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Lessons Learned During an Experimental Blended Course

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Abstract

During the Fall 2003 quarter, Rochester Institute of Technology offered a graduate course titled "Operating Systems for Telecommunications." This author facilitated the course which was conducted in two sections. The first section was conducted in an fully asynchronous distance learning environment. The second section met face-to-face (F2F) once a week while conducting the remainder of its activities at a distance over the Internet. This paper compares the two environments and discusses the lessons learned about faculty and student satisfaction and student performance.

Background

Blended learning programs combine the best aspects of the classroom based format and the asynchronous learning network (ALN) format for course presentation (1). Research conducted at a number of leading higher education schools (2), (3), (4) has reported positive results with respect to faculty and student preferences for more flexible learning. One of the often stated benefits is the increased opportunity for students to reflect on what they are learning. In the blended environment, there is time to think and rethink individual responses. Topic discussions can continue over extended times allowing students to consider and prepare their responses.

In the late Spring of 2003, RIT's Online Learning Department set out to collaborate with a small group of RIT faculty to design and then evaluate "blended" courses (5). In order to know more about how effective the blended teaching and learning process might be, Online Learning sponsored pilot courses in which a portion of the class time is canceled and replaced with some form of asynchronous (any time, any where) discourse. Experienced distance learning faculty were invited to collaborate with instructional designers in developing a blended course, monitoring key activities to measure success and acceptance, and to participate in disseminating Pilot results to the rest of campus through panel discussions, newsletter articles, and possibly conference papers.

The Blended Learning Pilot Project (6) started in the Fall quarter 2003 with five courses. Four were traditional face-to-face (F2F) classes which substituted at least 25% of the classroom lecture and seat-time activities with online group activities and discussions. The fifth course, which is the topic of this paper, was originally planned as a fully

asynchronous distance learning course. The course was offered in two sections. One section was conducted completely over the internet and while the second section was blended to replace some online interactive requirements with a weekly, one-hour long F2F meeting.

Course Details

Operating Systems for Telecommunications (0614-728) is normally an online course offering. Besides being part of the pilot, it was decided to offer the one section of the course in a blended format to accommodate international students, who, under recent homeland security rules, are allowed to attend only one course per term where physical presence is not required (7). The course is intended for online delivery in either a distance learning (DL) or blended learning (BL) environment to first-year graduate students.

The course examined the features and operation of operating systems (OS) for local and global computing. Topics covered basic OS functions such as executing user commands, providing system resource sharing, managing memory, input/output devices and files, and providing for security and protection of the system. A special emphasis was placed on networking and distributed operating systems in order to meet the needs of telecommunications engineering technology students.

The course consisted of ten learning modules - each module being one week long. At the end of each week, a private performance feedback message was sent to each student. Besides the comments on performance, the message clearly stated the number of points earned toward the final grade. Each week, the faculty member assigned chapters from the text (8) and posted lectures and supplemental reading materials along with short questions and/or brief literature research projects. Written assignments and integrating new knowledge into scholarly discussions were components of student grades.

All students were expected to contribute to the weekly class discussions. Those in the distance learning section posted at least three substantive messages on three of the seven days of each week. A substantive message is one that adds information which promotes learning for everyone in the class and is approximately 350 words long. These messages constitute an asynchronous discussion which promotes student learning. In addition, DL students were required to post a summary at the end of each week addressing their personal learning for the week. For blended learning students, the three substantive messages were replaced with a weekly classroom meeting. Attendance was recorded and BL students were expected to come prepared to contribute substantive comments and/or questions. In addition, each BL student posted a summary message to review his or her personal learning for that week. There was no course interaction between the DL and the BL sections.

Comparison

A total of nineteen students took the course. There were six in the blended section and thirteen in the distance section. There were four international students in the course. Two were registered in the distance section and two in the blended section.

During the first two or three weeks of the course, the faculty member noticed that the students in the (blended section) F2F meeting were not prepared to support a discussion and learn from each other. Instead, they were expecting to attend a traditional class with a standard lecture. This behavior differed from the distance learning section where students immediately engaged in online discussions of course related topics. It wasn't until about the fourth week, after much encouragement by the instructor, that the BL students began participating in a meaningful discussion using the one-hour meeting time. Perhaps there was also an element of 'not-knowing' each other which initially inhibited the sharing of knowledge and experience. Email messages sent by the faculty member two days before the F2F session attempted to force students to prepare for an interactive class period. In the future, when this course is again taught in the blended mode, points counting toward the final grade will likely be made available for students to earn by participating in the discussions of the F2F sessions.

Interaction and sharing of ideas did ultimately happen in the later weeks of the course. In these sessions, when peer-to-peer communications did happen, the one-hour, F2F meeting time was not sufficiently long to allow everyone to express their opinions. In the last three or four weeks, the F2F sessions exceeded the allotted time and then, even, continued right out into the parking lot.

Survey information was collected to measure student satisfaction in both sessions. The data in Figure 1. show the results of a student survey given to both the DL and the BL students. Responses to question were requested using a standard Likert scale of 1 to 5.

Figure 1. Student Evaluations for 031-0614-728-90 and 031-0614-728-89

	SECT- 90 Distance Learning	SECT- 89 Blended
The Course		
How well the stated course objectives were fulfilled	4.25 (4)	4.50 (4)
Quality of the course media (videos, CD-ROM, print material, etc)	4.50 (4)	4.50 (4)
Effectiveness of course materials (textbook, handouts, videos, etc) in helping you learn	4.50 (4)	4.50 (4)
Value of the course assignments (homework, laboratory work, papers, etc) in helping you learn the course content	4.50 (4)	4.50 (4)

The Instructor		
Effectiveness in explaining, giving examples, and discussing the course material	4.25 (4)	4.50 (4)
Organization and preparation for course (planning assignments, announcing quizzes, etc)	4.75 (4)	4.50 (4)
Receptiveness to student questions and concerns	4.75 (4)	5.00 (4)
Helpfulness of responses to student questions and concerns	4.50 (4)	5.00 (4)
Availability for individual assistance to students	4.50 (4)	5.00 (4)
Use of teaching techniques and styles that encouraged learning	4.25 (4)	4.50 (4)
Timeliness in returning graded work	4.75 (4)	5.00 (4)
Exams		
Clarity of exam/quiz questions	4.00 (3)	4.50 (4)
Relevancy of the exam/quiz questions to the course objectives	4.00 (3)	4.50 (4)
Fairness of the standards used for grading	4.50 (4)	4.50 (4)
Consistency of the standards used for grading	4.50 (4)	4.50 (4)
Overall		
This course overall	4.50 (4)	4.50 (4)
The instructor overall	4.50 (4)	4.75 (4)

Legend:
5 = Very good, 4 = Good, 3 = Adequate, 2 = Poor, 1 = Very Poor
Numbers in parenthesis represent number of responses

The following Z-statistic was used to test whether the difference between any of the pairs of means is significant.

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

At the 0.01 confidence level, the difference between any pair of two means is attributed to chance if the Z-statistic is less than 1.90. It turns out that there is no statistically significant difference between any pair of means in Figure 1.

This author, acting as the faculty member for both the DL and the BL sections, relates his experiences and feelings to be used as a measure of faculty satisfaction. "I found that I was experiencing some uncomfortable feelings related to what is happening in the two sections of the course. The feelings have to do with the differences in what the students in the DL section experience and what the students in the BL section experience. We held a 50 minute discussion on Monday night in the BL section and we discussed four or five topics. At first, I felt I had let the DL students down because I had not provided

them the same opportunity to learn about these specific topics. However, on Monday, Tuesday and Wednesday, there were online discussions that took place related to a different set of topics. And, then, I felt that the BL students had missed out on an important learning opportunity. All the topics covered in both the DL and the BL sections were important and closely related to key course content. My best statement for expressing my satisfaction (or dissatisfaction) is that I am having guilt feelings because not all students are experiencing all activities.

Student performance in the two sections was measured as a function of the grades earned. Figure 2 presents a summary of the grades earned by students in the two sections.

Figure 2. Comparison of Grades Received

Letter Grade	Number	Percent
Distance Learning Section (SECT-90)		
A	**8**	**89**
B	**1**	**11**
C	**0**	**0**
Blended Learning Section (SECT-89)		
A	**3**	**75**
B	**1**	**25**
C	**0**	**0**

As is apparent, there is no statistical difference in student performance between those taking the course in the DL environment than those taking the course in the BL environment.

Conclusion

The overall driving force behind the Blended Learning Pilot Demonstration was to demonstrate the wide use of alternative teaching and learning environments which exist using easily-acquired, modern educational technology. The course addressed in this paper started with materials intended for asynchronous distance learning and modified them to present the course in hybrid, blended environment.

The paper discusses and explores several lessons learned concerning the development and delivery of a blended course developed from a distance learning version of the course. The paper presented research data collected during a pilot demonstration program. It was found that student satisfaction and performance were not significantly

different in either the completely Distance Learning section or in the hybrid environment provided in the Blended Learning environment.

The students voiced satisfaction with having a choice to select either the blended or the distance format for the course. Therefore, future courses will likely be conducted in a similar mixed (blended and distance) format. This will allow for the collection of more data – hopefully with larger sample sizes.

Appendix A – Teaching Philosophy Which is Repeatedly Stated for Students

> *It is assumed that students are motivated to learn, otherwise you wouldn't be here. Therefore, while we may have quizzes and tests occasionally, you are treated as fellow professionals -- as engineers, who wants to learn new skills and concepts, and who will do what is assigned to accomplish that goal.*
>
> *Students are considered as a learning resource the same as the textbook and instructor. Students often have common difficulties, common insights and a set of experiences from which others can learn. Therefore, it is important to share your knowledge, questions and experience with your fellow students when it is applicable to the topic under discussion.*
>
> *Student responsibilities include having to think about the assignments and being prepared for each class week. It's not OK to just read the assignment. What does the topic material mean to you? How have you seen the author's or the instructor's viewpoint or theory applied? Remember, you have responsibility for your learning, and this means taking an active role. You must actively participate in the classroom discussions. A major portion of your final course grade depends upon posting messages with high quality content (see syllabus). The content of these messages is used to determine the level of your learning. Rather than picturing these messages as a chore, look at them as an opportunity to demonstrate what you have learned. If you find that you are doing most of the "talking", you might give others a chance. If you find that you are not as active in the discussions as others, try to force yourself to become more assertive and express your views.*
>
> *The role of the instructor is that of a mentor, facilitator, therapist, and cheerleader. Student expectations for performance in the course are clearly defined. This faculty members strives to provide constructive, positive feedback about your performance on a weekly basis. This is so you can continuously learn and improve. At the end of the course, you will already know your grade by simply totaling each of these interim feedback grades.*

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Author Information

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