

Proposing a model for evaluation of effective electronic learning strategies on students' achievement: A case study in virtual universities

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Abstract

The aim of the present study was to evaluate the effective electronic learning strategies on virtual students' academic improvement. The research method of the present study is correlational-descriptive. The population of the study includes all the virtual universities' students of Iran in academic year of 2011-2012. According to Morgan's Table, finally 363 participants were selected for the study. There are three data collection instruments including: a researcher-made questionnaire about electronic learning strategies ($\alpha = .94$), a researcher-made questionnaire of educational interest ($\alpha = .92$), and a comparison of students' mean scores during two successive terms in achievement tests (tests of the taken courses). Validity of the mentioned questionnaires was provided in terms of content. The results of the study indicated that there has been a significant relationship between electronic learning strategies based on cognitive presence, social presence, and teaching presence with virtual students' achievements.

Keywords: electronic learning strategies, virtual students, virtual university, cognitive presence, social presence, teaching presence

Introduction

The aim of electronic learning is providing equal, free and searchable access, during the courses and creation of homogeneous educational environment for different classes every-

where and optimizing the methods of providing materials for deeper and more serious learning. E-learning is a kind of distance education in which "computational networks" (especially internet), electronic materials and education management software as well as electronic content, along with old teachers and nowadays' "facilitators of learning", are used for developing the learning process. In this kind of education, materials (along with the teacher's teaching) are provided for the students electronically and through the net. In E-learning, the collection of the above equipments is utilized for the following purposes: transferring the electronic course materials to the students through the net, controlling the students' activities and mentioning their weaknesses and strengths through the net by the teacher, continuous evaluation through giving electronic tests and exercises and transferring the evaluation task from the end of the process to its context, drawing curriculum problems by the students and answering them by the teacher, the relationship between the students and professors, automatic reception of the reports, analytic and statistical diagrams from education process by the teacher and management of the system. Materials are among the most important elements of E-learning. Electronic material is a software, along with "teacher's teaching" is within classic teachings and it is proper to be produced in the form of multimedia and be interactive so that the students could be educated with the most outcome. The concept of interaction in electronic concept is one of the important merits of the electronic education system in relation

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to classical education, because in classical education, advancing the class interactively by individual students is almost impossible. In this educational context, unlike classical education, students will benefit from the subjects as much as their abilities. It should be mentioned that student's achievement and benefit depend on the amount of their involvement, participation, and presence that they have actively in the learning process. Achievement means the increase of learning, increase in the level of scores, and learners' pass in courses and grades (Seif, 2007). In E-Learning, the learning environment for different styles such as visual (diagram, map, film, note, etc.) audio (tape, lecture, note, and readout), touch (repletion in writing, making, operation of the project, note taking, parable, studying papers) are completely suitable (Schlosser, & Simonson, 2006). Therefore, utilizing the effective E-Learning strategies on virtual students' progress is very important.

Theoretical Framework

E-learning has the necessary capacities for real support of interactions and relationships, since literally, E-Learning includes multidimensional forms of interactions and relationships such as simultaneous and distant relationship, multidimensional simulations and hyper seeking capabilities of people, the interactions including pluralism capacity. The learners have control and direct influence on the outcomes of the learning processes. This indicates that nowadays the nature and regulations of learning have been significantly influenced by construction-oriented theory. Merrill (1991, as cited in Morgan, 2011) believes that assumptions of constructivism include: 1. Knowledge is made of experience; 2. Learning is the process of determined interpretation of the world; 3. Learning is a dynamic process; 4. Learning needs to be in a real environment; 5. Testing should be intertwined with homework, not to be a distinct activity. According to constructivism approach, learners' achievement is due to the skills that make them embark on the organization of the materials and experience a kind of integrity and unity (Mehrmohammadi *et al.* 2004, as cited in Seif, 2007). It seems that Garrison, Anderson & Archer's Community of inquiry model can remarkably involve students in teaching-learning environment so that a deep

understanding will be obtained regarding the issue of their studies. Community of inquiry model is an activity that has been made for a deep understanding of characteristics and features of E-Learning between teachers and learners and leads them to identify the critical issues. Based on their ideas, it took a long time that higher education institutions find that material by itself could not be indicative of learning quality and the environment in which the teachers lead the course and also the quality of interaction that moves the learning process forward, finally distinct the institutions from each other. Community of inquiry model is consisted of three main elements that should be taken into account during designing and accomplishing an E-learning period. These three elements are cognitive presence, social presence, and teaching presence. Cognitive presence refers to the conditions through which the learners can talk and discuss about the raised and discussed concepts and make agreement and have identical perception about them. Social presence is defined as competence of the activists and participants in a community of inquiry to be introduced socially and emotionally. Yu and Corry (2002) determined three aspects of social presence sensation: 1. Social context, 2. Online communication, and 3. Interaction. Picciano (2002, 2010) found that there is a strong relationship between the learners' perceptions about interaction, social presence, and learning. The results of the Gunawardena and Zittle (1997) indicated that having social presence sensation has a significant relationship with students' satisfaction about online curricula. Hazmer (2000) believes that formation of a learning group for providing a social feeling and finally successful interaction of the learners with each other is necessary. The results of studies conducted by Murphy *et al.* (1998), Alavi *et al.* (2009), Feizi *et al.* (2004), Kamalian *et al.* (2009) indicated that usage of asynchronous online collaboration increases interaction, satisfaction and learning of the learners and finally it increases their achievement.

The Major Research Hypothesis

Regarding the above-mentioned objectives, the following research hypothesis was raised:

There is a significant relationship between effective E-learning strategies and students' achievement.

The Minor Research Hypotheses

1. There is a significant relationship between cognitive -oriented learning strategy and students' achievements.

2. There is a significant relationship between social-oriented learning strategy and students' achievements.

3. There is a significant relationship between teaching-oriented learning strategy and students' achievements.

4. Educational interest mediates the relationship between the four effective learning strategies and students' achievement.

Methodology

The method of the present study is correlational-descriptive. Data collection instruments are three types including: 1. The researcher made questionnaire about E-learning strategies ($\alpha = 0.94$), 2. The researcher made questionnaire about educational interest ($\alpha = 0.92$), 3. Comparison of the mean scores of the students during two successive terms in achievement tests (the tests related to the taken courses). Content validity of the mentioned questionnaires was provided. The population of the present study includes all of the students of the virtual universities in Iran in 2011-2012. Finally, based on Morgan's Table, 363 persons were selected for the study. For data analysis, Pearson correlation and structural equation model by usage of LISREL software were used.

Results

Hypothesis 1: There is a significant relationship between cognitive-oriented learning strategy and students' achievements.

According to the findings of the above Table, there is a significant relationship between dialogue and exchange of views about the proposed concepts and identical and common understanding and structures' formation of the proposed concepts with virtual students' achievement based on cognitive presence. Based on beta coefficient for one unit increase of dialogue and exchange of views about the proposed concepts, the virtual students' achievement had 0.73 units of increase and for one unit of identical and common understanding and structures' formation of the proposed concepts virtual students' achievement

had 0.32 units of increase. According to the findings of the above Table, dialogue and exchange of views about the proposed concepts determines 58 percent variance, and identical and common understanding of the structures' formation of the proposed concepts determines 34 percent variance of the virtual students' achievement.

Hypothesis 2: There is a significant relationship between social-oriented learning strategy and students' achievements.

According to the findings of the above Table, there was a significant relationship between synchronous collaboration of the learning groups and asynchronous collaboration of the learning groups with virtual students' achievement based on social presence. Based on beta coefficient, for one unit of synchronous collaboration of the learning groups the virtual students' achievement had 0.77 units of increase and for one unit of asynchronous collaboration of the learning groups, the virtual students' achievement had 0.26 units of increase. According to the findings of the above Table, synchronous collaboration of the learning groups determines 13 percent variance, and asynchronous collaboration of the learning groups determines 21 percent variance of the virtual students' achievement.

Hypothesis 3: There is a significant relationship between teaching-oriented learning strategy and students' achievements.

According to the findings of the above Table, there was a significant relationship between active participation for learning and having enthusiasm to the learning results with virtual students' achievement based on teaching presence. Based on beta coefficient, for one unit of active participation for learning, the virtual students' achievement had 0.49 units of increase and for one unit of having enthusiasm to the learning results the virtual students' achievement had 0.48 units of increase. According to the findings of the above Table, active participation for learning determines 28 percent variance, and having enthusiasm to the learning results determines 24 percent variance of the virtual students' achievement.

Hypothesis 4: Educational interest mediates the relationship between the four effective learning strategies and students' achievement.

According to the results of the above Table, GFI index is 0.95 and AGFI index is 0.91 that shows the model has fitness.

Table 1. Stepwise multiple regression about prediction of the virtual students' achievement based on cognitive presence

	<i>B</i>	SEM	<i>Beta</i>	<i>t</i>	<i>sig</i>	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i>	<i>sig</i>
The first stage										
Constant coefficient	17/374	1/251		8/287	0/001					
Discussion and dialogue about the proposed concepts	3/467	1/426	0/462	13/734	0/001	0/763	0/582	0/457	623/562	0/001
Stage two										
Constant coefficient	6/367	2/683		3/568						
Discussion and dialogue about the proposed concepts	2/573	0/058	0/724	15/538	0/001					
Identical and common understanding and structures' formation of the proposed concepts	0/492	0/638	0/322	5/696	0/001	0/585	0/342	0/254	345/639	0/001

Table 2. Stepwise multiple regression about prediction of the virtual students' achievement based on social presence

	<i>B</i>	SEM	<i>Beta</i>	<i>t</i>	<i>Sig</i>	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i>	<i>sig</i>
The first stage										
Constant coefficient	5/535	3/730	0/346	2/564	0/238	0/363	0/131	0/645	217/465	0/001
synchronous collaboration of the learning groups	1/256	0/042		11/277	0/001					
The second stage										
Constant coefficient	12/731	2/268		3/673	0/001					
synchronous collaboration of the learning groups	0/624	0/038	0/768	14.265		0/467	0/218	0/565	35/483	0/001
asynchronous collaboration of the learning groups	0/733	0/057	0/256	5/266	0/001					

Table 3. Stepwise multiple regression about prediction of the virtual students' achievement based on teaching presence

	<i>B</i>	Sted. error	<i>Beta</i>	<i>t</i>	<i>Sig</i>	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i>	<i>sig</i>
The first stage										
Constant coefficient	7/346	2/167		2/263	0/238	0/535	286/0	0/482	492/843	0/001
Active participation for learning	1/045	0/046	0/532	18/645	0/001					
The second stage										
Constant coefficient	12/736	2/463		6/604	0/001					
Active participation for learning	0/907	0/047	0/493	16/490	0/001	0/492	0/242	0/769	302/491	0/001
Having enthusiasm to the learning results	0/508	0/032	0/482	8/435	0/001					

Table 4. The relationship between the research variables in structural equation model

Relationships between the variables	Impact coefficient	Error	t	results
educational interest → students' achievement in smart schools	0/562	0/015	2/42	+
dialogue and exchange of views about the proposed → concepts students' achievement in smart schools	0/421	0/031	3/34	+
Identical and common understanding of structures' formation of the proposed → concepts students' achievement in smart schools	0/368	0/016	2/26	+
synchronous collaboration of the learning groups students' achievement in smart schools	0/062	0/043	2/05	+
asynchronous collaboration of the learning groups → students' achievement in smart schools	0/016	0/052	2/24	+
active participation for learning → students' achievement in smart schools	0/013	0/036	5/21	+
having enthusiasm for the learning results → students' achievement in smart schools	0/152	0062	2/76	+
dialogue and exchange of views about the proposed concepts → educational interest	0/137	0/056	2/56	+
Identical and common understanding of structures' formation of the proposed concepts → educational interest	0/484	0/073	2/43	+
synchronous collaboration of the learning groups → educational interest	0/712	0/025	2/236	+
asynchronous collaboration of the learning groups → educational interest	0/526	0/066	3/570	+
active participation for learning → educational interest	0/337	0/049	4/469	+
having enthusiasm for the learning results → educational interest	0/352	0/027	2/762	+
X ² =234.42	df=28	RMSEA=0.214	AGFI=0.91	GFI=0.95

Conclusions

According to the community of inquiry model of Garrison *et al.* (2000), there are three learning strategies that should be taken into account in designing and performing an E-learning period. These three strategies are cognitive presence, social presence and teaching presence. Cognitive presence refers to the conditions through which learners can have dialogue and exchange their views about the proposed concepts and make agreement and have the same understanding about this strategy. Social presence is defined as the activists and participants' competence in a community of inquiry to be introduced socially and emotionally. Teaching presence is defined as designing and leading the cognitive and social presence with the aim

of achieving the real results of learning. The results of the present study, regarding the first hypothesis indicated that there is a significant relationship between dialogue and exchange of views about the proposed concepts and identical and common understanding, and structures' formation of the proposed concepts with the virtual students' achievement based on their cognitive presence. Based on beta coefficient, for one unit increase of dialogue and exchange of views about the proposed concepts, students' achievement had 0.73 units of increase and for one unit increase of dialogue and exchange of views about the proposed concepts, the students' achievement increased 0.32 units. Studies by Morgan (2010), Skelasser *et al.* (2006, as cited in Morgan, 2010), Ruhe *et al.* (2009) indicated that utilizing E-learning strategies

such as visual, audio, and touch lead to more recognition and understanding of the students about the proposed concepts. About the second research hypothesis, there were a significant relationship between synchronous collaboration of the learning groups and asynchronous collaboration of the learning groups with the virtual students' achievement based on the social presence. Based on beta coefficient, for one unit increase of synchronous collaboration of the learning groups, the virtual students' achievement increased 0.77 units and for one unit increase of asynchronous collaboration of the learning groups the virtual students' achievement had 0.26 units of increase. Hazmer (2000) also believes that formation of a learning group for creation of a social feeling and finally successful interaction of the learners with each other is necessary. The results of the studies by Murphy *et al.* (1998) and Tu & Corry (2002) showed that social presence strategy leads to more increase of interaction between the learners and consequently increases their achievement. Regarding the third hypothesis, the results indicated that there were significant relationships between active participation for learning and having enthusiasm for the learning results with the virtual students' achievement base on

the teaching presence. Based on beta coefficient, for one unit of active participation for learning, the virtual students' achievement had 0.49 units of increase and for one unit of having enthusiasm for the learning results the virtual students' achievement had 0.48 units of increase. The results of the study has consistency with the studies conducted by Feizi *et al.* (2004), Alavi *et al.* (2009) and Kamaian *et al.* (2009). Their studies also indicated that the students' learning is under the influence of their active participation and presence. Picciano (2002, 2010) found that there is a strong relationship between the learner's perceptions about interaction, social presence and learning. Regarding the fourth hypothesis, the results showed that direct impact coefficient of the cognitive presence was 0.789, social presence 0.078, and teaching presence was 0.695 and indirect impact coefficient of the cognitive presence was 0.384, social presence 0.695, and teaching presence was 0.386. Accordingly, cognitive presence has had the highest direct impact coefficient on the virtual students' achievement. According to the obtained structural equation model, GFI index was 0.95, and AGFI index was 0.91 that shows the fitness of the model is rather desirable.

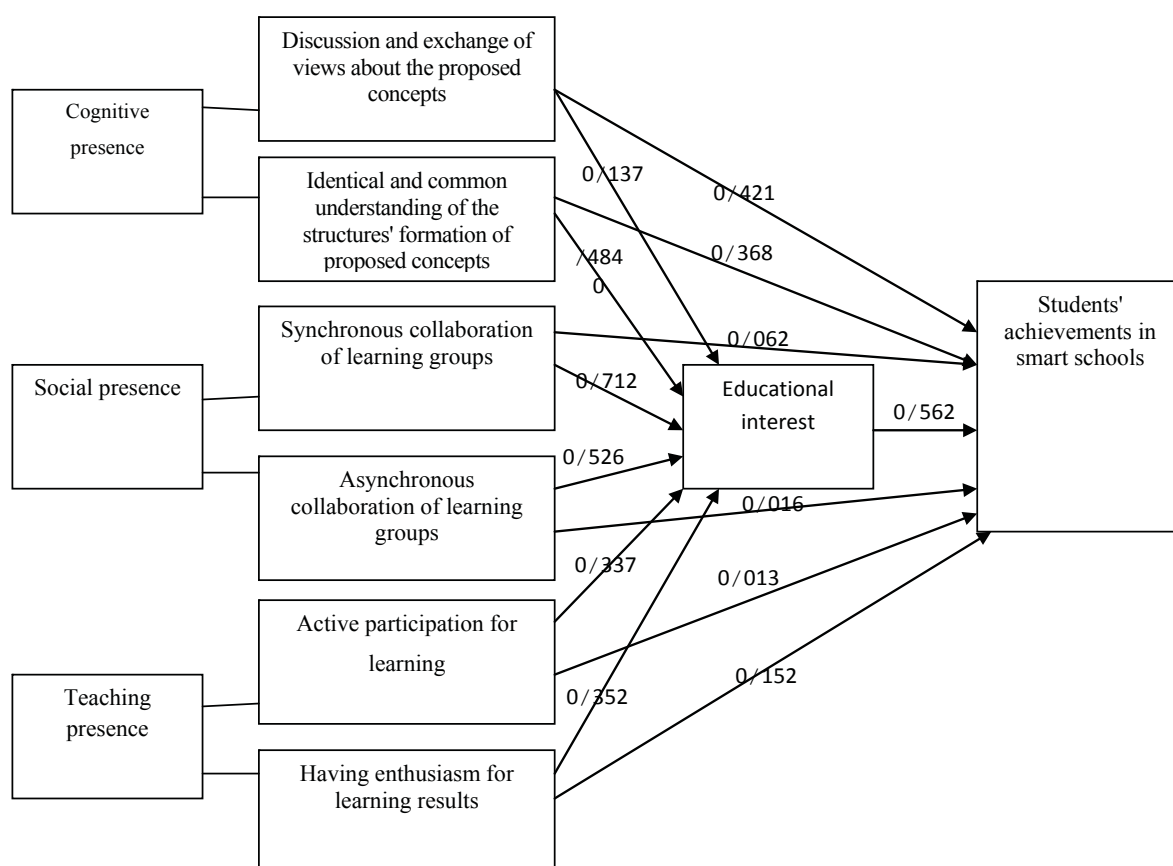


Figure 1. Experimental model of the effective learning strategies on students' achievement at virtual universities

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