Students’ Perspective on the Impact of a Web-based Discussion Forum on Student Learning

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Abstract - It is often said that students learn best from their peers, thus it is beneficial to promote student-to-student interactions inside and outside of the classroom. A Web-based discussion forum is one way of facilitating these interactions. At Rochester Institute of Technology, every oncampus course has a website, which includes e-mail and discussion forum sections, and areas where the course syllabus, homework, and grades can be posted. The level of usage of these course websites varies across RIT, with many instructors using the websites solely for posting course syllabus and grades, and few using the discussion forum. The authors conducted a survey of students in the structural analysis and structural loads courses to determine the impact of online discussion forums on student learning in engineering technology on-campus courses. The survey results and correlation of students’ participation rates with course grades indicate a positive impact on student learning in these oncampus courses.

Index Terms – Online discussion forum, student-to-student interaction, student learning, web-based courses

INTRODUCTION

The use of web-based technology in education is on the increase [1, 2, 3], and this provides additional opportunity for students to increase their knowledge base and enhance their learning. The effectiveness of using an out-of-class educational tool in addition to face-to-face lectures to enhance student learning and interaction in oncampus courses is investigated in this paper. Our contention is that a web-based discussion forum provides an avenue for students to post questions and answers, which increases student-to-student interaction outside of the classroom, and enhances and promotes active learning.

At the Rochester Institute of Technology (RIT), every oncampus course has a web presence that uses a web-based course management system called, Mycourses. Each course website includes features for posting course content such as course syllabus and other materials, a grade-book section, an online discussion forum, a chat feature, and an e-mail section. However, a statistics report of feature use on the RIT Courseware Management System (CMS) for Fall 2005 (October, 2005) shows that 1,053 courses (or 33%) out of a total of 3,239 on-campus courses made use of the course website to post course syllabus and other course content materials, while 872 courses (or 27%) used the grade book feature. Only 201 courses (or 6%) used the online discussion forum and 29 courses (or 1%) used the chat feature [4]. The main difference between chat and discussion forum features is that chat is synchronous – which requires all participants to be logged on at the same time – while the discussion forum is asynchronous – which does not require all participants to be logged on at the same time - and thus allows more scheduling flexibility for the students [5]. From this RIT CMS usage report, it is clear that very few instructors at RIT currently use the online discussion forum feature in on-campus courses, inspite of the fact every RIT on-campus course has a web presence and a lot of technical support is available. We believe this fact also holds true outside of RIT, and one of the reasons for this may be that many instructors are not aware of the positive impact of online discussion forums on student learning. This is the impetus for this study.

Hein and Irvine [1] used online discussion groups in an introductory physics oncampus course. The initial discussion questions were formulated and posed by the instructor, but students were also allowed to pose questions. The students’ responses to the posted questions were monitored by the instructor for any misconceptions, and were promptly corrected by the instructor, if it wasn’t already corrected by other students. The instructor also provided a rubric to the students to guide them as to the format and expectations for their responses. Participation in the discussion forum was purely voluntary and only 30% of the students actively participated in the online discussions. An end-of-term survey was used to assess the effectiveness of the online discussions.

Northern Arizona University (NAU), uses an online discussion tool called “Screen Porch” that supports a graphic user interface and allows participants to include graphics and multimedia links. [2] Weekly discussion topics are coordinated with the web course, and students are asked to respond to one or two open ended questions. Student group projects are also posted on the discussion forum. The group size is usually limited to 6 students for ease of communication.

A similar study was conducted by Spencer and Hiltz [3] at the New Jersey Institute of Technology (NJIT) where data was collected from 29 online courses using synchronous chat sessions within the Asynchronous Learning Networks (ALN). Instructors were interviewed, and students were surveyed online to investigate their perception of the effectiveness of this chat feature. The rate of student participation in the chat rooms varied from 5% to 50%.

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Douglas Nisbet, [6] conducted a study at Robert Gorden University on the impact of online interaction on student learning. On the basis of their study, input parameters were tentatively postulated that included: (1) Learning Design and Assessment, (2) Tutor management and skills, (3) Learning e-literacy skills, and (4) peer-related learning.

McDuffie and Slavit, [7] have also used online discussion forums in their methods courses for elementary school mathematics teachers.

All of the research discussed above has been focused on Online courses or in fields such as physics and mathematics, with none, to the authors’ knowledge, in the engineering technology field which has a highly technical and practical emphasis. In addition, the correlation of students’ participation in the discussion or chat forums with students’ grades has not been provided in these studies. The critical research questions that we seek to answer in this study are: (1) What are students’ perceptions of the effectiveness of online discussion forums in enhancing student learning in engineering technology on-campus courses? (2) Do students’ participation in online discussion forums improve learning in engineering technology on-campus courses? This paper presents the results of student surveys in two engineering technology courses, correlation studies between students’ participation in the online discussion forum and course grades, and makes the case for the use of online discussion forums in engineering technology on-campus courses. In the discussions section of the paper, suggestions for improving the effectiveness of online discussion forums are given. These may be useful to engineering technology and engineering instructors interested in using online discussion forums in their on-campus courses. This study is based on students’ self-reported attitudes and behaviors in two civil engineering technology courses at RIT using a questionnaire which is available in the Appendix. Participation (that is, regularly logging on to the website to read postings, and posting questions and answers) was made 5 percent of the course grade in order to motivate students to review postings in the discussion forum, and engage in the online discussions. Student participation was monitored using a feature in Mycourses that enables the instructor to monitor how often students review a particular posting. The students were informed at the beginning of the term that the response time for answers to posted questions would be 24 hours on weekdays and 48 hours on weekends. However, the instructor usually logged on to the discussion forum at least twice a day and the actual mean response time it took the instructor and other students to answer posted questions was calculated to be 9.5 hours. Though not every student displayed the same level of participation in the discussion forum, we found that using the discussion forum had a positive impact on the educational experiences of students in these two engineering technology courses. In the following sections, we present the students’ self-reported attitudes and behaviors, the analysis of the surveys, and a statistical analysis of the impact of the students’ participation rate in the online forum on the students’ course grades.

THE SURVEY RESULTS

The authors conducted student surveys in the fall term of 2005 in the structural analysis course (n=32) and the structural loads course (n=30). The survey instrument as shown in the Appendix consists of twelve questions, 7 quantitative and 5 qualitative. The civil engineering technology program at RIT has a total of approximately 180 students (about 45 per graduating class), and given that the survey involved 62 students, we consider this a good representation of the students’ perspective on the impact of online discussion forums on student learning and engagement, especially considering that only about 6% of on-campus courses at RIT use the discussion forum feature. We will now discuss the student responses to each of the survey questions.

Question #1: What year are you?
56% of the students surveyed were 4th year Civil Engineering Technology students, 29% were 3rd year students, and 15% were 5th year students.

Question #2: How many of your courses this quarter use a course website (Please exclude online courses)?
Of the courses the students were currently enrolled in, an average of 2.5 of those courses used the Mycourses course management software during the term that this survey was conducted. The survey responses for this question are shown in Figure 1. Given that these students are typically enrolled in four or five courses a term, the responses to this question does not indicate widespread usage of the web-based course management software. This finding is similar to the results of the statistical analysis on the Courseware Management System use at RIT by Betlow and Humbert [4] discussed earlier in the Introduction section.

![Figure 1](image)

**FIGURE 1**
**USAGE OF MYCOURSES**

Question #3: How many of your courses this quarter use an online discussion forum (please exclude online courses)?
63% reported just one course used the discussion forum feature, 35% indicated two courses, and 2% indicated that more than three of their courses used an online discussion forum. This result is shown in Figure 2.
From Figures 1 and 2, it is apparent that the use of online discussion forums is not very widespread, even at RIT where every on-campus course has a website.

**Question #4: How often do you log on to the Discussion Forum to view the posted questions and answers?**

Figure 3 shows the frequency with which students log on to the online discussion forum, as reported by the students. 32% of the students log onto the online discussion forum more than once a week, 27% use the forum once a week, 26% students use it daily, 13% students rarely use the forum, and 2% students have never logged on to the online discussion forum. These results indicate that 85% of the students used the online discussion forum for the structural analysis and structural loads courses at least once a week. Note that what we measured here was how often the students read the information posted in the forum, and not necessarily how often they posted questions or answers in the forum.

**Question #5: How often do you post questions in the Discussion Forum?**

11% of the students posted questions at least once a week, 58% rarely posted questions, 31% never posted information in the discussion forum. This result is shown in Figure 4. It appears that though a high percentage of the students (85%) logged on to review information posted in the online discussion forum at least once a week, only 11% actually posted questions frequently in the forum.

**Question #6: Do you find it easier and more convenient to ask questions in the Discussion Forum than to ask in class, if so why?**

In the Structural Analysis course, there was an even split: 16 out of 32 students (or 50%) preferred class discussion to online forum discussion, and 16 students (or 50%) felt the online discussion forum was more effective for asking and answering questions. In the Structural loads and systems course, 18 out of 30 students (or 60%) preferred online discussion forum over class discussion, and 12 students (or 40%) were in favor of class discussion. Some sample positive responses on the use of online discussion forum were as follows:

- “It is easier to ask questions in the discussion forum than to ask in class as sometimes you need an answer before class.”
- “Can ask a question any time of day and there are many people to answer it.”
- “It’s convenient so that you don’t have to wait until next class, and also you don’t take class time.”
- “It is easier because we do our work outside of class, and that’s when we have the problems.”
- “Sometimes a question may not come to you until after class when you are doing your homework.”

Some of the few negative responses regarding the use of online discussion forum were as follows:

- “Face to Face discussion is more convenient as you can really get into a discussion and clarify your questions with diagrams to get a better understanding.”
- “To get the answer you have to wait for a long time.”

**Question #7: How often do you post answers to other students’ questions in the Discussion Forum?**

As indicated in Figure 5, 9% of the students posted answers to students’ questions at least once a week, 49% rarely posted answers to posted questions on the discussion forum, and 42% never answered any of the posted questions in the discussion forum. Once again, though a great majority of the students visit the online discussion forum to review postings, only 9%
of the students responded to the posted questions at least once a week.

**FIGURE 5**
PERCENTAGE OF STUDENTS POSTING ANSWERS TO QUESTIONS.

Question #8: What other forms of communication do you use to ask your professor or another student questions (circle all that apply)?

Figure 6 shows the student responses to this question. In addition to using the online discussion forum, a greater percentage of the students preferred to use e-mail and instant messenger (IM) to communicate with instructors and their peers.

**FIGURE 6**
OTHER MEANS OF COMMUNICATION

Question #9: Why do you use these other forms of communication?
The sample responses were as follows:
- “More convenient and easier to communicate.”
- “Quick responses.”
- “It’s more individual attention, and even faster than waiting for the discussion forum.”

Question #10: What advantages do you see with using the Discussion Forum instead of these other forms of communication?
91% of the students were in favor of using the online discussion forum, and 9% either did not use the internet at all, or preferred face to face discussion rather than online discussion. Some sample responses on the advantages of the online discussion forum were:
- “If you can’t get hold of someone you can post a question and hopefully the question will be answered promptly.”
- “Responses from peers are sometimes easier to understand.”
- “Communication with other classmates increases.”
- “Listening with eyes are always better than ears.”
- “Anyone can answer the posted question and there is a greater chance of getting a correct response.”
- “Involvement of the whole class.”

Question #11: Describe the impact of the Discussion Forum on your learning and success in this course?
55% of the students indicated that the online discussion forum had a positive impact on their learning in these courses, while 45% felt the online discussion forum had no impact on their learning. Thus, a majority of the students surveyed felt the online discussion forum enhanced their learning in these two engineering technology courses. Here are some sample students responses to this question:
- “It really helps with the homework as it is an out of class assignment, and you can see if anyone has posted anything.”
- “It was great to see all the questions to get a different view on the question and then the answers show another way to go about the problem.”

Here are some not-so positive responses regarding the online discussion forum:
- “As there were no graphics involved, online discussion forum didn’t make any difference”
- “The online discussions were not anonymous and everyone could look at the discussion which didn’t give much freedom.”

Question #12: What improvements could be made to the current Discussion Forum to make it a greater resource to students and faculty?
Some sample student responses were as follows:
- “Introduce more graphics – ability to draw problems which would help illustrate more clearly the problem.”
- “It would be more convenient to know if someone has posted something without having to log into the specific class on Mycourses.”
- “Email notifications when a question is posted.”
- “Make it mandatory for everyone to post something once a week and also respond to someone else’s question.”

**ANALYSIS AND DISCUSSIONS**

The student participation rate in the online discussion forums, defined as the number of postings read and posted in the discussion forum, was obtained for both the structural analysis course and the structural loads course from the web-based course management software, Mycourses. These participation rates were then compared with the students’ course grades to determine what correlation, if any, exists. For the structural analysis course, a Pearson Correlation
Coefficient of $r = +0.18$ was obtained, and the regression line of best fit shown in Figure 7 indicates an upward trend. For the structural loads course, a Pearson Correlation coefficient of $r = +0.30$ was obtained, and the regression line of best fit shown in Figure 8 indicates an upward trend. These results indicate that there is a positive relationship between students' participation in the online discussion forum and the students' course grades in both courses.

From the analysis of the student surveys, we find that 55% of the students felt the online discussion forum had a positive impact on their learning; 11% of the students posted questions at least once a week, while 9% responded to these questions at least once a week. It is apparent from the qualitative part of the survey that the students felt the online discussion forum was a particularly helpful means of student-to-student and student-to-instructor communications while working on their homework assignments, and it also facilitated student-to-student interaction and peer-to-peer instruction. About 85% of the students logged on to the discussion forum at least once a week, indicating an adequate level of student participation and engagement in these on-campus courses.

To improve the rate at which students actually post or answer questions in the discussion forum, as opposed to merely logging on to the discussion forum to review posted information, the following ideas should be implemented:

- Introduce more graphics and multimedia links, which will enhance the learning process of students, as graphics always help in perceiving knowledge better. [2]
- Grading process – structure the grading to ensure students see value and a reason to participate in the discussion forum. The instructor could encourage more student participation by providing timely feedback to the students’ questions where no peer feedback is posted within 12 hours.
- Challenge and extend the discussion – The students should be pushed to extend their current bounds of knowledge and understanding for the maximum advantage to be gained from the exercise [8].
- Providing an anonymous environment in the discussion forum may give the students opportunity to ask more questions of the instructor and their peers [8]. However, anonymous postings could create problems if insensitive or rude comments are posted by the students, but the instructor could lay down strict guidelines to discourage this from happening.
- Instructor should investigate posting questions that would facilitate and encourage online discussions among the students.

**CONCLUSIONS**

We have carried out surveys to gauge students’ perceptions of the impact of online discussion forums on student learning in on-campus courses. The analysis of the survey results and correlation of the students’ participation rate in the discussion forum with their course grades indicates that the use of online discussion forums has a positive impact on student learning and performance in on-campus courses. These online forums provide the students one more avenue for asking questions of the instructor and their peers outside of the classroom. It provides an additional avenue for shy or deaf students to ask and answer questions which they may not be inclined to respond to in the classroom for fear of being ridiculed. The discussion forum also serves as a repertoire for questions and answers on the course that students can refer to at any time during the term. In fact, the authors have developed a “living” document called “Past Discussion Forum Answers and Questions” that is continuously updated based on the questions posted in the discussion forums. This is in contrast to the oftentimes unrecorded questions asked in the classroom for which the answers may not be readily available to the students after the lecture. Students working on their homework do not have to wait till the next class before asking questions.
that may arise. This helps to reduce the students’ frustration level and helps with retention of students in the course.

In spite of the impersonal nature of communication inherent with online discussion forums, the students’ postings were mainly focused on course content and the discussions were carried out in an atmosphere of mutual respect, and there were no postings that the instructor had to pull off for insensitive or rude comments. We believe that the technical nature of the course and the non-anonymity of the discussion forum helped to discourage the posting of any negative or insensitive comments. The average time it took the instructor and students to respond to posted questions was 9.5 hours, and the students appeared to be satisfied with this response time. Based on the positive results from the survey and the statistical analysis, it is the authors’ belief that student learning, performance, and engagement in engineering technology oncampus courses are enhanced through the use of online discussion forums. Although more work is required on the part of the instructor compared to a traditional class, the use of online discussion forums in oncampus courses should be encouraged and supported in engineering and engineering technology programs.

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REFERENCES


APPENDIX

ONLINE DISCUSSION FORUM SURVEY INSTRUMENT: STRUCTURAL ANALYSIS/STRUCTURAL LOADS COURSE

1.) What year are you?
1st  2nd  3rd  4th  5th  6th+

2.) How many of your courses this quarter use a course website (please exclude online courses)?
1   2   3   4   5

3.) How many of your courses this quarter use an online Discussion Forum (please exclude online courses)?
1   2   3   4   5

4.) How often do you log on to the Discussion Forum to view the questions and answers?
Never  Rarely  Once a week  A few times week  Daily

5.) How often do you post questions in the Discussion Forum?
Never  Rarely  Once a week  A few times week  Daily

6.) Do you find it easier and more convenient to ask questions in the Discussion Forum than to ask in class, if so why?

7.) How often do you post answers to other students’ questions in the Discussion Forum?
Never  Rarely  Once a week  A few times week  Daily

8.) What other forms of communication do you use to ask your professor or another student questions (circle all that apply)?
Phone  Email  Instant Messenger

9.) Why do you use these other forms of communication?

10.) What advantages do you see with using the Discussion Forum instead of these other forms of communication?

11.) Describe the impact of the Discussion Forum on your learning and success in this course?

12.) What improvements could be made to the current Discussion Forum to make it a greater resource to students and faculty?