University of K. N. Toosi and Technical University of Amir Kabir, respectively. To select 541 sample individuals, division in proportion to these 3 groups was accomplished and the questionnaires were submitted to individuals in the following order: 148 students of the University of Science and Technique, 233 students of K. N. Toosi University and 160 students of Amir Kabir Technical University (Table 2).

Table 2: Sample distribution in the population

<table>
<thead>
<tr>
<th>University</th>
<th>Number of Students</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science and Technique</td>
<td>475</td>
<td>148</td>
</tr>
<tr>
<td>K. N. Toosi</td>
<td>750</td>
<td>233</td>
</tr>
<tr>
<td>Amir Kabir</td>
<td>510</td>
<td>160</td>
</tr>
<tr>
<td>Total</td>
<td>1735</td>
<td>541</td>
</tr>
</tbody>
</table>

The abundance of students in BS and MS courses is presented in Table 3.
6- Introduction of Statistical Techniques to Analyze Data

In the present research, Regression statistical techniques and SPSS 18 are used to analyze data and P<0.05 is considered as the significance level. In fact, the relationship between variables is examined through defining zero hypothesis and contrary hypothesis and testing research hypotheses by correlation coefficient. Respecting the goal of evaluating the significant relationship between E-learning and students' satisfaction, correlation coefficient indicator is used which is a mathematical indicator and describes the direction and value of the relationship between two variables. Moreover, since data are gathered categorically, Pierson indicator of correlation coefficient is selected among all indicators. Finally, the model is evaluated through regression equation.

7- Research Findings

Respecting the main hypothesis of the research and relying on evaluation of effective components on E-learning and satisfaction in studied universities, results were examined having gathered data and presented statistical tests in consideration. These results are as follows:

**Hypotheses 1-4: There is a significant relationship between instructor characteristics, teaching material, design of learning content and playfulness and satisfaction.**

- Based on results, the variable of "instructor characteristics" has a direct effect of 89.9% on the variable of E-learning in 3 studied universities. In other words, the side hypothesis of the research, namely, there is a significant relationship between instructor characteristics and E-learning, in confirmed with 95% confidence and this consistent with findings of "Selim et al" (2007).

- Based on results, the variable of "teaching material" has a direct effect of 85.1% on the variable of E-learning in 3 studied universities. In other words, the second side hypothesis of the research, namely, there is a significant relationship between teaching material and E-learning, in confirmed with 95% confidence and "Yaghubi et al" (2008) reported similar results.

- Based on results, the variable of "design of learning content" has a direct effect of 87.5% on the variable of E-learning in 3 studied universities. In other words, the third side hypothesis of the research, namely, there is a significant relationship between design of learning content and E-learning, in confirmed with 95% confidence which is consistent with findings of "Lim et al" (2007).

- Based on results, the variable of "playfulness" has a direct effect of 76.4% on the variable of E-learning in 3 studied universities. In other words, the fourth side hypothesis of the research, namely, there is a significant relationship between teaching material and E-learning, in confirmed with 95% confidence which is consistent with findings of "Tai et al" (2011).

Result summary of Pierson correlation coefficient test of effective factors on E-learning is presented in Table 4.
Table 4: Results of Pierson correlation coefficient test of effective factors on E-learning

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Correlation coefficient</th>
<th>Sig</th>
<th>Confidence percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor characteristics</td>
<td>89.9</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Teaching material</td>
<td>85.1</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Design of learning content</td>
<td>87.5</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Playfulness</td>
<td>76.4</td>
<td>0.000</td>
<td>95%</td>
</tr>
</tbody>
</table>

P<0.05, sig<α ==> zero hypothesis is rejected and contrary hypothesis is confirmed

The Main Hypothesis of the Research: There is a relationship between E-learning and learners' satisfaction.

Pierson correlation coefficient is used to examine the relationship between E-learning (independent variable) and learners' satisfaction (dependent variable). According to results, all 4 variables of instructor characteristics, teaching material, design of learning content and playfulness have a significant relationship with learners' satisfaction. The independent variable of "design of learning content" has the most prominent relationship with learner's satisfaction (87.3%) and afterwards are "teaching material" (80.3%) and "instructor characteristics" (79.5%), respectively. "Playfulness" has the least prominent relationship with learner's satisfaction (49.8%).

Also, the following linear model is specified to investigate the effect of E-learning and its 4 variables (independent variable) on learners' satisfaction (dependent variable). Here, multi-variable regression method is also used to calculate coefficients. Thus, all 4 variables entered the multi-variable regression model.

\[ Y = C + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 \]

Where:
- \( Y \) = Dependent variable of "learners' satisfaction"
- \( X_1 \) = Independent variable of "instructor characteristics"
- \( X_2 \) = Independent variable of "teaching material"
- \( X_3 \) = Independent variable of "design of learning content"
- \( X_4 \) = Independent variable of "playfulness"

The estimated model is:
\[ Y = 2.11 + 0.97X_1 + 2.30X_2 + 3.27X_3 + 1.25X_4 \]
\[ R^2 = 0.884 \]
\[ R^2 = 0.885 \]

Result summary of Pierson correlation coefficient test for effective factors on satisfaction is presented in Table 5.

Table 5: Results of Pierson correlation coefficient test of the effect of E-learning 4 variables on learners' satisfaction

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Correlation coefficient</th>
<th>Sig</th>
<th>Confidence percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of learning content</td>
<td>87.3</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Teaching material</td>
<td>80.3</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Instructor characteristics</td>
<td>79.5</td>
<td>0.000</td>
<td>95%</td>
</tr>
<tr>
<td>Playfulness</td>
<td>49.8</td>
<td>0.000</td>
<td>95%</td>
</tr>
</tbody>
</table>
Based on calculated $R^2$, considered aspects of E-learning describe 88% of changes in the dependent variable (learners' satisfaction) and the remaining 12% is influenced by other variables and factors. Since coefficients of research variables are positive, thus there is a direct relationship between changes resulted from respecting variables of E-learning and learners' satisfaction (consistent with results of hypotheses testing).

8- Suggestions

Learner's satisfaction is one the most important factors in learning process since modern education methods of the present era, such as E-learning, only focus on the learner and increasing the quality of his learning. Learners' satisfaction results in improvement of their incentives and promotes their learning level. Thus, this must be highly considered in holding educational courses, especially in groups at universities. Based the main goal of the present research, evaluation of the effect of E-learning on, and relationship with, students of virtual courses, and also according to results, it is clarified that there is a direct and positive relationship between these tow elements. Among all independent variables, "design of learning content" has the most prominent effect on satisfaction and after that "teaching material" and "instructor characteristics" variables, respectively, in terms of significance of the effect. "Playfulness" has the least prominent effect. Thus, following suggestions are proposed based on opinions of students of virtual courses at three pioneer universities in the area of E-learning:

1- it was observed, based on respondents' opinions, that design of learning content had the most prominent effect on (and relationship with) satisfaction. Since the environment of E-learning is learner-based and the individual must understand subjects by his own abilities, thus the simpler are the subjects presented (so that it becomes possible for every user to understand subjects and they can create incentive in the learner person), the effect on learning quality is stronger. Therefore, it is suggested here to conduct learning content applying appropriate and up-to-date principles of pedagogical planning and using experienced professors and experts of other majors in the field of virtual course planning (respecting the lack of experts in this field).

2- Results from respondents' opinions indicate that teaching material and technology in E-learning is the second effective factor on learners' satisfaction. Therefore, we suggest pioneer universities in this pedagogical system to take some actions to correctly implement E-learning system and to improve accessibility to modern technologies. For example, in the area of providing hardware requirements, they give cheap Lap Tops to students (like India) or pay proper loans to buy appropriate computers. Also, in terms of software services, they can create Persian operating systems and use a variety of multimedia software to reduce the disturbance is students' plans.

3- Since "instructor characteristics" is the third effective factor on learners' satisfaction, thus it is suggested that universities use instructors who are always present and have relationship and virtual interaction in learning process, have skills in electronic methods, possess high commitment toward learners' education, provide a simpler interactive environment, have a positive approach and act like a facilitator. These characteristics highly promote learners' satisfaction and make learning a simpler process. Thus, courses can be held to improve personal and communicational skills of instructors.

4- In the present paper, "playfulness" (the learning process being mentally enjoyable) had the least prominent effect on satisfaction and this indicates that enjoy their learning environment even less than the average (49.8%). Hence, it is suggested to higher education institutes to change their learning content through surveys from students and try (as much as possible) to design technological systems of E-learning commensurate with their interests. Concerning this area, universities and institutes can design web pages with high graphic or other side attractions such as links to scientific articles.

Although the present research models investigated four effective factors on E-learning and four effective factors on learners' satisfaction through a realized questionnaire, but it was concluded that these variables have only a 88% effect on satisfaction and the remaining 12% is affected by other factors and variables which can be investigated in future studies.
References:


