Research Article

Assessment of Electronic Education Student's Perception of Effective Distance Education Components to Explain Satisfaction of Electronic Education

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Abstract

Background: Satisfaction is one of the most common indicators of effective learning and many factors, such as interaction, flexibility, and feedback, are involved in the development of satisfaction. Thus, goals of this research was to determine electronic education student's perception towards effective distance education components and contribution of these components in explaining satisfaction of distance education.

Methods: The current research used a survey method. The statistical population consisted of all electronic education graduate students (3915) of universities of Tehran, who took part in distance education in the academic year of 2014 to 2015. Overall, 390 students were selected by the random classified sampling method. For gathering data, 2 instruments were used. One for measuring effective distance education components and another for measuring satisfaction of electronic education. The first scale included 24 items with 3 dimensions, including interaction, flexibility and feedback, and the other scale included 20 items with one dimension, being satisfaction. Data were analyzed through the SPSS software, version 21, and statistical methods were used, such as variance analysis, one sample t - test, and multivariate regression analysis. Validity and reliability of both scales were confirmed through content, convergent validity, and reliability (Cronbach's alpha coefficient of 0.77 for effective distance education scale and Cronbach's alpha coefficient of 0.85 for electronic education satisfaction scale).

Results: The mean satisfaction of electronic education of female students (M = 14.44, p ≤ 0/001) was significantly higher than that of male students (M = 11.84 p ≤ 0/001) in all academic groups, including humanities, technical, and basic sciences. Also, data analyses showed that 46% of satisfaction variance could be explained by combination of interaction, flexibility, feedback, gender, and academic groups. Among them, flexibility contribution (Beta = 0.590, P ≤ 0/001) was more than interaction (B = 0.547, P ≤ 0.001) and feedback (B = 0.369, P ≤ 0.001).

Conclusions: The research statistical model suggested that interaction, flexibility, feedback, and gender are positive explanations of satisfaction. Also, the research goal was approved, which means that designing effective distance education by proposed agents could lead to greater satisfaction of electronic education students.

Keywords: Effective Distance Education, Satisfaction, Interaction, Flexibility, Feedback

1. Background

Learning can be defined as persistent and relatively stable change in current performance or human's potential performance caused by experience of interacting with the surrounding world (1). According to researches of Mishra (2), Zaharias et al. (3), and Huang (4), learning theories that are more significant in online courses include:

- Behaviorism: Learners learn activities and behaviors through observation and personal interaction.

- Cognitivist: Learners learn by engaging their ideas and experiencing along with others through collaboration and communication.

- Constructivism: Online learning should create challenging activities that allow learners to connect the old and new data together and build personal knowledge. This level of higher thinking should be supported by using learning theories as the educational foundation.

- Connectivism: Based on this theory, required and functional knowledge could not be obtained from personal

experience or by using others' experiences and it should rather be inevitably obtained from creating connections. Learners should try to discover apparently hidden patterns by creating connections and by using global communication networks or communication between existences and foster the required skills (5).

Regardless of the learning theories, satisfaction of electronic education influences variables and conditions, such as interaction, flexibility, telepresence, motivation, feedback, measurement, skills and techniques of study, conditions and facilities of educational environment, features and personality characteristics.

Researches in the field of distance education have indicated that this field has many benefits (6), especially convenience, flexibility, and availability at any time and place (7). Distance learning reduces costs and increases telepresence, flexibility, interaction, motivation, access, and the number of learners (8, 9). Furthermore, it has the ability of creating a rich and motivational educational environment (10), and gives learners ease and flexibility as learning could be achieved at any time and place (11), and also increases the amount of communication and contribution of the users (12), while learners have greater opportunities to express their thoughts and impressions (13). Behaviors that lead to prompt and on time feedback are positive predictors of learning and satisfaction (14). Media flexibility and the ability to develop an interactive course environment play a larger role in learner's satisfaction; ease of use and frequency of use (15).

On theoretical foundations of distance education, use of information and communication technology for learning are common. Researches have shown that use of information and communication technology reinforces learning through interaction and learner's satisfaction (16). Howard and Discenza (17) noted that currently a substantial proportion of distance programs use technologies that allow for real - time interactions with the instructor and other students (teleconferencing, videoconferencing, and computer chatroom discussions). They performed a study on 19 management information system programs and reported that 41.18% of the programs used full duplex communication (simultaneous communication in both directions).

The characteristics of the Internet and a computer - mediated environment appear to make them ideal for problem-based learning. According to Laffey et al. (18), computer - mediated learning on the Internet is suitable for project - based learning because it provides ample resources, allowing students to perform their own planning and present new forms of knowledge, which expands the mechanisms for collaboration and communication. Oth-

ers also argued that computer - mediated collaborations and the Web are excellent technologies for case studies and integrating higher order learning (19).

Review theories and researches regarding effective distance education and satisfaction showed that these variables play a large role in the learning process, curriculum development, and educational design. Unfortunately, in the current distance education design, there is less attention paid towards interaction, flexibility, and feedback that lead to satisfaction and higher order cognitive learning.

In the current study, to draw attention of distance education authorities to assessment of interaction, flexibility, and feedback along with electronic education students' satisfaction, these variables were studied in electronic education students. The status of interaction, flexibility, feedback, and satisfaction in academic groups and contribution of variables in explaining satisfaction have been studied.

Thus, in view of the fundamental goal of the research, the research questions were as follows:

1. What is the student's perception of effective distance education components (interaction, flexibility, and feedback)?

2. What is the contribution of effective distance education components (interaction, flexibility, and feedback) in satisfaction of electronic education students?

2. Methods

The current research used the survey method. The statistical population consisted of all electronic education students (3915 electronic students) of universities of Tehran, who performed distance education in the academic year of 2014 to 2015. Overall, 390 graduate students were chosen by the random classified sampling method. Criterion for sampling was student's experiences of online courses through videoconference. In other words, electronic students completed the scale if they took part in distance courses that were implemented by videoconference technology. Therefore, among the universities, which implemented distance education, Payame Noor, Tehran, Tarbiat Modarres, and Khaje Nasir Universities were chosen and the scales were completed by electronic learners.

According to the random classified sampling method, sample size was determined by statistical strata size. In the present study, statistical strata size of the universities was 1350, 1050, 810, and 705, respectively. Overall, 125, 101, 89, and 75 electronic learners were selected among universities, respectively, and the sample size was 390 electronic learners (see Table 1).

Table 1. Distribution of the Sample According to Gender, Academic Group, and Universities

University	Population Size	Basic Sciences		Humanities		Technical		Sample Size
		Males	Females	Males	Females	Males	Females	
Payame Noor	1350 (34)	10	12	39	33	15	16	125 (32)
Tehran	1050 (27)	11	12	31	32	5	10	101 (26)
Tarbiat Modarres	810 (21)	12	13	14	28	13	9	89 (23)
Khaje Nasir	705 (18)	0	0	0	0	40	35	75 (19)
Total	3915 (100)	33 (8.5)	37 (9.5)	84 (21.5)	93 (24)	73 (18.5)	70 (18)	390 (100)

For gathering data, 2 instruments were used, one for measuring effective distance education components and another for measuring distance education satisfaction. For assessment of effective distance education components, the Devi scale was used (20). The scale was constructed in 2006 by Devi, and it has 24 items; 10 items measuring the interaction subscale, 7 items measuring the flexibility subscale, and 7 items measuring the feedback subscale. Predictive validity of the Devi scale was confirmed through significant correlation of interaction, flexibility, feedback components, and satisfaction of the electronic education scale. Also, Baratian (21) reported the reliability coefficients of the scale between 0.65 and 0.77. Content validity of the scale of distance education was confirmed by experts.

The scale validity was measured by Baratian (21) and according to his research, the obtained results were as follows: Validity of the Devi scale demonstrated correlation of interaction, flexibility, and feedback with satisfaction of electronic education. If electronic education, satisfaction scores had a positive correlation with the Devi scale and its subscales were evidence of good validity of the scale and its subscales.

For assessment of distance education satisfaction, Martz et al.'s scale was used (22). It has 20 items, which is consistent with Keller's (23) Attention, Relevance, Confidence, and Satisfaction (ARCS) model, and is concerned with providing strategies to motivate students in an effort to increase academic performance.

Finally, data were analyzed using the SPSS software, version 21, and variance analysis, one sample t - test, and multivariate regression analysis. Internal reliability coefficient of the scale was calculated with the Cronbach's Alpha method for the total of scales and its subscales, which was variable from 0.75 to 0.89. Electronic education satisfaction scores had a positive correlation with Devi's scale and its subscales, which is evidence of convergent validity of the scale and its subscales.

Scoring is based on the Likert scale, and the answers were graded as follows: a) completely agree, b) agree, c) somewhat agree, d) somewhat disagree, e) disagree, and f) completely disagree. The cases (a) to (f), scored 1 to 6, respectively.

It is necessary to note that at all research stages, a complete report was presented to the participants regarding the study and its goals. With respect to ethical considerations, an attempt was made to preserve the confidentiality of the data; moreover, research goals were described to participants prior to the study and data collection.

3. Results

Electronic education student's perception of effective distance education components (interaction, flexibility, and feedback) and contribution of effective distance education components in explaining satisfaction of electronic education students were the research goals of the current study.

According to the first research goal, for assessment of the variables, mean scores of each variable were compared with expected mean, using the one sample t - test (see Table 2).

The results showed:

- Satisfaction with distance education mean was higher than expected mean (10 score) in all groups, significantly. However, scores of female satisfaction (14.44) was higher than males (11.84). Among the variables, student's satisfaction of humanities was higher than other academic groups.

- Student's perception of interaction was lower than average in all academic groups and genders, yet in the humanities group, it was higher than average.

- Student's perception of flexibility was higher than average in all academic groups and genders.

- Student's perception of feedback was lower than average in all academic groups and genders.

Table 2. Comparison of Observed Mean of Effective Distance Education Components with Expected Mean

Variables	Statistical Indexes	Academic Group			Male	Female
		Technical	Humanities	Basic Science		
Satisfaction	Observed mean	13.10	14.17	13.53	11.84	14.44
	Expected mean	10	10	10	10	10
	T	12.62	10.45	10.17	8.025	22.46
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Standard deviation	0.756	0.845	0.941	1.114	1.850
Interaction	Observed mean	10.07	12.49	10.43	11.45	11.12
	Expected mean	12	12	12	12	12
	T	6.27	20.52	13.47	6.78	19.31
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Standard deviation	1.178	1.421	1.101	0.978	1.01
Flexibility	Observed mean	13.15	13.86	13.61	13.72	13.71
	Expected mean	10	10	10	10	10
	T	1.66	8.29	4.42	2.34	8.11
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Standard deviation	1.825	1.502	1.897	1.245	1.401
Feedback	Observed mean	9.88	9.45	8.22	9.08	9.07
	Expected mean	10	10	10	10	10
	T	8.95	13.26	3.21	4.32	13.17
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Standard deviation	0.708	0.985	1.011	1.032	0.752

According to the second research goal, for estimation of interaction, flexibility, feedback, gender, and academic groups variables contribution have used multivariate regression analysis, to explain electronic student's satisfaction of distance education.

In view of R Square, 46% of satisfaction of distance education could be explained by combination of interaction, flexibility, feedback, gender, and academic groups. Regarding results of analysis of variance calculated by R Square, the outcomes were significant at less than 0.001 (F = 57.97). Each of the 3 variables of interaction (Beta = 0.547), flexibility (Beta = 0.590) and feedback (Beta = 0.369) played a significant role in satisfaction with distance education (see Table 3).

Regression analysis was used to explain satisfaction according to 3 variables of interaction, flexibility, and feedback for different academic groups and gender (Table 3). It was observed that in all cases, sum of the mentioned variables explained satisfaction of distance education with statistical significance. The variance percentage of satisfaction with distance education was high in the humanities academic group (0.325) and low for the technical academic group (0.178). Regression coefficient of the interaction was significant in all academic groups except for the technical group. Beta coefficient in the humanities students was higher than technical and basic science students. These coefficients showed that the interaction contribution to explain satisfaction of humanities was higher than technical and basic sciences.

Flexibility could significantly explain student's satisfaction in all academic groups, except for the technical group in both genders. Given the beta measures, it could be concluded that flexibility contribution to explain satisfaction in academic groups of humanities and basic science was more than the technical group. Contribution of the flexibility to explain female satisfaction was more than

Table 3. The Role of Interaction, Flexibility, Feedback, Gender, and Academic Groups Variables in the Level of Satisfaction

Model	Standardized Coefficients (Beta)	Std. Error of the Estimate	t	Sig.
Interaction	0.547	0.318	7.173	0.001
Flexibility	0.590	0.240	7.143	0.001
Feedback	0.369	0.122	3.537	0.001
Gender	0.287	0.210	6.030	0.001
Academic groups	0.215	0.547	2.92	0.002

male satisfaction. Feedback could significantly explain satisfaction in both genders for the groups of humanities and technical group, except for the basic science group.

4. Discussion

Electronic education student's perception of effective distance education components (interaction, flexibility, and feedback) and contribution of effective distance education components in explaining satisfaction of electronic education students were the research goals of the current study. The distance education environment is an expanding market driven by several market forces. Two scales included these variables and were administered to 390 distance students. The results of the scales were 3 constructs that ultimately correlated with the satisfaction ratings of the subjects. Using these factors as guidance, some operational and administrative implications of these findings are discussed. Distance education is a complicated process and its outcomes, such as the teaching-learning process, are influenced by many factors and variables that make its assessment very difficult. There is relative agreement that interaction, flexibility, feedback, gender contribution and the like, explain variance of satisfaction of distance education. However, there is no complete agreement in case of pure contribution of each the variables between researchers, as findings of various researches are influenced by cultural factors and social context of studied societies. Findings of the current research showed that average of students satisfaction of academic groups and genders is higher than expected mean of the satisfaction scale (namely score 10), however, in this respect, there was a significant difference between various academic groups, especially between males and females; female satisfaction was more than male satisfaction. Female satisfaction scores of distance education was more than male satisfaction scores. Part of this significant difference was related to comfort of females with electronic education, which is consistent with the study of Arbaugh (16) in regards to female's tendency towards online interactions. His study indicated that there is gender difference regarding class par-

ticipation; females participate in online classes more than traditional classes. Also, this finding was consistent with Devi (20) and Baratian's (21) studies.

Students interaction in online classes is lower than average in both genders and all academic groups, yet student's flexibility is higher than average. Feedback mean of all groups was lower than average.

According to a study by Maki, Patterson, and Whittaker (24), electronic students showed higher levels of satisfaction in technology-mediated environments. Overall satisfaction was also used by Smart and Cappel as one of the measures of participants' reactions in completing online learning units. The results showed that students in the elective course had higher satisfaction than subjects in the required course (25).

In addition, Chou and Liu found that satisfaction was also an important indicator of learning effectiveness. Satisfaction is a component of collaborative, constructivism, and sociocultural learning models (13).

Each of interaction, flexibility, and feedback variables played a significant role in explaining student's satisfaction of distance education. Among them, flexibility contributed significantly more than interaction and feedback contribution in explaining students' satisfaction. In general, flexibility is influential in explaining student's satisfaction of distance education, regardless of gender and academic group. This is probably an indicator of student's satisfaction of electronic courses flexibility. These results are consistent with that of Arbaugh (14, 15), who reported that satisfaction had a positive correlation with flexibility. Also, other researchers (20-23) reported the same findings.

Lack of interaction, flexibility, and feedback, reduce student's satisfaction and threaten their adjustment and health and result in destructive moral and social consequences, thus impede students potential from development. According to Arbaugh (14), effective distance education has characteristics that develop student's potentials. New researches demonstrate these characteristics. Many factors, such as flexibility and learner's control, increase satisfaction, while perceived interaction difficulty decreases satisfaction (15). The most common indicators

of effective distance education are motivation (14, 24, 25), interaction with learners and lecturers (15), and perceived flexibility (15, 20). These variables have been demonstrated in this research.

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Footnote

Authors' Contribution: Study concept and design: Baratian and Farajollahi; Analysis and interpretation of data: Baratian and Farajollahi; Drafting of the manuscript: Baratian and Farajollahi; Critical revision of the manuscript for important intellectual content: Baratian, Farajollahi, Saramadi and Mosakazemi; Statistical analysis: Baratian.

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