



Mediators of Participation in Online Discussions

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Introduction

Online asynchronous discussion forums have become an essential medium for communication in higher education. They are integrated into course management systems that are centrally supported by many colleges and universities, and are utilized for both teach-student communication and student-student collaboration. The purpose of this study was to understand the mediators that both contribute to and inhibit student participation in help seeking course discussion forums. Student participation in course forums is important to study because it can negate factors that appear to affect student retention rates: poor performance in class, loss of interest in the subject, and not feeling a sense of inclusion in and identity with the department or program of study^{1,2,3}. Because these are factors that particularly affect women and minority students in engineering majors^{4,5,6,7}, we were interested in studying online discussion at the university's school of engineering. In this paper we present a new questionnaire, the Forum Participation Mediators Instrument, and analyze the responses of forty-three students enrolled in an engineering Computer Science class.

Motivation

This study is a part of a larger effort whose goal is to formatively assess and predict student performance in class using a combination of quantitative and qualitative techniques that look at discussion content as well as forum participation frequency and patterns of frequency^{8,9}. During this project we realized that our own analyses, as well as that of many others, ignored the underlying reasons for forum participation when students *are given the choice* to participate. To investigate mediators of participation, we developed a new survey instrument called the Forum Participation Mediators Instrument (FPMI). The purpose of FPMI is to assist in discerning the underlying reasons for student participation, or lack of participation, in course discussion forums. The survey looks at the many factors that may contribute to or inhibit student participation, examines student perception of satisfaction, and explores alternative methods of help seeking.

The development of the FPMI was motivated by the problem of correlating motivation and forum participation in a previous study. Prior to the study, students in an undergraduate engineering course had been surveyed using an engineering motivation instrument that was developed for university accreditation purposes. We used the instrument in the spring of 2010 and no correlations were found between forum participation and the instrument's four subscales (efficacy, motivation, leadership and multidisciplinary learning). A decision was made to add a proven in-depth psychometric instrument to the survey suite and we looked for instruments that had been used in recent post-secondary (mostly) studies of efficacy, motivation, confidence, and control, i.e. constructs we tried to measure with the broader engineering instrument, ideally having a high Cronbach coefficient, a measure of internal reliability, and having been applied to study online learning. The resulting scales were all relevant but all addressed constructs abstractly as opposed to in the context of discussion forums (Table 1). Complete citations for the instruments, and studies of their application, are provided in Appendix I.

Table 1. Instruments investigated.

Name	Reference
<i>Academic Confidence Scale (ACS)</i>	(Sander & Sanders, 2003; Bandura, 2001)
<i>Academic Self Efficacy Scale (ASES)</i>	(Elias & Loomis, 2000; Lent et al., 1997; 1986)
<i>Motivated Strategies for Learning Questionnaire (MSLQ)</i>	(Pintrich et al., 1991)
<i>Academic Locus of Control (LOC)</i>	(Rotter, 1966; Trice, 1985)
<i>Patterns of Adaptive Learning Survey (PALS)</i>	(Midgley et al., 2000)
<i>Multidimensional Achievement Motivation Measure</i>	(Spence & Helmreich, 1983)
<i>Student Motivation Scale</i>	(Martin, 2003, 2001)
<i>Academic Motivation Scale</i>	(Vallerand et al., 1992)
<i>Achievement Goal Questionnaire (AGQ)</i>	(Elliot & Church, 1997; Elliot & McGregor, 2001)

We also considered a survey that is available through Moodle¹⁰, the Constructivist On-Line Learning Environment Survey (COLLES)¹¹. COLLES was developed for *generating a profile of students' perceptions of the extent to which the virtual classroom environment is fostering their learning*. Its questions are well suited to online discussion; and questions about student-tutor interaction, which occur less frequently in our context, were adaptable for student-student interaction. The primary reason for not using COLLES was that it did not get to the heart of why or why not students chose to use discussion forums. The above psychometric instruments failed for the same reason, which ultimately motivated the development of the new instrument.

We began to explore factors that might foster or inhibit forum participation based on models of motivation and efficacy. For example, a student's *need to participate* might be low due to a preference for attending office hours, or because the student was already a high achiever in the class. This led us to believe that we must include questions about other methods of obtaining help, e.g., meeting with the instructor, as well as questions about class achievement. Another factor was *ease of participating*, which might be low due to a slow server or inexperience with computer-mediated-communication (CMC). This led to questions about the server and application, as well as questions about past CMC experience. There are also factors that mediate motivation such as communication anxiety¹². The lack of confidence or tendency toward introversion that can preclude students from asking questions in class might prevail online as well, and this may have an additional cultural component.

Table 2. FPMI questions.

Q1	Which of the following factors influence your decision to USE the discussion board?
Q2	Which of the following factors influence your decision NOT TO USE (TO IGNORE) the discussion board?
Q3	Describe how often the following statements are true. (Satisfaction construct.)

Q4	Describe how often you obtain help in the following ways. (Help-seeking construct.)
Q5	Describe your experiences with respect to the course discussion board.
Q6	Describe your experiences with regard to peer-to-peer interaction on the course discussion board.
Q7	Describe how feedback on the course discussion board helps facilitate (or not) your learning in the course.

Four scaled questions (Q1-4) and three open questions (Q5-6) were decided upon (Table 2). Likert-type scale response anchors were based on Vagias¹³. Although the goal in Q1 and Q2 was to obtain the degree of influence as well as the type of influence, ultimately we forfeited questions about degree of influence because they remained confusing, in favor of getting a clear up or down vote on the type of influence. We have subsequently added a level of influence – low, medium or high - for factors that are checked (see Appendix II for the current version).

Methodology

The study took place in the context of an upper level undergraduate computer science course at the University of Southern California. Students enrolled in the course used a question and answer discussion board with separate forums for each of four projects and one forum for theoretical questions. Participation frequency of each student was linked to student FPMI response. Types of participation included initial postings (usually, but not exclusively, questions), responses, and question views. The instrument was administered to 173 students at the end of the fall semester in 2010. Forty-three students responded (25% response rate). Analysis of the data is presented in the next section. Validity of the new instrument was approached statistically and by considering the results. For example, a validation of Q3, the satisfaction construct, showed that the last question was lowering the reliability (internal consistency using Cronbach’s alpha) of the construct for this sample, so the question was reworded for more consistency within the question group. In addition, two other questions were reworded for clarity. This resulted in the following new question items for Q3.

Q3 (a-d)	My questions are answered (a) quickly / (b) clearly / (c) completely / (d) by the instructor or TA.
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Similarly, validation and investigation of the results of Q4, the help-seeking construct, showed that the questions about contacting an expert personally could be collapsed because we didn’t actually need to distinguish between the instructor and TA, or between email and telephone. The questions are now represented by one question, “By email (phone) to instructor or TA”. In addition, “searching online” was added as a help-seeking option and “other” was provided with a fill-in space to capture other ways to seek help, and the parenthetical explanations after the influence questions were reworded for clarity (i.e., “I.e., Which of these factors persuade you to participate? Statements may refer to either initiating posts or responding to posts.”) The current version of the instrument is provided in Appendix II.

Analysis and Results

An analysis of participation mediators, forum satisfaction, and help-seeking alternatives is reported on. Correlations were performed between mediators and help-seeking behaviors, and between participation and help-seeking behaviors. Responses to questions are explained below, followed by an analysis of some of the questions.

Mediators of Participation

Responses to Q1 and Q2 are shown in Table 3 and 4. The ‘similar problem’ phenomenon dominates as a contributing influence, followed by that of being out of time or being stuck. Inhibiting influences include alternative ways to receive help, the sufficiency of lurking (reading only) on the forum, and not having the time to participate. Attending office hours was a major inhibitor to participating in discussions, but not a negative one.

Table 3. Mediating factors that contribute to participation.

Q1 Which of the following factors influences your decision to USE the discussion board? (I.e., which of these factors <i>persuade</i> you to participate. Statements may refer to posting questions or replies.)		
Question Response Item	% Responding	N Responding
I have a question for the instructor.	26%	11
I need time-critical help before the deadline.	37%	16
I have exhausted all other avenues of problem solving.	33%	14
I think someone else is likely to have the same problem I do.	70%	30
I know the answer to a posted question.	23%	10
I have the same (similar) problem as one that is posted.	60%	26
I enjoy helping people when I can.	23%	10
I enjoy discussing course ideas online.	26%	11
I receive credit (or a bonus) for participating in discussion.	5%	2

Table 4. Mediating factors that inhibit participation.

Q2 Which of the following factors influence your decision NOT TO USE (TO IGNORE) the discussion board? (I.e., which of these factors <i>dissuade</i> you from participating. Statements may refer to posting questions or replies.)		
Question Response Item	% Responding	N Responding
Reading other students' Q&A postings is enough.	30%	13
I do well in class and have no questions.	5%	2
I need help but don't know which questions to ask.	16%	7
I attend office hours and receive answers there.	33%	14
I am not that interested in helping other students.	2%	1
I do not know the answers to other students' questions.	19%	8
I do not have time to check the board.	26%	11
I am shy and avoid class discussions, even online.	9%	4

The teacher/TA doesn't participate enough.	12%	5
I don't get good responses to my questions.	19%	8
I don't get credit (or a bonus) for participating.	9%	3
Moodle is slow.	5%	2
Moodle discussion forums are difficult to use.	9%	4

Discussion Forum Satisfaction

Responses to Q3 are shown in Table 5. Student satisfaction with the discussion board tended to be high so we infer that it was beneficial to students. In this course, the instructor participated a moderately in the forums, meaning that he responded to questions that were not answered by others and did not rely on his teaching assistant to do so. We believe that this contributed to high student satisfaction as well.

Table 5. Satisfaction with the discussion board may influence participation.

Q3 Describe how often the following statements are true. (Only answer if you ever posted a question.)				
Response	Never/Rarely	Sometimes	Often/Always	Total
My questions are answered quickly.	4 (2/2)	23	11 (09/02)	38
My questions are answered satisfactorily.	2 (1/1)	20	16 (13/03)	38
My questions are answered thoroughly.	3 (2/1)	18	17 (14/03)	38
I want the instructor/TA to answer my questions.	5 (2/3)	12	21 (11/10)	38

Help-Seeking Options

Responses to Q4 are shown in Table 6. Clearly, multiple help-seeking options can inhibit participation. The results indicate that most students obtain help privately from other students, or ask the instructor at class or during office hours, as opposed to using the forums. In fact, the use of the forums ranks lower than most alternatives. In this case, the instructor held frequent office hours, which were well attended.

Table 6. Help seeking habits that influence participation.

Q4 Describe how often you obtain help in the following ways.				
Response	Never/Rarely	Sometimes	Often/Always	Total
During office hours	11 (04/07)	11	21 (08/13)	43
During or after lectures	08 (03/05)	13	22 (11/11)	43
Through the online discussion board (OAD)	11 (04/07)	19	13 (10/03)	43
Working with a group partner	04 (01/03)	04	35 (19/16)	43
Asking friends who have taken the course	06 (04/02)	12	25 (11/14)	43
By telephone to the instructor	39 (34/05)	03	01	43
By telephone to the TA	39 (33/06)	03	01	43
By email to the instructor	09 (03/06)	15	19 (08/11)	43

By email to the TA	12 (06/06)	16	15 (08/07)	43
Other	23 (20/03)	12	08 (03/05)	43

Help-Seeking Analysis

Correlations among help-seeking options and forum satisfaction are shown in Table 7. There are three types of patterns: students who interacted with the instructor (Office, Lecture, Email/Instructor), students who interacted with the TA (OAD, Email/TA), and students who collaborated with each other (Group, Friend). Results show that each variable in the same category was strongly correlated with each other. Among the three categories, OAD was highly correlated with satisfaction, $r(43) = .67, p < .01$. This implies that students who obtained help through the discussion board were satisfied with answers they received, which we assume was a contributor for their participation.

Table 7. Correlations among help seeking options and forum satisfaction.

(N=43)	Office	Lecture	OAD	Group	Friend	Tel/Ins	Tel/TA	Email/Ins	Email/TA	Other	Satisfaction
Office	1	.628**	.286	-.060	.131	.145	.183	.660**	.375*	.104	.194
Lecture	.628**	1	.296	-.131	.114	.051	.091	.630**	.237	.144	.112
OAD	.286	.296	1	-.002	.080	.054	.053	.294	.348*	.157	.673**
Group	-.060	-.131	-.002	1	.387*	-.236	-.069	.094	.033	-.049	-.008
Friend	.131	.114	.080	.387*	1	-.145	-.056	.201	.172	-.024	.188
Tel/Ins	.145	.051	.054	-.236	-.145	1	.653**	.086	.179	.416**	.031
Tel/TA	.183	.091	.053	-.069	-.056	.653**	1	.101	.307*	.197	.035
Email/Ins	.660**	.630**	.294	.094	.201	.086	.101	1	.536**	.213	.298
Email/TA	.375*	.237	.348*	.033	.172	.179	.307*	.536**	1	.211	.245
Other	.104	.144	.157	-.049	-.024	.416**	.197	.213	.211	1	.118
Satisfaction	.194	.112	.673**	-.008	.188	.031	.035	.298	.245	.118	1

* $p < .05$. ** $p < 0.01$

Help-Seeking and Discussion Participation

Correlations among the degree of forum participation, significant help-seeking options, and forum satisfaction are shown in Table 8. Forum participation was represented quantitatively by the number of threads started (#Initial Posts), the number replies provided (#Reply Posts), and the number of unique-post views (#Views). There was no correlation between the degree of participation and satisfaction; however, viewing messages was negatively correlated with the Friend and Other help-seeking options, leading to the conclusion that students who obtained help by asking friends or from other sources did not tend to look at the discussion board. It is possible that one member of a group may have participated in a forum and then shared results with others.

Table 8. Correlations for forum participation, help seeking options, and satisfaction.

(N=43)	#Initial Posts	#Reply Posts	#Views	Friend	Other	Satisfaction
#Initial Posts	1	.350*	.301*	.060	-.204	.117
#Reply Posts	.350*	1	.579**	-.079	-.207	.012
#Views	.301*	.579**	1	-.404**	-.318*	-.038
Friend	.060	-.079	-.404**	1	-.024	.188
Other	-.204	-.207	-.318*	-.024	1	.118
Satisfaction	.117	.012	-.038	.188	.118	1

*p<.05. **p<0.01

Discussion and Conclusion

Although only one class of students was studied, the results revealed some of the hidden reasons these students chose to participate in their class discussion forums. Reasons included personal motivators and de-motivators, satisfaction with responses, and preferences for help seeking. For this class, mediators that influenced participation were social, while mediators that inhibited participation most often were due to choosing alternative help seeking venues, and possibly sharing information among team members, even while satisfaction with the course forum was high. We were surprised that students appeared to be influenced more by the shared-ness of the space than its efficacy in providing help. It was also clear that personal accessibility of the instructor mediated the use of the discussion board. Internet/server slowness was not a factor for these particular students though in a different population (non-engineering students, students at a different school, etc.) it could have been. Further work will focus on analysis of open responses and further correlation of constructs with actual student participation as well as grades, demographic and academic achievement.

The results presented, which possibly extend to online knowledge sharing environments generally, suggest that student participation depends on a variety of malleable factors that might be important to educational researchers who study computer-mediated communication.

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APPENDIX I

A complete list of the motivation instruments is provided here.

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APPENDIX II

The current version of the Forum Participation Mediators Instrument is provided here.

The following questions relate to the course discussion board and other ways to obtain help. Please mark the responses that most closely match your personal experience in the course.

1. Which of the following factors influence your decision to **USE** the discussion board? (I.e., which of these factors *persuade* you to participate?) NOTE: Statements may refer to either initiating posts or responding to posts.

Please check all that apply. Indicate the level of influence (low-high) for the factors you check.

- | | |
|---|------------------|
| <input type="checkbox"/> I have a question for the instructor. | (low, med, high) |
| <input type="checkbox"/> I need time-critical help before the deadline. | (low, med, high) |
| <input type="checkbox"/> I have exhausted all other avenues of problem solving. | (low, med, high) |
| <input type="checkbox"/> I think someone else is likely to have the same problem I do. | (low, med, high) |
| <input type="checkbox"/> I know the answer to a posted question. | (low, med, high) |
| <input type="checkbox"/> I have the same (similar) problem as one that is posted. | (low, med, high) |
| <input type="checkbox"/> I enjoy helping people when I can. | (low, med, high) |
| <input type="checkbox"/> I enjoy discussing course ideas online. | (low, med, high) |
| <input type="checkbox"/> I receive credit (or a bonus) for participating in discussion. | (low, med, high) |
| <input type="checkbox"/> Other reason: _____ | (low, med, high) |

2. Which of the following factors influence your decision **NOT TO USE** (to ignore) the discussion board? (I.e., which of these factors *dissuade* you from participating?) NOTE: Statements may refer to either initiating posts or responding to posts.

Please check all that apply. Indicate the level of influence (low-high) for the factors you check.

- Reading other students' Q&A postings is enough. (low, med, high)
 I do well in class and have no questions. (low, med, high)
 I need help but don't know which questions to ask. (low, med, high)
 I attend office hours and receive answers there. (low, med, high)
 I am not that interested in helping other students. (low, med, high)
 I do not know the answers to other students' questions. (low, med, high)
 I do not have time to check the board. (low, med, high)
 My written English is not good. (low, med, high)
 I should not participate for cultural reasons. (low, med, high)
 I am shy and avoid class discussions, even online. (low, med, high)
 The teacher/TA doesn't participate enough. (low, med, high)
 I don't get good responses to my questions. (low, med, high)
 I don't get credit (or a bonus) for participating. (low, med, high)
 The Internet connection is slow. (low, med, high)
 Other reason: _____ (low, med, high)

3. Please rate the level to which the following statements are applicable to your experience. NOTE: ONLY respond if you have posted questions on the discussion board.)

	Never	Rarely	Sometimes	Often	Always
My questions are answered quickly.	<input type="checkbox"/>				
My questions are answered clearly.	<input type="checkbox"/>				
My questions are answered completely.	<input type="checkbox"/>				
My questions are answered by instructor (or TA).	<input type="checkbox"/>				

4. Please rate the degree to which you attempt to receive assistance in the following ways:

	Never	Rarely	Sometimes	Often	Always
During faculty office hours	<input type="checkbox"/>				
During or after course lectures	<input type="checkbox"/>				
Through the online discussion board	<input type="checkbox"/>				
	Never	Rarely	Sometimes	Often	Always
Working with a group partner	<input type="checkbox"/>				
Asking friends who have taken course	<input type="checkbox"/>				
By email (or phone) to instructor (or TA)	<input type="checkbox"/>				
By searching the internet	<input type="checkbox"/>				
Other _____	<input type="checkbox"/>				

5. Please describe your overall experiences with regard to the course discussion board:

6. Please describe your experiences specific to peer-to-peer interaction on the course discussion board:

7. Please describe how the discussion board feedback helps facilitate (or not) your learning in the course: