



Investigating the Factors Affecting the Intention to Use E-Learning from the Viewpoint of Higher Education Students

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Abstract

Background: E-learning has been considered one of the outstanding applications of information and communication technologies during the past years.

Objectives: The purpose of this study is to investigate the factors affecting the intention of academic individuals to use e-learning with an emphasis on the flow theory.

Methods: This is a descriptive and applied piece of research. The study population included 112 e-learning students in the Virtual Faculty of the Isfahan University, Iran. A conceptual model was presented for the research. Liao's questionnaire was used for data collection. The questionnaire contained 25 items about several factors, including challenge (4 indices), skill (4 indices), interaction (3 indices), intermediate variable (4 indices), three dependent variables of exploratory use (4 indices), intention to use (3 indices), and time distortion (2 indices). Each item was answered on the basis of a 5-point Likert scale, from completely disagree (with score 1) to completely agree (with score 5). Cronbach's alpha value of 0.87 confirmed the reliability of the questionnaire. The descriptive data were analyzed and Pearson test and covariance analysis were conducted by the SPSS software programs version 23 and AMOS version 24.

Results: The findings revealed that skill, challenge, and interactivity have a positive relationship with flow experience which, in turn, is positively related to the intention to use, exploratory use, and time distortion.

Conclusions: The finding of this study is the serious and effective behavior of the users, which can be considered a variable of gaining flow experience in e-learning. It is an important aspect by which the users decide to reuse the system in an exploratory manner with no sense of track of time.

Keywords: E-Learning, Acceptance, Flow Theory, Virtual Learner

1. Background

Electronic learning is defined as the application of electronic communication technology in education. Following great advances in information and communication technology, electronic learning is regarded as a new paradigm in modern educational methods. E-learning has provided new opportunities for learning in a modern society, leading to a lot of changes in learning. These changes have created a great demand for e-learning in educational institutions as well as businesses (1).

In e-learning, communication media and technologies are used to provide materials and well-designed contents for students. With regard to the rapid development in computer technology, such a learning system is assumed to have evolved from low interactions in written communications to high interactions on the Internet (2). Research has shown that the flow theory is a useful construct by

which the user can understand the concepts of computer-mediated technologies (3-6).

The flow theory was first presented by Csikszentmihalyi (7) as "the state in which people are so intensely involved in an activity that nothing else seems to matter". A flow structure seeks to integrate motivation, personality, and subjective experience. Figure 1 indicates two of the most crucial aspects of the flow theory, namely challenge and skill. According to the following model, "flow channel" is a characteristic of the theory. It is defined as the state of mind that keeps a person focused on an activity. What is expected is that flow experiences occur under an optimal combination of challenge and skill. When the levels of skill and challenge are not compatible, anxiety occurs (i.e. a high task challenge but a low skill level) and boredom (i.e. a high level of skill but a low task challenge) (8).

Some researchers have studied the flow theory in technology and computer-based fields. For example, surveys

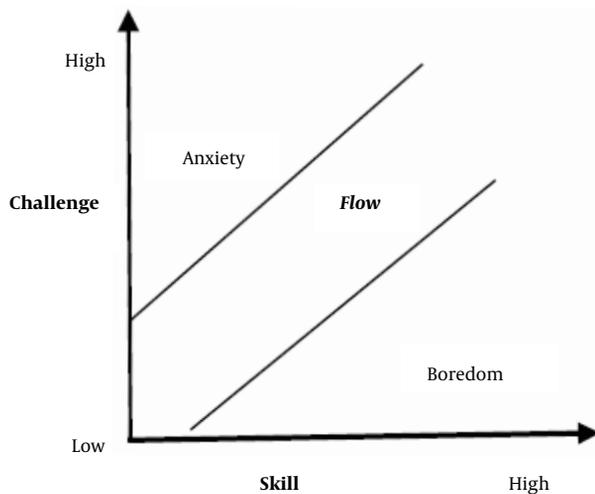


Figure 1. Three channel flow model (8)

have been conducted on computer-mediated communication (CMC) technology by Webster et al. (9); the user navigation behavior in the Web by Novak et al. (10); the effect of augmented reality (AR) learning on the learner's level by Ibáñez et al. (11); learning performance and potential behavior clusters in elementary students by Hsieh et al. (12); and the use of computers and education system to increase students' learning and to generate students' satisfaction by Oliveira dos Santos et al. (13).

The complex essence of human behaviors can influence the application of e-learning systems. The study of factors affecting the application of e-learning by users is one of the scientific approaches by which an individual can optimize the utilization of such education services (14).

Considering the above-mentioned points, this research, which is based on optimal experience, seeks to find out what factors affect e-learning acceptance. In other words, the purpose of the current study is to investigate the factors affecting the intention of academic individuals to use e-learning with an emphasis on the flow theory. In order to respond to this question, the flow theory is implemented in e-learning environments and a model is proposed to clarify the flow status (Figure 2).

The conceptual model of this research is aimed at recognizing the intention to use an e-learning system, emphasizing flow experience based on previous experiences (Figure 2). We define the corresponding variables and present reasons for each of those variables. As it can be seen in the figure, the variables of the model, such as skill, challenge, and interaction, are categorized as flow antecedents. Flow is defined as a holistic sense that people have when they engage in a task. A flow experience has two key character-

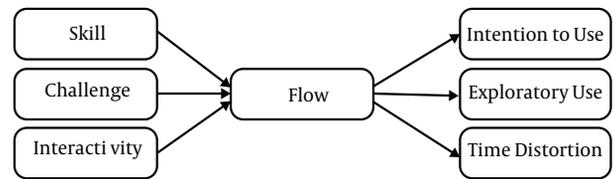


Figure 2. The conceptual model applied in this research

istics including the total concentration on an activity and the enjoyment of being engaged in that activity (7). Here, concentration means the degree of a person's attention on an activity, and enjoyment is how a person finds the use of the system without focusing on the consequences (15).

The probability of using a system by a person is called intention to use. The intention to use is defined as a duration in which someone is engaged with technology, uses it, and repeats the use. Many studies have confirmed the positive relationship of flow to the intention of using, for example, distance education (16) or social networks (17). In this study, the intention to use is defined as the probability of using an e-learning system.

Exploratory use refers to the searching of a system for its new functions. Also, time distortion points to a situation in which people do not feel the lapse of time when they are using a system (7). An overview of the literature shows that, after users sense the flow, they have common experiences. Common experiences include exploratory behavior, intention to use, and time distortion (16). As a result, in the present research, intention to use, exploratory use, and time distortion were regarded as the exogenous variables of the model.

Skills are defined as users' confidence to overcome those barriers, which hinder them from using an e-learning system. The level of an individual's skills is an important antecedent of flow (7, 13, 18, 19).

Challenge is defined as the level of difficulty that a user perceives when dealing with an e-learning system. Like skill, the challenge is one of the most important antecedents of flow (7, 10, 13, 18). When handling an e-learning system, a user should perform so well as to achieve his or her goals of gaining access to the target information.

Interactivity is an important factor in human-computer interactions (16). Many researchers believe that optimal experience in an interactive environment can enhance communication and exploratory behavior (20-22). Thus in the present study, interactivity is considered one of the antecedents of flow.

1.1. The Hypotheses of the Study

1- Flow experience is positively related to intention to use.

- 2- Flow experience is positively related to exploratory use.
- 3- Flow experience is positively related to perceived time distortion.
- 4- Skill is positively related to flow experience.
- 5- Challenge is positively related to flow experience.
- 6- Interactivity is positively related to flow experience.

2. Methods

This research is a survey conducted with a statistical population that initially included all the M.S. students who had started their courses in 2017. Indeed, the sample was selected of the students who had passed at least three semesters in the Virtual Faculty of the University of Isfahan. They were specializing in three disciplines, including Master of Business Administration (MBA), Executive MBA, and Knowledge of Information and Science (KIS). For data collection, an electronic questionnaire was delivered to each of them either by e-mail or in person. In this study, the sample size was calculated through the Morgan Table. The participants were selected by random sampling. Finally, of all the questionnaires delivered 112 were received and accepted.

The data collection tool was the questionnaire devised by Liao (16). It was tailored to the conceptual model of the research. The questionnaire contained 25 items regarding several factors, including challenge (4 indices), skill (4 indices), interaction (3 indices), intermediate variables (4 indices) as well as three dependent variables of exploratory use (4 indices), intention to use (3 indices) and time distortion (2 indices). Each item was answered on the basis of the 5-point Likert scale, from completely disagree (score 1) to completely agree (score 5). In order to test the conceptual model of this research, we used covariance-based structural equation modeling. For this purpose, the SPSS software was used to analyze the data extracted from the questionnaires and AMOS. The reliability of the questionnaire was determined by Cronbach's alpha coefficient and the content validity was evaluated by assessing the validity of the indicators used in the questionnaire. This was done separately from the review of the research background. In addition, confirmatory factor analysis and assurance of the significance of the factor loads of each investigated component indicated the construct validity of the questionnaire. Cronbach's alpha value of 0.87 signified the tool reliability.

In order to analyze the data, SPSS version 23 and AMOS version 24 were used. The data received from the questionnaires were entered in a computer after they were coded by the Likert method. First, a descriptive analysis was performed on the demographic characteristics of the

subjects. In this case, means, standard deviations, percentages, and frequencies were used. Participation in this study was optional. The participants were also assured that all the collected data would be kept confidential.

Out of 112 respondents, 33 and 79 were men and women, respectively. They ranged from 26 to 31 years of age. As they reported, 36.6 percent of them had spent 1 to 5 hours per week using an e-learning system, while 63.4 percent had spent more than 5 hours per week doing that.

3. Results

The structural equations modeling (SEM) was done to test the research hypotheses. The data were analyzed through the Amos-24 software. Table 1 presents the results of the descriptive analysis of the model variables.

Table 1. Descriptive Analysis of the Research Variables (N = 112)

Variable	Mean \pm SD	Variance
Skill	10.06 \pm 2.187	4.784
Challenge	13.14 \pm 2.813	7.911
Interaction	9.66 \pm 2.023	4.094
Exploratory use	10.48 \pm 1.908	3.642
Intention to use	11.31 \pm 2.274	5.171
Time distortion	7.41 \pm 1.957	3.829
Flow	20.80 \pm 4.042	16.335

The questionnaire validity was measured through a confirmatory factor analysis by principal component extraction and varimax rotation. The resulting KMO figure was 0.783, the Bartlett figure stood at 2373.847, and the degree of freedom was significant at 742 ($P < 0.001$). Cronbach's alpha for the reliability of the questionnaire was 0.87.

3.1. Structural Equation Modeling

A statistical analysis of the model assumptions was performed to quantitatively define the correlation levels among the variables based on the data obtained. Using the correlation figures, the path coefficients, which were regression standard coefficients (beta), were determined. The highest correlation was observed between flow and time distortion (0.752). The range of the other correlations indicates the strength of the relationships among the dependent and independent variables (Table 2).

In this study, the model's overall goodness of fit to the data was desirable. The comparative fit index (CFI), the incremental fit index (IFI), the Tucker-Lewis index (TLI), and the goodness-of-fit index (GFI) were found to be 0.917, 0.919, 0.903, and 0.901, respectively. A value above 0.90

Table 2. Correlation Coefficients Among the Research Variables

	Skill	Challenge	Interaction	Exploratory Use	Intention to Use	Time Distortion
Challenge	0.222 ^a					
Interaction	0.416 ^b	0.146 ^c				
Exploratory Use	0.454 ^b	0.437 ^b	0.335 ^b			
Intention to Use	0.276 ^b	0.377 ^b	0.230 ^a	0.420 ^b		
Time Distortion	0.199 ^a	0.294 ^b	0.074	0.345 ^b	0.402 ^b	
Flow	0.403 ^b	0.412 ^b	0.345 ^b	0.528 ^b	0.635 ^b	0.752 ^b

^a P < 0.01.^b P < 0.001.^c P < 0.05.

was considered to be an indicator of good fit. The normed chi-square (CMIN) was also lower than the acceptable value (i.e. lower than 3). The root mean-square error of approximation (RMSEA) had an acceptable level on the goodness of fit of the model. Table 3 provides the fitness indexes.

Table 3. Goodness of Fit Indexes

Fitness Indexes	Amount	Acceptance Range
Chi-square	336.005	-
DF	218	-
Chi-square/DF ratio	1.541	< 3
GFI	0.901	> 0.90, acceptable
TLI	0.903	> 0.90, acceptable
RMSEA	0.060	< 0.08, acceptable
CFI	0.917	> 0.90, acceptable
PCFI	0.790	> 0.50, acceptable
IFI	0.919	> 0.90, acceptable

Abbreviations: CFI, comparative fit index; DF, degree of freedom; GFI, goodness-of-fit index; IFI, incremental fit index; RMSEA, root mean-square error of approximation; TLI, Tucker-Lewis index.

The results of the structural equation analysis are provided in Figure 3 and Table 4. As in Figure 3, the research model was mapped in order to show how the corresponding concepts or factors are related together.

The research data supported hypotheses 1, 2, and 3. In other words, flow experience has a positive and significant effect on intention to use ($\beta = 0.60$; $t = 5.640$; $P < 0.001$), exploratory to use ($\beta = 0.73$; $t = 5.522$; $P < 0.001$), and time distortion ($\beta = 0.54$; $t = 4.662$; $P < 0.001$).

Also, as shown in Table 4, the results supported hypothesis 4; user skill has a significant effect on flow experience ($\beta = 0.20$; $t = 1.992$; $P < 0.05$). The results supported hypothesis 5 as well; user challenge has a significant effect on flow experience ($\beta = 0.46$; $t = 4.297$; $P < 0.01$); Hypothesis 6 is supported too; user interactivity has a significant effect on flow experience ($\beta = 0.37$; $t = 3.030$; $P < 0.01$). The standard

path coefficients of the proposed model, demonstrated in Table 4 are all significant.

Among the mentioned cases, the flow construct has the greatest impact on exploratory use. According to the results, the flow hypothesis theory can be used in an environment where a user is in interaction with an e-learning system.

4. Discussion

It was demonstrated in this research that the flow theory can be applied to e-learning environments. The findings revealed that skill, challenge, and interactivity construct have a positive relationship with flow experience. This is in agreement with the results reached by Ghani and Desphande (23), Hamari et al. (19), Liao (16), and Hsieh et al. (12). The important factors in the flow theory are skill and challenge. Obviously, individuals with higher levels of skill and self-efficiency can have better specifications when dealing with computers and experience a state of flow more easily (19, 24). The more comfortably the users can work with a system and the more engaged they are with that system while using it; the better they experience the flow.

The findings of this research reveal that interactivity construct affects the flow experience. As individuals develop through interactivity with other individuals, they also undergo cognitive and behavioral evolutions through interacting with machines and computers (12, 19). A rich interactive relationship between the user and the system gives him or her an optimal experience and encourages future reuses. A number of prior researchers have stated that achieving the flow experience through interactivity with other users facilitates learning (16, 25).

After the individuals feel the flow, they gain common experiences. Since the flow experience comes through users' cognition, emotion, interactivity, and skill of mutual interactivity with the system, their satisfaction is almost ensured; consequently, such a situation facilitates

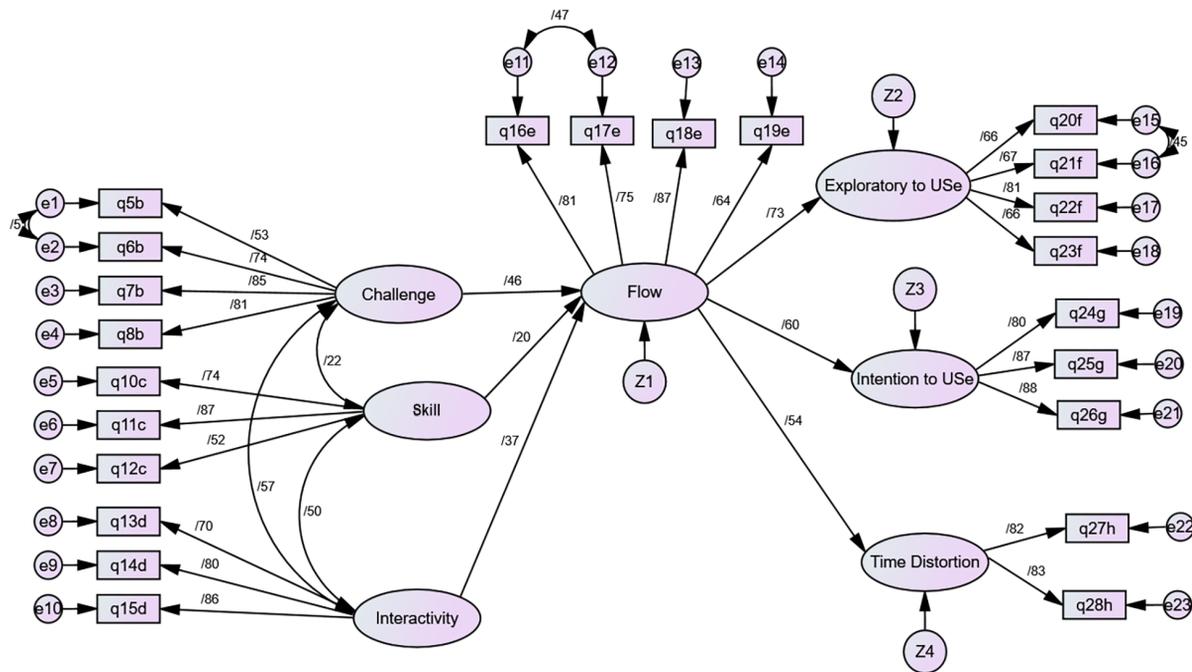


Figure 3. Structural equation model: the impact of different variables on the flow

Table 4. The Test Results for the Relationships Among the Parameters of the Proposed Model

Path	Non-Standard Coefficient	Standard Coefficient	Consequent Hypothesis
Skill to flow	0.27	0.20	Accepted
Challenge to flow	0.46	0.46	Accepted
Interaction to flow	0.32	0.37	Accepted
Flow to intention to use	0.64	0.60	Accepted
Flow to exploratory to use	0.45	0.73	Accepted
Flow to time distortion	0.49	0.54	Accepted

searching, navigation, and reusing, as the required behaviors in an e-learning environment. Many researchers have shown that flow increases communication (9), exploratory behavior (9, 23, 25), learning (13, 16), and computer use in this environment (9, 19, 23).

The findings in this research are similar to those in prior research. After the students experience the flow, many positive attitudes develop, including exploratory behavior, and intention to use. Considering the prior research, a user neglects the concept of time when intending to do an activity and discovers new mechanisms of activity. Oliveira dos Santos et al. (13) proved that flow has a positive relationship with experience, voluntary use, and real use. Liao (16) demonstrated that flow has a significant impact

on exploratory use.

The findings of the current research as well as the comments made above are all in agreement with those in previous studies that have ever dealt with the above-mentioned concepts of significance in computer environments. In addition, part of the findings here regards the serious and effective behavior of users as an important novel aspect. This aspect is, indeed, a variable of flow experience in e-learning, by which the users decide to reuse the system through exploratory use with no sense of track of time. Eventually, the positive attitude of the users for reusing e-learning systems leads to boost “the flow theory” through gaining experience. The results of this research also expand new horizons for further research on users’

behaviors. Some factors other than those examined in the present study, such as focus of attention and control, may affect the acceptance of e-learning. Hence, further study is needed. The relationships found among the variables in this research provide good topics to study in other fields. Any similar research on those subjects will reinforce the theoretical framework presented in this study.

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Footnotes

Authors' Contribution: The authors developed the original idea and the protocol, abstracted and analyzed data, wrote the manuscript, and is the guarantor. The authors contributed to the development of the protocol, technical support, and Statistical analysis. The authors contributed to the design and analysis of the study data and drafted the manuscript.

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Informed Consent: Participation in this study was optional. After obtaining approval from the college officials, the questionnaires' were distributed among the students and also assured them that all information collected will remain confidential.

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