

## AN INVESTIGATION OF FACTORS AFFECTING STUDENT PARTICIPATION LEVEL IN AN ONLINE DISCUSSION FORUM

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### ABSTRACT

This study analyzed the factors that affect student participation in discussion forum under the two main purposes. The first purpose was to examine the relationship between the students' individual demographics and categories of students' participation level (inactive, moderate, and active) in discussion forum of an online course. The second purpose was to examine the students' views about reasons for low level of interaction in discussion forum. A total of 196 students who attended computers systems and structures course of online certificate program were included in the study. The data was collected at the beginning and at the end of the course through online survey and semi-structured interviews. The descriptive and inferential statistical techniques were used to analyze the quantitative data. The content analysis method was used to analyze the qualitative data. The results of the study indicated that three student characteristics (achievement, gender and weekly hours of Internet use) showed a significant relationship with students' participation level in discussion forum of the online course. Also, the findings emphasized some of the critical issues that should be taken into account in designing online discussions, such as, students' workload and responsibilities, progress of interaction over the Internet taking more time, planned and structured instructional activities in discussion forum.

**Keywords:** Computer mediated communication, asynchronous discussion, online discussion forum, online learning

### INTRODUCTION

Many public and private educational institutions have offered several courses by the use of Internet technologies, and these courses in online environments have become a common option for learners in higher education. The time and place flexibility provided by online courses and programs has conducted an increasing number of learners, especially adults who have several responsibilities, such as, jobs and families, to come back to education in the last years (Moore & Kearsley, 2005; Simonson et al., 2009).

Computer mediated communication (CMC) has great potential for designing these type of online courses. Interaction with learners and teachers through CMC seems to be one of the most influential features of online courses. Moore (1989) identified three types of interaction: (1) learner-instructor interaction, which provides feedback and dialog between student and instructor; and (3) learner-learner interaction, which facilitates the exchange of information, ideas and dialog among peers; (2) learner-content interaction, which enables students to obtain information from the material. In the literature, several studies are consisted with Moore's (1989) promotion of these three types of interaction that are essential in distance education (i.e. Swam, 2001; Vrasidas & McIsaac, 1999; Yukselturk & Yildirim, 2008).

Asynchronous and synchronous communication tools are used mainly for all types of interaction in online courses. Synchronous interaction requires simultaneous participation of all students and instructors. The advantage of synchronous mode is that interaction occurs in real time. On the other hand, asynchronous interaction does not require simultaneous participation of all students and instructors. Students and instructors can post the messages or respond to the messages at any time and at any where they prefer and view the messages many times after the messages have been posted. Also, it is an effective mode for reflection and critical analysis. In other words, asynchronous discussions facilitate critical analysis and reflection of thoughts and things learned in the courses by especially writing. Due to these advantages, the popularity of using asynchronous online discussion evolves over time in online learning (Hammond, 1999; Thomas, 2002; Wu & Hiltz, 2004).

One of the most widely used asynchronous communication tools in online courses is discussion forums in which students and teachers post to threaded asynchronous discussions. Currently, the asynchronous online discussion forums also are contemporary tools that can save, arrange and present the messages into various discussion threads. Participation in asynchronous discussions, such as discussion forums, can be identified as an indicator to evaluate the progress of interaction and collaboration in online courses (Hammond, 1999; Prinsen, Volman & Terwel, 2007).

## RELATED LITERATURE

Learner participation has been discussed widely as a key part of online learning recently. It has been conceptualized differently in several studies. For example, Hrastinski (2008) mentioned six different ways of conceptualization: accessing e-learning environments, writing, quality writing, writing and reading, actual and perceived writing and taking part and joining in a dialogue. After analyzing several related studies in the literature, Hrastinski (2008, p. 1761) proposed following definition of online learner participation:

Online learner participation is a process of learning by taking part and maintaining relations with others. It is a complex process comprising doing, communicating, thinking, feeling and belonging, which occurs both online and offline.

Learner participation measuring interaction with peers and teachers in online environments can enhance learning outcomes. Researchers expressed that participation affects perceived positively learning, quality assessment of assignments, achievement, satisfaction and retention rates in the literature (Hrastinski, 2008). For example, Woods (2002) stated that both quality and quantity of interaction with the instructor and peers are much more crucial to the success of online courses and student satisfaction than to success and satisfaction in traditional courses. Davies and Graff (2005) examined the relationship between the level of online participation and student grades (i.e. high, medium, low, fail). They concluded that students achieving high or medium passing grades engaged more actively than students achieving low passing grades and also students achieving low passing grades were more active than students who failed in the several modules of courses even though greater online interaction did not lead to significantly higher performance. Another study was conducted to analyze discussions in courses delivered completely online by Picciano (2002) who found that students perceived greater quality and quantity of learning as a result of participating in the discussions.

In the literature, there are several studies that take an interest in factors affecting the participation in online asynchronous discussion. Cheung and Hew (2008) discussed factors that are fallen into three different categories: attributes of the asynchronous online discussion, role of the facilitator and design of discussion activities. Similarly, Vonderwell and Zachariah (2005) searched for factors that influence learner participation and they found that online learner participation are influenced by technology and interface characteristics, content area experience, student roles and instructional tasks, and information overload. In another study conducted by Vrasidas and McIsaac (1999) who examined the nature of interaction in an online course from both teacher and student perspectives and they concluded that the structure of course, class size, feedback, and prior knowledge of computer mediated communication all affected the interaction.

Moreover, there are other important aspects that influence student's participation and one of them is related to the differences in students' demographics and abilities in online courses. For example, Godwin, Thorpe and Richardson (2008) mentioned that students taking online courses with a high level of interaction tended to be different from the students taking the courses with a low level of interaction in regard to age, gender and previous qualifications. Although the results were not statistically significant, high interactive students were generally younger, male and having had higher educational qualifications. McLean and Morrison (2000) analyzed the relationships between learner participation and six socio demographic variables (i.e. sex, age, education level, occupation, residence in urban or rural areas, and region of residence) and they found two variables (holding a university degree and living in an urban area) to be the strongest predictors of participation. Another study by Prinsen, Volman, and Terwel (2007) examined the influence of learner characteristics on degree and type of participation in a CSCL environment. They stated that females send more messages to the discussions than males do and are more dependent on their computer skills. Students who are good at comprehensive reading also send more messages. Another variable that influences the degree of participation is popularity among classmates.

As a summary, the importance of participation and interaction in education especially in online learning is extensive in the literature. Caspi et al. (2006) mentioned that CMC media such as synchronous or asynchronous tools provided new opportunities for students to participate in online courses, but, participation in the web-based instructional environment tends to be lower while comparing to participation in the face-to-face courses. There are several factors affecting learner participation that was mentioned in online environments. There have still not been enough findings to answer general questions about these factors, especially impact of student characteristics in online discussion due to continuously variations in CMC applications, methods of study, instructions, roles of teachers and students (Prinsen, Volman & Terwel, 2007). As a result, the relationship between participation and interaction and learning outcomes is a complex phenomenon and we need more studies related to this phenomenon (Picciano, 2002).

## METHOD

### Research Questions

This study analyzed the factors that affect student participation in discussion forum under the two main purposes. The first purpose was to investigate the relationship between the students' demographics and intellectual abilities and categories of students' participation level in discussion forum of an online course. The second purpose was to examine the students' views about reasons for low level of interaction in discussion forum of an online course. The following two major research questions guided this study:

- Is there a relationship between students' participation level (inactive, moderate, and active) in discussion forum and students' demographics and intellectual abilities (gender, age, employment, education level, online course experience, domain knowledge, weekly hours of Internet use, achievement, and status after the course) in an online course?
- What are the students' views about reasons for low level of interaction in discussion forum in an online course?

### Description of Online Certificate Program and an Online Course

Online Information Technologies Certificate Program (ITCP) is one of the first Internet Based Education Projects of the Middle East Technical University in Ankara, Turkey. It is based on synchronous and asynchronous communication methods over the Internet offered by cooperation of Computer Engineering Department and Continuing Education Center at Middle East Technical University. The online certificate program was started in May 1998, and it is still active (Isler, 1998).

This online certificate program offers online lecture notes, learning activities and visual aids to the participants in the courses. One instructor and two assistant are dealing with each course. Also, each course has an asynchronous (e.g. discussion forum) and synchronous (e.g. chat sessions) communication tools to provide interaction between instructors and students, and students and students. At the end of each semester, there are face-to-face sessions for each course. Computers Systems and Structures is one of the first semester courses in this online certificate program. The main aim of this course is to give an introductory level of knowledge on software, equipment and structure of computer systems. Central processing unit, memories, input/output principles, environmental tools, such as printers, operating systems, general application software, programming languages, and also files, file systems, data transfer are handled through out the course.

### Variables

The dependent variable was the students' participation level in discussion forum of the online course (Computers Systems and Structures Course). There were three groups of students described in Table 1: inactives, moderates, and actives. The number of messages written or sent by the students in the discussion forum of the online course was 838 at the end of the semester. The average of number of messages per student (N=196) was 4.3. Active students in this course wrote five or more messages. Moderate participants wrote average of number of messages or less. Inactive participants in this study did not write any messages and they only read written messages in this online course.

Table 1. Description and Categories of Students' Participation Level

Participation level	Description	# of messages
Actives	writing at least five or more messages in the discussion forum	= > 5
Moderates	writing average of number of messages (4.3) or less in the discussion forum	= < 4
Inactives	not writing any messages, only reading others' messages	-

Students' demographics and intellectual abilities (gender, age, employment, education level, online course experience, domain knowledge, weekly hours of Internet use, achievement, and status after the course) were all independent variables. The list of independent variables, descriptions, and categories of these variables are presented in Table 2.

Table 2. Description and Categories of Independent Variables

Variables	Description	Categories
Gender	Sex of students	Male Female
Age	Age of students	24 and younger 25-30 31 and older
Education Level	Education level of students	Undergraduate/graduate Student Graduate
Employment	Indicates whether students are working at any job	Working Not working
Online Experience	Indicates whether students took online courses before	Yes No
Domain (subject-area) Knowledge	Students' perception of their own subject-area knowledge about the course topics	Low Intermediate High
Weekly Hours of Internet Use	How many hours per week on the Internet students spend time	14 and less hours 15-30 hours 31 and more hours
Student Achievement	Indicates whether students pass the course	Successful Unsuccessful
Student Status	Indicates whether students continue to attend the program after the course	Continuous Dropout

### Subject of the Study

The subject of the study was selected from all participants who attended to the online Information Technologies Certificate Program in 2008-2009. A total of 196 students who registered computers systems and structures course of this online certificate program were included in the study. The percentages of inactive students were 34.7 %, moderate active students were 32.7 %, and active students were 33.2 %.

The number of male students (72.9 %) was greater than the number of female (27.1 %) students, and the students' ages ranged from 19 to 55 with an average of 27.1 years. 54% of the online program students were undergraduate or graduate students. More than half of the students (56.1 %) have full-time or part-time jobs. Only a few of them (12.8 %) have previously been in an online course. 38.5 % of the students did not have enough information about course content. Also, more than 60 % of students use Internet more than 15 hours weekly. Moreover, 41 % of the students did not pass the course and 26.5 % of the students left the program after the course. Table 3 presents the percentages of participants' demographic characteristics with regard to participation level (inactive, moderate, active).

Table 3. Percentage of Participants' Demographic Characteristics

	Inactive		Moderate		Active	
	N	%	N	%	N	%
Gender						
Male	48	33.6	54	37.8	41	28.70
Female	20	37.7	9	17.0	24	45.3
Age						
24 and younger	23	31.9	22	30.6	27	37.5
25-30	29	32.2	32	35.6	29	32.2
31 and older	16	47.1	9	26.5	9	26.5
Education Level						

Student (BS or MS student)	38	35.8	39	36.8	29	27.4
Graduate	30	33.3	24	26.7	36	40.0
<b>Occupation</b>						
Working	37	33.6	33	30.0	40	36.4
Not Working	31	36.0	30	34.9	25	29.1
<b>Previous Online Course</b>						
Yes	10	40.0	8	32.0	7	28.0
No	58	33.9	55	32.2	58	33.9
<b>Domain Knowledge</b>						
Low	33	44.6	21	28.4	20	27.0
Intermediate	25	29.4	27	31.8	33	38.8
High	9	27.3	14	42.4	10	30.3
<b>Weekly Hours of Internet Use</b>						
14 and less hours	23	35.4	17	26.2	25	38.5
15-30 hours	26	47.3	13	23.6	16	29.1
31 and more hours	14	24.6	24	43.5	18	31.9
<b>Student Achievement</b>						
Successful	25	21.9	38	33.3	51	44.7
Unsuccessful	43	52.4	25	30.5	14	17.1
<b>Student Status</b>						
Continuous	47	32.6	44	30.6	53	36.8
Dropout	21	40.4	19	36.5	12	23.1

### Data Collection and Analysis

During the data collection of the study, demographic characteristics (e.g., age, gender, employment status) of the participants were obtained from the application forms they filled out while registering for the program. After the program started, the online survey was administered to collect students' prior knowledge, and preferences. Furthermore, student achievement (successful or unsuccessful) status was determined based on assignments and final examination at the end of the course. Also, students who quitted the program or continued to attend the program after the course were described as a student status in the study.

In addition, semi-structured interviews were conducted with six students to elicit additional information regarding factors related to student participation at the end of the course. The interview schedules were developed around the reasons for low level interaction in discussion forum. In order to represent variety among students, the interviewees were selected equally from inactive, moderate and active students. Before each interview starts, the students were informed about the purpose of the interview. Each interview took about 15 minutes, and was tape-recorded with the permission of the students.

During the data analysis of the study, each of the individual variables was coded into categories and then they were analyzed by descriptive and inferential statistical techniques including frequencies, percentages, and chi-square analyses. Two-way cross-tabulations analysis with chi-square testing was used to determine if relationships existed between the students' individual characteristics and their participation level in the discussion forum of the online course. Furthermore, the data from semi-structured interviews was examined based on qualitative analysis methods as explained by Yildirim and Simsek (2000). The frequent statements and the points sought in the interview were separated from the data to be grouped considering the predetermined framework of the study. The statements of the participants were translated from Turkish to English by the author and presented as a summarized way.

## RESULTS

The results of the study will be reported in regard to two research questions separately.

### The relationship between students' participation, demographics and intellectual abilities

In order to examine first research question, the following hypothesis can be stated: "there was no relationship between students' participation levels in discussion forum and students' demographics and abilities". It was tested by two-way contingency table analyses (chi-square for independence). Before testing this hypothesis, categories were combined to satisfy the test assumption that expected counts in all cells were greater than or equal to 5.

The chi-square test revealed that students' participation level in discussion forum was found to be significantly related with student achievement (Pearson  $\chi^2$  (df=2, N = 196) = 8.47, p = 0.014, Cramer's V=0.230), gender (Pearson  $\chi^2$  (df=2, N = 196) = 8.61, p = 0.014, Cramer's V=0.210) and weekly hours of Internet use (Pearson  $\chi^2$  (df=4, N = 189) = 10.12, p = 0.038, Cramer's V=0.164). Student achievement variable had the most effect on participation level for the online students (Cramer's V=0.230). Table 4 summarizes individual characteristics showing significant association with students' participation level in discussion forum.

Table 4: Individual Characteristics Showing Significant Association with Participation Level

Variables	P. Level		Success	Unsuccess	$\chi^2$	p	Cramer's V	
Achievement	Inactive	C	25	18	8.47	0.014	0.230	
		E	30.6	12.4				
	Moderate	C	38	18				
		E	39.9	16.1				
	Active	C	51	10				
		E	43.5	17.5				
			<b>Male</b>	<b>Female</b>				
Gender	Inactive	C	48	20	8.607	0.014	0.210	
		E	49.6	18.4				
	Moderate	C	54	9				
		E	46.0	17.0				
	Active	C	41	24				
		E	47.4	17.6				
			<b>1-14 h</b>	<b>15-30</b>	<b>30-h</b>			
Weekly hours of Internet use	Inactive	C	23	26	17	10.121	0.038	0.164
		E	22.7	19.2	24.1			
	Moderate	C	17	13	30			
		E	20.6	17.5	21.9			
	Active	C	25	16	22			
		E	21.7	18.3	23			

Note. C = Counted, E = Expected

The results of the study also showed that there was no relationships between students' participation level in discussion forum and age (Pearson  $\chi^2$  (df=4, N = 196) = 3.42, p = 0.489, Cramer's V = 0.094), education level (Pearson  $\chi^2$  (df=2, N = 196) = 3.99, p = 0.136, Cramer's V = 0.143), employment (Pearson  $\chi^2$  (df=2, N = 196) = 1.213, p = 0.545, Cramer's V = 0.079), prior web-based learning experience (Pearson  $\chi^2$  (df=2, N = 196) = 4.63,

$p = 0.793$ , Cramer's  $V = 0.049$ ), domain knowledge (Pearson  $\chi^2$  ( $df=4$ ,  $N = 192$ ) = 6.44,  $p = 0.169$ , Cramer's  $V = 0.129$ ), and status of student (Pearson  $\chi^2$  ( $df=2$ ,  $N = 196$ ) = 3.26,  $p = 0.196$ , Cramer's  $V = 0.129$ ).

### Participants' Views about Reasons for Low Level of Interaction

The interviews were conducted with six students to analyze factors affecting participation and interaction in the online course. According to the students, interaction in the online course, especially among the participants, was not enough in the discussion forum. They mentioned that there were several reasons for the low level interaction in course discussion. The first reason was as stated by four participants that almost all participants had different responsibilities, and had various occupations in their life. They stated that their background, previous knowledge levels, ages and occupation were different. This might influence the low level of interaction with others.

The second reason was due to the nature of the program that it was an online program. In these online programs, students were not at the same place physically and they generally attended course web sites asynchronously; therefore, they generally were alone during their learning process. They stated that the progress of interaction among the students over the Internet took more time compared to face-to-face interaction. One student stated that:

Interaction might be broken off due to the Internet-based education. It is difficult to increase the interaction among people when they can not be at the same place physically and they can not spend time together.

As the third reason, three students stated that there were not enough activities to have interaction among the participants in discussion forum, so they could not find common topics to talk to each other and they might not improve their interaction.

Fourth, they stated that not studying regularly and difficulty in learning the subject affected their participation adversely. Three students mentioned that if they did not study regularly, they could not interact successfully in the courses. One student indicated that some course topics were too difficult and they could not understand them timely. Therefore, they could not know what to ask or how to ask questions during the discussion.

Fifth, some students generally preferred to communicate with others who had common background or who knew each other before the program. For instance, one student stated that:

There are 4-5 participants who are students at the same university. Their communications among themselves are well and they generally prefer to talk to each other.

As a summary, according to interview results, the reasons for low level of interaction are itemized as five main items in the Table 5.

Table 5: Interview results related to the reasons for low level of interaction in the discussion

#### Five main reasons

- having different responsibilities and various occupations,
- the nature of the program being online (i.e. attending course web sites asynchronously and progress of interaction over the Internet was taking more time),
- not having enough interactive activities in the course,
- not studying course topics regularly,
- interacting only with participants with common background

### DISCUSSION AND CONCLUSION

Communication and interaction has recently been accepted as a means to increase the quality of instruction (Thomas, 2002). In other words, one of the key components of good teaching is meaningful interaction with peers and teachers (Vrasidas & McIsaac, 1999). Students' participation is a prerequisite for supplying interaction and communication in online courses. There are number of factors affecting participation in asynchronous discussion that needs to be identified in online courses. The study examined factors affecting student participation and interaction in discussion forum of an online course. From nine characteristics of students examined, only three of them (achievement, gender and weekly hours of Internet use) showed a significant relationship with student participation level in discussion forum (i.e., inactive, moderate, and active). Also, students mentioned several other factors that might affect the participation, such as, having different responsibilities, not studying course topics regularly and not having enough interactive activities in the discussion.

According to the statistical results of the study, successful students in the online course were generally active participants in discussion forum. Similarly, in the literature, researchers have examined how participation in asynchronous discussions in online courses affects student performance. A correlation between the number of student discussion postings in online course and student performance is generally positive and researchers found that online active discussions contribute to learning positively even though some of them stated that the correlation is not statistically significant (Davies & Graff 2005; Godwin, Thorpe & Richardson, 2008; Picciano, 2002). Researchers found that students tended to obtain higher grades on the courses with high levels of interaction in the courses, but, there is no evidence that they would generalize beyond the courses in their study.

Another result of the study confirmed that there is a significant difference between the expected and counted number of inactive, moderate and active students regarding gender in discussion forum. The results showed that the active female students (45.3 %) were higher than males (28.6%), but, the moderate active female students (17 %) were lower than males (37.8 %) in discussion forum. In the literature, gender based differences in online education have been recognized as an important focus for research for a long time. When reviewing gender related studies, the effects of this variable are inconclusive. It means that some studies, like this study, reported differences between genders (i.e. Arbaugh, 2000; Prinsen, Volman, & Terwel, 2007) while others did not (i.e. Ory, Bullock & Burnaska, 1997). For example, Arbaugh (2000) mentioned that male students communicated via computer mediated communication in a competitive manner and also they tried to improve their own status in relation to their peers. However, female students viewed computer mediated communication as a medium to develop higher collaboration in online learning. They were more supportive of networks to increase learning and communication for the group. On the other hand, Ory, Bullock and Burnaska (1997) examined gender differences in the use of and attitudes about asynchronous communication about one year in a university setting and did not find any differences.

Moreover, Internet use is becoming more common in Turkey. A study carried out by State Statistics Institute (TUIK, 2008) shows that 24.5 % of the household have opportunities to access the Internet in Turkey. 76 % the household members use the Internet for reading online newspapers or magazines, 74 % for sending and getting e-mail, 69.7 % for sending instant message, 69.7 % for downloading music or listening music. Due to the increasing of use of Internet, the frequency of Internet use was also analyzed in this study and students' participation level was found to be significantly related with students' weekly hours of Internet use. The results showed that most of the active students (38.5 %) in the discussion forum preferred to use the Internet 14 and less hours in a week. Also, most of the inactive students (47.3 %) spent 15-30 hours online weekly. It might be expected that the students who spend more time online were active participants in online courses, but, this expectation was not supported in this study.

The results also demonstrated that participation in discussion forum was not strong enough in the online course. 34 % of the students did not write any message to the discussion forum and also 32.7 % of the student wrote only four or less messages during the online discussion. Likewise, the interview results showed that interaction among the students was weak in the course and they stated that there were number of reasons for low level interaction in discussion forum. These reasons included having different responsibilities and various occupations, not studying course topics regularly, interacting only with participants with common background, progress of interaction over the Internet was taking more time, and not having enough interactive activities in the course. These issues related to the reasons of low level interaction were also discussed by several researchers in the literature (Dennen, 2005; Vonderwell & Zachariah, 2005; Yukselturk & Yildirim, 2008).

As a summary, in this study it was supported that student participation to discussion forum was related to several students' demographics and abilities and also there were several factors affecting low level interaction in course discussion. This type of study results help designers and teachers who monitor how actively students participate in asynchronous discussion and can gain information from the low-participating students to find out why they are inactive. Therefore, they can decide on the proper interventions. For example, initially, social environments could be created for open communication in the course where participants feel comfortable posting questions or comments related to content, assignments, and projects. In order to promote interaction, discussions also should be planned and structured. Instructional activities, projects, and reports could be designed to perform collaborative learning. In other words, the courses might be designed with a required discussion groups as stated by the course expectations. Also, students should be encouraged to attend the discussions and also they should receive timely feedback by the instructors. (Dennen, 2005; Prinsen, Volman & Terwel, 2007; Vonderwell & Zachariah, 2005; Yukselturk & Yildirim, 2008).

As a recommendation for further studies, examining more than one course participation is recommended. In addition, verification of the study results with some other learners or samples might be worthy of consideration

in future studies. For the generalizability of the findings, the sample size might be increased. Also, in further studies, the posted messages in discussions also can be examined based on content analysis methods to describe the quality of messages that might affect learning outcomes.

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