



# The Correlation Between Students' Attitudes and Persistence in E-Learning

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## Abstract

**Background:** For a long time, “attitude” was considered an effective factor in student-teacher interaction and students' progress in traditional education. Recently, it is studied as a motivational factor in learners' engagement in distance and e-learning education.

**Objectives:** This study tried to find out the correlation between “attitude” and “persistence” in e-learning education.

**Methods:** To explore the probable correlation between students' attitudes and their persistence in e-learning systems a survey was conducted to seek students' attitudes toward online course, online interaction, and some of e-communication tools, namely online chat, discussion forum, and e-mail. A sample of 744 students was obtained from 5,285 e-learning undergraduate students who were formally accepted to study in online courses at three Iranian universities from 2014 to 2017. The instruments were two researcher-made questionnaires for persistent and non-persistent students in e-learning systems.

**Results:** Findings showed a positive, direct, and significant relationship between students' persistence and their attitudes toward online course ( $r = 0.744$ ;  $P = 0.014$ ) and online interaction ( $r = 0.863$ ;  $P = 0.001$ ) in e-learning. Also, there was a relationship between students' attitudes toward online interaction with the frequency of student-professor interaction ( $r = 0.943$ ,  $P < 0.001$ ) and the frequency of student-student interaction ( $r = 0.793$ ,  $P = 0.006$ ).

**Conclusions:** The observed positive and significant relationship between students' attitudes toward online interaction and persistence showed that students' persistence can be increased through enhancing student-professor and student-student interactions in e-learning systems.

**Keywords:** Persistence, Attitude, Online Course, Online Interaction, Online Chat, Discussion Forum, E-Mail

## 1. Background

Distance education is a special educational system characterized by time-space separation of learner and teacher, non-adjacent learner-teacher relationship, and more control on the learning process by the learner, rather than the teacher (1). These features put the learning responsibility on the learner, introduce the education element as the focal point of the learning, and make individual and independent learning as a fundamental strategy for the learner in distance learning systems. Although the emphasis is on individual and independent learning in distance education, the new trends such as online and virtual learning introduce learning settings by which isolated and individual learning of distance education institutions are transformed into collective communicational settings (2).

Lots of studies in online and virtual learning contexts, considered positive attitudes of e-learners as a motiva-

tional factor for their engagement in the learning process (3, 4). But there is still a lack of a comprehensive practical definition of the word “attitude” in the literature.

In some studies, the “attitude” was divided into emotional, cognitive, and behavioral sections. The emotional section referred to a feeling of love or a sense of hatred for a specific object. The cognitive section was related to beliefs and opinions, and the behavioral part referred to what one really wants to do (5, 6). In another study, “Technology Acceptance Model” or “TAM” was introduced, a conceptual model for assessing the attitudes of learners about the use of information and internet technologies (4). In TAM, the attitude is defined by two specific behavioral ideas, including the attitude toward ease of use and the attitude toward the utility of the use of technology. These two attitudes are specified as determinants of the intention of a person to use technology (6). TAM constructs have been widely used to address the dropout phenomenon, the most seri-

ous problem in the domain of e-learning (7). Despite the clear advantages of e-learning over conventional education, many people dropped out part way without completing their courses. The drop out phenomenon occurs much more frequently in online learning environment than traditional face-to-face education. Online courses have a 10% to 20% higher failed retention rate than traditional classroom environments (8). Totally, 40% to 80% of online students drop out of online classes (9). Other remarkable results from online education centers suggested that more than 50% of e-learning students dropped out, while only 10% of attendances to the traditional classes dropped out (10).

A significant amount of literature on persistence and dropout in higher education is based on the theoretical model put forward by Tinto (11). The Tinto's model of "dropping out" suggests that the persistence or "the students' commitment to completing their study program at a particular institution" is the result of the scientific and social integration of the student and the community within that institution (6, 12). Pascarella and Terenzini (13) concluded that student-professor interaction in formal and informal settings were positively associated with student's persistence.

## 2. Objectives

Accordingly, this study at first aimed to find out the correlation between attitudes of e-learning students' toward online course and their persistence in e-learning. Second, it explored the correlation between attitudes of e-learners toward online interaction and their persistence in e-learning. Specifically, it examined the correlation between attitudes of students toward three communication tools of online chat, discussion forum, and email with their persistence in e-learning.

## 3. Methods

The present study was applied descriptive research, carried out in online courses of three Iranian universities of Khaje Nasirodin Tousi, Quran and Hadith sciences, and Shiraz University. Having determined 385 students as the research sample on the basis of statistical population and relevant formulas, including Krejcie and Morgan's, researchers decided to collect data from the three target colleges during e-students' final exams being held in-person on the campus to increase the external validity of the study, namely increase the results' generality. Accordingly, the actual research sample of the study was determined to be

744 students, including two groups of persistent and non-persistent students from three target colleges, equal to 14% of the whole studied population and two times more than the nominal case study.

Data collection instruments were two researcher-made questionnaires for persistent and non-persistent students in e-learning education. In order to investigate the correlation between students' attitudes toward e-learning and their persistence in e-learning systems, five attitudinal indices were designed. Students' attitudes toward online course, online interaction, online chat, discussion forum, and e-mail were indices used to construct persistent and non-persistent questionnaires. The questionnaires were comprised of items, asking personal information of learners and 26 questions exploring their attitudes toward e-learning and online courses. The answer spectrum of the questionnaires was Likert type and of 5-point (ranging from completely disagree with code 1 to completely agree with code 5).

To ensure the validity of the newly developed questionnaires, after their first construction, judgment method was used; a method in which data collection instruments are judged or refereed by scholars. To this aim, the first versions of the questionnaires were handed to university professors and lecturers expert in e-learning domain. Their opinions regarding each question were collected and analyzed. The questionnaires were amended based on recommended modifications. Finally, they were reviewed and approved by the professors and lecturers.

To determine the reliability of the questionnaires and to estimate the internal consistency of the measurement tools, Cronbach's alpha coefficient was used. The SPSS version 22 was applied to measure the internal consistency of the tools. The results were 0.79 and 0.82 for persistent and non-persistent questionnaires, respectively, which indicate to appropriate reliability of the data collection tools. For data analysis, Pearson's correlation coefficient was used.

Researchers collected data from three target universities during final exams. At the beginning of the data collection stages, the participants were presented by a thorough explanation of the study and its objectives. With respect to ethical considerations, an attempt was made to preserve the confidentiality of the collected data and privacy of the participants. To increase the external validity of the study; namely, to increase the results' generalizability, the researchers referred to the colleges during the examinations for several consecutive days, distributed the questionnaires among persistent students and collected the completed questionnaires. They also corresponded

and communicated with non-persistent students through emails or phone calls to become aware of their viewpoints and to receive their information.

To determine the persistence rate of each online course, at first, the number of enrollments for that course was calculated and summed for three consecutive years (The reason that three consecutive years were considered for data collection and determining the persistence of each course was that, firstly, the ability of universities to provide students' feedback, meet their expectations, and increase their persistence gradually increased. Secondly, the survey and the results of similar studies suggested that the dropout rate of students was higher in the primary months and years of education.). Then the number of students who were studying (the persistent candidates) and the number of students dropped out (the non-persistent candidates) was determined. Dropped out students consisted of those who had formally abandoned their education and those who had not continued informally. [Table 1](#) shows the persistence rate in each online course in three universities. To determine the persistence rate of each course, [Equation 1](#) was used.

Equation 1. Calculating the Persistence Rate of Online Courses

$$\text{The persistence rate of a course} = \frac{\text{The number of the persistent candidates in each course}}{\text{The total candidates of that course}} \quad (1)$$

## 4. Results

### 4.1. Demographic Characteristics of the Participants

Analysis of the results showed that out of the 744 respondents to the questionnaires 54% (402 students) were female and 46% were male. Moreover, 39.5% (294 students) of the respondents were between 19 and 25 years old and 37.5% (279 students) were between 26 and 35 years. In addition, 51.3% of the participants (382 students) were married and 48.7% were single. Also, 26.7% of the participants (199 students) stated that they spend more than 10 hours a week on online learning and 27.8% (207 students) mentioned 3 to 6 hours of online learning weekly. The main role in life of 36.7% of the participants were students and 28.8% were employees.

To Clarify dropout phenomena, the most pervasive problem in the domain of e-learning systems, the present study tried to explore the attitudes of e-learners toward online course and online interaction.

### 4.2. Analyzing the Relationship Between Attitude and Persistence

#### 4.2.1. Students' Attitudes Toward Online Course

This index is derived from four statements of the persistent and non-persistent questionnaires namely (a) participation in online courses have increased students' knowledge, (b) online courses have met students' expectations, (c) students offer online courses to other students, (d) students are willing to attend to another online course.

#### 4.2.2. Students' Attitudes Toward Online Interaction

This index is also derived from four statements of the persistent and non-persistent questionnaires: (a) timely feedback by the professor, (b) usefulness of feedback received by the student, (c) adequacy or non-adequacy of student-professor relationship, (d) adequacy or non-adequacy of student-student relationship.

#### 4.2.3. Students' Attitudes Toward Online Chat, Discussion Forum, and E-mail

This index is derived from three questions of the persistent and non-persistent questionnaires that asked students whether the weekly online chat, discussion forum, and e-mail improved their online learning experience.

In order to create the above indices, the frequency of answers to each index was calculated at the level of the online course, and its average was used as the desired index. The severity of the relationship between the indices was calculated by the Pearson correlation coefficient. Since the extent of using online interaction tools (online chat, discussion forum, and email) by the students (in student-student and student-professor interactions) could affect students' attitudes, six other questions were designed to seek the students' opinions about the frequency of student-professor and student-student interaction. Then the relationship between these two indices and the above five indices was examined. The results of the correlation analysis are presented in [Table 2](#).

It can be inferred from [Table 2](#) that, there was a positive and significant relationship between two indices of "attitude toward online interaction" and "attitude toward online course" at 95% confidence level ( $r = 0.650$ ,  $P = 0.042$ ,  $P < 0.05$ ). Also, there was a positive, direct, and significant relationship between two indices of "attitude toward online chat" (which is a synchronous interaction method) and "attitude toward online course" ( $r = 0.687$ ,  $P = 0.028$ ,  $P < 0.05$ ). The same relationship was observed between two asynchronous interaction methods of discussion forum and e-mail. Indices of "attitude toward discussion forum" ( $r = 0.748$ ,  $P = 0.013$ ,  $P < 0.05$ ) and "attitude toward e-

**Table 1.** Statistical Population, Rate of Response, and Persistence in Each Online Course

University/Course	Participant Number	Response Rate, %		Persistence Rate
		Persistent	Non-Persistent	
<b>Khaje Nasireddin Tousi</b>				
Industrial engineering	207	22.4	15.2	0.78
Information Technology Engineering	120	65.5	33.3	0.70
Computer Engineering (Software)	120	56.5	45.7	0.71
<b>Quran sciences and Hadith</b>				
Hadith Sciences	606	27.8	48.9	0.92
Quran Sciences	771	10.6	21.2	0.93
<b>Shiraz</b>				
Information Technology Engineering	918	4.8	9.2	0.81
Computer Engineering (Hardware)	775	6.2	2.1	0.75
Computer Engineering (Software)	806	7.4	6.8	0.82
Electrical Engineering (Telecom.)	125	65.6	26.9	0.79
Law	837	8.4	16.8	0.87
<b>Total (mean)</b>	5,285	27.51	22.61	0.808

**Table 2.** The Correlation Between Attitudinal Indices and E-Learning

	Attitude Toward Online Course	Attitude Toward Online Interaction	Attitude Toward Online Chat	Attitude Toward Discussion Forum	Attitude Toward E-Mail	Frequency of Student-Professor Interaction	Frequency of Student-Student Interaction
Attitude toward online course	1	0.650 <sup>a</sup> , 0.042	0.687 <sup>a</sup> , 0.028	0.748 <sup>a</sup> , 0.013	0.888 <sup>b</sup> , 0.001	0.499, 0.142	0.208, 0.564
Attitude toward online interaction		1	0.069, 0.851	0.262, 0.465	0.353, 0.317	0.943 <sup>b</sup> , 0.000	0.793 <sup>b</sup> , 0.006
Attitude toward online chat			1	0.907 <sup>b</sup> , 0.000	0.864 <sup>b</sup> , 0.001	-0.104, 0.775	-0.362, 0.304
Attitude toward discussion forum				1	0.862 <sup>b</sup> , 0.001	0.093, 0.799	-0.102, 0.779
Attitude toward e-mail					1	0.221, 0.539	-0.145, 0.690
Frequency of student-professor interaction						1	0.815 <sup>b</sup> , 0.004
Frequency of student-student interaction							1

<sup>a</sup>This means that the correlation is significant at  $P = 0.05$ .

<sup>b</sup>This means that the correlation is significant at  $P = 0.01$ .

mail" ( $r = 0.888$ ,  $P = 0.001$ ,  $P < 0.01$ ) have the same relationship with attitudes toward online courses, respectfully.

The results showed that a positive and significant relationship was observed between "the frequency of student-professor interaction" and "attitude toward online interaction" at 99% confidence level ( $r = 0.943$ ,  $P < 0.001$ ). Also, there was a direct and significant relationship between "frequency of student-student interaction" and "attitude toward online interaction", at 99% confidence level ( $r =$

$0.793$ ,  $P < 0.01$ ).

Finally, in order to find out the relationship between "attitude toward interaction" and "students' persistence in e-learning", correlation coefficient was calculated and the results are displayed in [Table 3](#).

As the [Table 3](#) shows, there was a positive, direct, and significant relationship between "students' attitude toward online course" and "their persistence in e-learning" at 95% confidence level ( $r = 0.744$ ;  $P = 0.014$ ,  $P < 0.05$ ).

**Table 3.** Correlation Coefficient Between Students' Persistence and Attitudinal Indices

Indices	Attitude Toward Online Course	Attitude Toward Online Interaction	Attitude Toward Online Chat	Attitude Toward Discussion Forum	Attitude Toward E-mail
Persistence	0.744 <sup>a</sup> , 0.014	0.862 <sup>b</sup> , 0.001	0.473, 0.168	0.584, 0.077	0.614, 0.059

<sup>a</sup>This means that the correlation is significant at  $P = 0.05$ .

<sup>b</sup>This means that the correlation is significant at  $P = 0.01$ .

There was also a positive, direct, and significant relationship between “students’ attitudes toward online interaction” and “their persistence in e-learning” at 99% confidence level ( $r = 0.862$ ;  $P = 0.001$ ,  $P < 0.01$ ). However, there was no significant relationship between “attitude toward electronic communication tools” (including online chat, discussion forum, and email) and “students’ persistence in e-learning”.

#### 4.3. Intervening Variables

Owing to the fact that lots of appropriate qualitative and quantitative data about personal characteristics of participants were collected by means of persistent and non-persistent questionnaires, some supplementary analysis were done on the data to further identify probable barriers of students’ persistence in e-learning. Those characteristics were about gender, marital status, having a child less than 18 years of old, job type, role in life and location of internet connection of the participants in the study. Two nonparametric statistical tests, including “chi-Square test of relationship” and “Cramer’s V” were used (one of the pre-conditions for using the above tests is that in the agreed tables of  $2 \times 2$ , the expected frequencies (even in one case) are not less than 5, and in larger tables in more than 20% of the cells is not less than 5. This is considered in the calculations.). In order to predict the probable relationship between each variable and the “students’ persistence” logistic regression method was used. The results of chi-square test to examine the relationship between the demographic variables and persistence are presented in Table 4.

##### 4.3.1. The Relationship Between Gender and Persistence

The chi-square test was used to examine the relationship between gender and persistence. In fact, the hypothesis to be examined here was that “there is a relationship between gender and persistence in e-learning”. In other words, the study tried to explore a significant difference between the persistent and non-persistent candidates in terms of gender.

As Table 4 shows, the zero hypothesis was rejected with 99% confidence level ( $\chi^2 = 9.260$ ;  $df = 1$ ;  $P < 0.01$ ). In other words, it can be concluded that there is a significant relationship between the frequency of the persistent and

non-persistent candidates in terms of gender. It should be noted that descriptive analysis of persistent and non-persistent candidates in terms of gender indicates that in the persistent group, 55% were female and 45% were male, while in the non-persistent group, 39.5% were female and 60.5% were male.

##### 4.3.2. The Relationship Between Marital Status and Persistence

The hypothesis to be examined here was that “there is a relationship between the marital status and the students’ persistence in e-learning”. As Table 4 shows, the zero hypothesis was rejected with a 99.9% confidence level ( $\chi^2 = 38.59$ ;  $df = 1$ ;  $P < 0.001$ ). In other words, it can be concluded that there was a significant difference between the frequency of the persistent and non-persistent candidates in terms of marital status. The descriptive analysis of persistent and non-persistent candidates in terms of marital status showed that in the persistent group, 52% were married and 48% were single, and in the non-persistent group, 82% were married and 18% were single. So a great percentage of candidates in the non-persistent group were married.

##### 4.3.3. The Relationship Between Having Children Under the Age of 18 at Home and Persistence

The hypothesis to be examined here was that “there is a relationship between having children under the age of 18 at home and the students’ persistence in e-learning”. As Table 4 shows, the zero hypothesis was rejected with 95% confidence level ( $\chi^2 = 2.218$ ;  $df = 1$ ;  $P > 0.05$ ). In other words, it can be concluded that there was no significant difference between the frequency of the persistent and non-persistent candidates in terms of having children under the age of 18 at home. The descriptive analysis of persistent and non-persistent candidates in terms of having children under the age of 18 at home showed that in the persistent group, 60% and in the non-persistent group 68% said that they have children under the age of 18 at home.

Three other variables of “job type”, “role in life”, and “the location of internet connection” were variables to which more than two categories were predicted. So the Cramer’s V statistics was used. Table 5 shows the results of this test for the desired variables.



**Table 4.** The Results of Chi-Square Test to Examine the Relationship Between the Desired Variables and Persistence

Chi-Square Test of Association	Frequency	Value	df	P Value
Gender	737	9.260a	1	0.002
Marital status	734	38.596a	1	0.000
Having children under 18 years old	432	2.218a	1	0.136

**Table 5.** The Results of Cramer's V Test to Examine the Relationship Between the Desired Variables and Persistence

Cramer's V Test	Frequency	Value	P Value
Job type	728	0.188	0.000
Role in life	717	0.278	0.000
The location of internet connection	711	0.204	0.000

#### 4.3.4. The Relationship Between Job Type and Persistence

The hypothesis to be considered here was that “there is a relationship between the job type and the students' persistence in e-learning”. As Table 5 shows, the zero hypothesis was rejected with a 99.9% confidence level (Cramer's  $V = 0.188$ ;  $P < 0.001$ ). In other words, it can be concluded that there was a significant difference between the frequency of the persistent and non-persistent candidates in terms of job type. The descriptive analysis of persistent and non-persistent candidates in terms of job type showed that 42% of the persistent group and 43% of the non-persistent group has no job. The analysis also indicated that 36% of the persistent group and 18% of the non-persistent group were self-employed, and 22% of the persistent group and 29% of the non-persistent group enjoyed governmental position.

#### 4.3.5. The Relationship Between Role and Persistence

The hypothesis to be examined here was that “there is a relationship between role and students' persistence in e-learning”. What is meant by the word “role of the student” is that the student spends most of his/her time as a “student”, “father or mother”, or “employee”. As Table 5 shows, the zero hypothesis was rejected with a 99.9% confidence level (Cramer's  $V = 0.251$ ;  $P < 0.001$ ). In other words, it can be concluded that there was a significant difference between the frequency of the persistent and non-persistent candidates in terms of their role. The descriptive analysis of persistent and non-persistent candidates in terms of job type showed that 23% and 54% of the persistent and non-persistent candidates were “father or mother”, respectively.

#### 4.3.6. The Relationship Between the Location of Internet Connection and Persistence

The hypothesis to be examined here was that “there is a relationship between the location of internet connection and the student's persistence in e-learning”. As Table 5 shows, the zero hypothesis was rejected with a 99.9% confidence level (Cramer's  $V = 0.204$ ;  $P < 0.001$ ). In other words, it can be concluded that there was a significant difference between the frequency of the persistent and non-persistent candidates in terms of the location of internet connection. The descriptive analysis of persistent and non-persistent candidates in terms of the location of internet connection showed that 86% of the persistent and 76% non-persistent candidates have mentioned “the house” as the location of internet connection, respectively. Similarly, 11% and 24% of the persistent and non-persistent candidates have mentioned “the workplace” as the location of internet connection.

#### 4.3.7. Predicting the Probable Relationship Between Intervening Variables and Persistence

In order to predict the probable relationship of the six intervening variables of “gender”, “marital status”, “having children under the age of 18”, “the location of internet connection”, “job type”, and “role in life” on the persistence, the logistic regression method was used. In this regard, the zero hypothesis was that “there is no relationship between each of the six independent variables and persistence ( $H_0: b = 0$ ).

Table 6 shows the status of six independent variables in the regression model. It should be noted that because variables of “job type”, “role in life”, and “the location of internet connection” were composed of more than two levels, they were converted to artificial variables based on their levels and the overall effect of the main variable had been tested.

Based on the significance level (Sig.) obtained for each of the variables and the constant, it could be seen that the zero hypothesis was rejected with 95% confidence level ( $P < 0.05$ ) with respect to four variables of “gender”, “marital status”, “job type”, and “role in life”. It means that there is a relationship between these four independent variables and persistence. However, the effects of two other vari-

**Table 6.** The Results of the Logistic Regression Test to Predict the Probable Relationship Between Intervening Variables and Persistence

	df	P Value	Confidence Intervals for the Odds Ratio	
			Lowest	Highest
Gender	1	0.001	1.486	4.982
Marital status	1	0.000	0.001	0.083
Having children under the age of 18	1	0.051	0.263	1.003
The location of internet connection	2	0.016		
Job type	3	0.001		
Role in life	3	0.148		
Constant	1	0.999		

ables, namely, “having children under the age of 18 years at home” and “the location of internet connection” were to the extent that they can be ignored. Thus it can be concluded that there was no significant relationship between these two variables of “having children under the age of 18 years at home” and “the location of internet connection” and persistence in e-learning education.

## 5. Discussion

The findings of the present research indicated positive relationships between students’ attitudes toward online course and online interaction with their persistence in e-learning systems. The three indices of online interaction: online chat, discussion forum, and e-mail have positive relationships with attitudes toward online course. A positive and significant relationship was observed between student-professor interaction and student-student interaction with attitudes toward online interaction.

The results showed a positive relationship between students’ attitudes toward online course and their persistence in e-learning. Students’ attitudes toward participating in the online course was determined by factors such as increasing students’ knowledge, meeting students’ expectations, and student’s willingness to attend to another online course. This suggests that when new information technology, such as e-learning system is introduced, perceived ease of use can be influential in the continuous use of the system (14).

In addition, findings indicated a positive relationship between students’ attitude toward online interaction and their persistence in e-learning. Similarly, studying the relationship between online interaction and the persistence of adult students over 25 years of old, Tello found a positive relationship between students’ attitudes toward online interaction and persistence. He also (6) found a significant

and positive relationship between students’ attitudes toward using discussion forums and their persistence in e-learning. However, in the present study, the relationship between communication tools (online chat, discussion forum, e-mail) and students’ persistence was not significant. This finding is inconsistent with previous studies and requires a more precise examination.

A positive and significant relationship was found between students’ attitude toward online interaction and their attitude toward online course. This finding was supported by many studies on the attitude and intention to use e-learning. The majority of studies found that the attitude was a vital component that can lead to intention to use technology (15-17). According to Hussein (18), students’ attitudes were a significant predictor and played an important role in the intention of students to use e-learning systems.

The other finding of the study was a significant relationship between students’ attitude toward online chat and their attitude toward online course. Nowadays, the incorporation of synchronous technologies such as online chat in online learning environments enable instant feedback (19, 20) and enhance participation and interaction (21, 22).

The same significant relationship was found between attitudes toward two other asynchronous communication tools of discussion forum and e-mail with attitudes toward online course. Asynchronous learning environments are particularly useful for thoughtful and in-depth discussions; all learners are allowed to respond to a topic and to hold ongoing discussions, especially when archiving is required (23). Researchers have observed that via asynchronous discussions, communication and collaboration is enhanced, and learners are not restricted to a set time/day for their participation, they have more time to prepare responses to questions or directions (24).

A positive and significant relationship was observed between student-professor and student-student interaction with attitude toward online interaction. It seems that the more the frequency of student-professor and student-student interactions, the more improved the students' attitudes toward online interaction. In a similar study, Bertea (25) found out a significant relationship between technical skills of students for working in virtual settings and their attitude toward online learning. Also, students' attitudes were influenced by other factors such as time spent on computer working. These results somehow confirm the findings of the research that indicated a positive and significant relationship between the interaction and students' attitude toward online interaction.

Qualitative data obtained from the study gave rise to precious findings about some characteristics of persistence and non-persistence students. A significant difference was found between persistence and non-persistence students in terms of gender. In the persistent group, females were 10% more than males, and in the non-persistent group, the minority of the students were females and the majority of them were males. Similarly, in a study conducted by Willging and Johnson (26), the proportion of males dropping out was higher than that of females. On the Student Information Exchange Consortium of 2001, Berg and Hung (27) stated that the rates of the persistence and graduation were consistently higher in females than males.

Marital status was the second difference of the persistent and non-persistent students. Descriptive analysis of persistent and non-persistent candidates in terms of marital status showed that in non-persistent group a greater percentage of candidates were married. The third significant difference of the persistent and non-persistent groups lies in the main role they had in their lives. The information obtained from descriptive analysis of students showed that the majority of the non-persistent students were father or mother, but only a minority of the persistent students had such a role. Rovai (28) considered two groups of pre-admission and post-admission factors influential in students' decisions to retention. He mentioned family responsibilities as the main external influencing factor in drop out or the persistence of students after admission.

### 5.1. Conclusions

The primary purpose of this study was to find the correlation between students' attitudes and their persistence in e-learning. The findings and implications of the study can provide insights into instructors and designers of e-learning systems. The positive relationship between stu-

dents' attitudes toward online interaction and their persistence in e-learning courses indicate a vital need for the provision of technological facilities to enable a collaborative environment in e-learning systems. The other implication is that to increase the persistence of students in online systems, their attitude toward online course should be improved. This study revealed that student-professor and student-student interactions can positively influence students' attitudes toward online course.

The significant relationship between students' attitudes toward three indices of online interaction in this study and online course showed that instructors should provide the course takers with enough opportunities and communication facilities to interact with other learners and feel a sense of belonging to the class. As Wise et al. (29) mentioned when learners experience a sense of belonging and presence during the course, their participation and involvement will be increased; hence, the probability of their dropping out would be decreased.

In e-learning contexts, electronic communication tools play an important role in students' participation in the learning process. E-learning course designers and instructors can functionally facilitate the use of synchronous and asynchronous communication tools and appropriately provide learners with instantaneous and delayed feedbacks during a course.

### Footnotes

**Authors' Contribution:** Mahdi Mahmodi developed the research methodology, performed the statistical analysis, and wrote the conclusion. Maryam Jalali Moghadam collected the required data, developed the statement of problem and literature review. Both authors contributed to the final revision of the manuscript.

**Conflict of Interests:** The authors declare that there is no conflict of interest in this study.

**Ethical Approval:** At the beginning of the data collection stage, the participants were given a thorough explanation of the study and its objectives. With respect to ethical considerations, an attempt was made to preserve the confidentiality of the collected data and privacy of the participants. All procedures performed in studies involving humans were in accordance with Payame Noor University.

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## References

1. Sherry L. Issues in distance education learning. *International J Educ Telecommun.* 1996;**1**(4):337-45.
2. Ebrahimzadeh I. Pedagogy based on information technology: Conceptual query. *J Paik Noor.* 2008;**4**(4):4-13.
3. Naghavi M. [Study of teachers and students attitude toward e-learning: Surveying in Iran's e-learning universities]. *Q J Res Plann High Educ.* 2007;**13**(1):157-76. Persian.
4. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: A comparison of two theoretical models. *Manage Sci.* 1989;**35**(8):982-1003. doi: [10.1287/mnsc.35.8.982](https://doi.org/10.1287/mnsc.35.8.982).
5. Liaw SS. Considerations for developing constructivist web-based learning. *International Journal of Instructional Media Int J Instr Media.* 2004;**31**:309-19.
6. Tello SF. *An analysis of the relationship between instructional interaction and student persistence in online education [dissertation]*. Lowell: University of Massachusetts; 2002.
7. Jung Y, Lee J. Learning engagement and persistence in massive open online courses (MOOCs). *Comput Educ.* 2018;**122**:9-22. doi: [10.1016/j.compedu.2018.02.013](https://doi.org/10.1016/j.compedu.2018.02.013).
8. Herbert M. Staying the course: A study in online student satisfaction and retention. *Online J Distance Learn Adm.* 2006;**9**(4).
9. Smith B. *E-learning technologies: A comparative study of adult learners enrolled on blended and online campuses engaging in a virtual classroom [dissertation]*. 2010.
10. Prensky M. *Digital game-based learning*. New York: McGraw-Hill; 2000.
11. Tinto V. *Leaving College: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press; 1987.
12. Svedberg MK. *Self-directed learning and persistence in online asynchronous undergraduate programs [dissertation]*. Virginia Polytechnic Institute and State University; 2010.
13. Pascarella ET, Terenzini PT. *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass; 1991.
14. Wu B, Chen X. Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Comput Hum Behav.* 2017;**67**:221-32. doi: [10.1016/j.chb.2016.10.028](https://doi.org/10.1016/j.chb.2016.10.028).
15. Tajudeen Shittu A, Madarsha Basha K, Suryani Nik AbdulRahman N, Badariah Tunku Ahmad T. Investigating students' attitude and intention to use social software in higher institution of learning in Malaysia. *Multicult Educ Technol J.* 2011;**5**(3):194-208. doi: [10.1108/17504971111166929](https://doi.org/10.1108/17504971111166929).
16. Sujeet KS, Jyoti KC. Technology acceptance model for the use of learning through websites among students in Oman. *Int Arab J E-Technol.* 2013;**3**(1):44-9.
17. Altawallbeh M, Soon F, Thiam W, Alshourah S. Mediating role of attitude, subjective norm and perceived behavioural control in the relationships between their respective salient beliefs and behavioural intention to adopt e-learning among instructors in Jordanian Universities. *J Educ Pract.* 2015;**6**(11):152-9.
18. Hussein Z. Leading to intention: The role of attitude in relation to technology acceptance model in e-learning. *Procedia Comput Sci.* 2017;**105**:159-64. doi: [10.1016/j.procs.2017.01.196](https://doi.org/10.1016/j.procs.2017.01.196).
19. Mattheos N, Nattestad A, Schitteck M, Attstrom R. A virtual classroom for undergraduate periodontology: A pilot study. *Eur J Dent Educ.* 2001;**5**(4):139-47. [PubMed: [11683890](https://pubmed.ncbi.nlm.nih.gov/11683890/)].
20. Hrastinski S, Keller C, Carlsson SA. Design exemplars for synchronous e-learning: A design theory approach. *Comput Edu.* 2010;**55**(2):652-62. doi: [10.1016/j.compedu.2010.02.025](https://doi.org/10.1016/j.compedu.2010.02.025).
21. Falloon G. Making the connection: Moore's theory of transactional distance and its relevance to the use of a virtual classroom in post-graduate online teacher education. *J Res Technol Educ.* 2011;**43**(3):187-209. doi: [10.1080/15391523.2011.10782569](https://doi.org/10.1080/15391523.2011.10782569).
22. Fujioka-Ito N. Designing a curriculum for a distance learning class: An example of a first-year Japanese course. *Theory Pract Lang Studies.* 2013;**3**(10). doi: [10.4304/tpls.3.10.1717-1725](https://doi.org/10.4304/tpls.3.10.1717-1725).
23. Branon RF, Essex C. Synchronous and asynchronous communication tools in distance education. *TechTrends.* 2001;**45**(1):36. doi: [10.1007/bf02763377](https://doi.org/10.1007/bf02763377).
24. Skylar AA. A comparison of asynchronous online text-based lectures and synchronous interactive web conferencing lectures. *Issues Teach Educ.* 2009;**18**(2):69-84.
25. Berteau P. Measuring students attitude towards e-learning A case study. *Proceedings of the 5th standing conference on e-learning and software for development, April 9-10. Bucharest: Romania.* 2009. p. 1-8.
26. Willging PA, Johnson SD. Factors that influence students' decision to drop out of online courses. *J Asynchronous Learn Networks.* 2004;**8**(4):105-18.
27. Berg ZL, Huang YP. A model for sustainable student retention: A holistic perspective on the student dropout problem with special attention to e-learning. *DEOSNEWS.* 2004;**13**(5):97-108.
28. Rovai AP. In search of higher persistence rates in distance education online programs. *Internet High Educ.* 2003;**6**(1):1-16. doi: [10.1016/S1096-7516\(02\)00158-6](https://doi.org/10.1016/S1096-7516(02)00158-6).
29. Wise AF, Cui Y, Jin WQ, Vytasek J. Mining for gold: Identifying content-related MOOC discussion threads across domains through linguistic modeling. *Internet High Educ.* 2017;**32**:11-28. doi: [10.1016/j.iheduc.2016.08.001](https://doi.org/10.1016/j.iheduc.2016.08.001).