Faculty Mini-Grant for Educational Research Report

The Impact of Blended Learning on Student Engagement

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Abstract

This report summarizes the blended learning activities that have taken place in a BIT class, IST 241/341 on Electronic and Mobile Commerce, and their impact of student engagement, student satisfaction, student-instructor interaction, student-student interaction, and student achievement. The results show that blended learning has positive effects on all five outcomes. Because of the small number of students in the distance sections of the class, we were only able to assess the effects on students in on-campus sections. Given that blended learning refers to a combination of online and traditional classroom instructions, assessing its impact on students in on-campus sections is deemed most appropriate.

Purpose and Significance of Project

The purpose of the project is twofold: (i) to implement blended learning activities into a BIT class, IST 241/341 on Electronic and Mobile Commerce, and (ii) to assess the effects of blended learning on student outcomes.

One of the challenges of teaching a medium-to-large class size is to engage students as much as it could be done with a small class size. The question is how? In an attempt to address this challenge, we implemented blended learning activities into a medium-sized class that has previously been taught in a lecture-based format and assess the impact of these activities on various student outcomes including student achievement.

What is blended learning? Blended learning is a mix of *traditional classroom* instruction and instruction *mediated* by technology. Blended learning can be implemented in the form of a flipped classroom where the acquisition of abstract concepts and knowledge can be carried out outside the classroom (e.g., before and/or after class) whereas classroom activities can focus on application, active learning and problem solving. Blended learning can also refer to supplementing traditional coursework with online media in the classroom. In general, blended learning refers to a blended form of delivery of education that alternates between online and classroom instruction.

Methodology

A quasi-experimental study was conducted to assess the effects of blended learning on student engagement, student satisfaction, student-instructor interaction, student-student interaction, and student achievement. The study was conducted over two semesters, one in Spring 2013 where the instructor-directed or lecture-based approach was used, and the other in Spring 2014 where blended learning was implemented. The number of on campus students in Spring 2013 is 46 and the number of on campus students in Spring 2014 is 42.

In both semesters, students were expected to come to class having read the assigned readings and be prepared to discuss the case studies at the beginning and end of each chapter.

Blended learning was implemented in the Spring 2014 semester in four ways:

1. **Before class**: Students were instructed to view video clips related to the class materials before coming to class.
2. **During class**: Clickers were used to assess students' understanding of the class materials. Selected video clips were played and discussed in class.
3. **After class**: Blackboard discussion board was used by students to discuss the class materials and to further extend class discussions outside the classroom.
4. **End-of-semester project**: Students were given some class time to work on a group project to propose a business model and develop a high-level business plan for an electronic commerce or mobile commerce initiative. This project is in line with the objective of developing an appreciation for technological entrepreneurship among students.

To assess the effects of blended learning activities on student learning, we administered a survey questionnaire in both semesters. The questionnaire assessed student engagement (3 items), student satisfaction (8 items), student-instructor interaction (5 items), and student-student interaction (3 items). The questionnaire items were adapted from the literature and they are presented in the appendix. Test performance is used to assess student achievement.

Since the questionnaire was administered during one of the classes in both of the semesters, not every student enrolled in the class was present. We received 37 responses in the Spring 2013 semester and 38 responses in the Spring 2014 semester. To maintain anonymity in the survey, the instructor left the classroom when the students filled out the questionnaires in which no identifying information was asked. The students handed their anonymous completed questionnaires to a student in the class who collected all the questionnaires and handed them over to the instructor.

Data Analysis

The t-test was used to compare student satisfaction, student engagement, student-instruction interaction, and student-student interaction in both semesters. All four variables are significant at $p<0.05$ and their descriptive statistics are shown in Table 1, where items measuring the same variable were aggregated by averaging across them. The Cronbach's alpha coefficients for these four variables are shown in Table 2, where coefficients of 0.8 and above indicate very good reliability.

Table 1: Descriptive Statistics

Variable	Mean (Sp'13)	Std. Dev. (Sp'13)	Mean (Sp'14)	Std. Dev. (Sp'14)	t-value	p-value (2-tailed)	Significant?
Student Engagement	4.13	1.47	4.88	1.44	2.24	0.028 < 0.05	Yes
Student Satisfaction	4.06	1.28	5.29	1.29	4.12	0.000 < 0.05	Yes
Student-Instructor Interaction	4.86	1.14	5.84	0.73	4.36	0.000 < 0.05	Yes
Student-Student Interaction	4.82	1.15	5.47	1.18	2.42	0.018 < 0.05	Yes

Table 2: Cronbach Alpha's Coefficients - Reliability Indices for Variables

Variable	Number of Items	Cronbach's Alpha Coefficient
Student Engagement	3	0.87
Student Satisfaction	8	0.97
Student-Instructor Interaction	5	0.89
Student-Student Interaction	3	0.87

To assess student achievement, we examined common exam questions in both semesters. Of the 12 common questions, chi-square tests show that 4 (or 33%) of them have indicated significant improvements (i.e., $p<0.05$) in the Spring 2014 semester over the Spring 2013 semester. Hence, a comparison of student performance on the common test questions across the two semesters suggests that blended learning has helped to improve student achievement.

Summary of Findings

Blended learning activities have been implemented in a medium-sized BIT class that is taken predominantly by undergraduate students. The effects of blending the course are assessed in this project. The results suggest that blended learning has many positive effects including increased student engagement, student satisfaction, student-instructor interaction, student-student interaction, and student achievement.

Discussions and Conclusions

Blended learning is gaining popularity in education. However, its effects on student learning and achievement are still unclear. In this project, we implemented blended learning activities in four ways: (i) the use of video clips to substantiate the course materials and the learning process both within and outside the classroom, (ii) the use of clickers to check for student understanding of the course content, (iii) the use of Blackboard discussion board to extend discussions of course content beyond the classroom setting, and (iv) the use of class time for students to work in groups to apply the course content to develop a business model and a high-level business plan for an electronic or mobile commerce initiative that they would like to propose.

Although the above blended learning activities have increased student engagement, student satisfaction, student-instructor interaction, student-student interaction, and student achievement, the activities come with some costs. For example, the following 'weaknesses' were pointed out by students:

- "Only major weakness I find is how easy it is to forget the [Blackboard] weekly discussion"
- "Fail to understand why we needed to post to a discussion board every week for class participation, when you already go to class and are expected to participate, it makes no sense and I feel it needs to be removed"
- "The course is fresh and exciting, but there are too many group projects"

Despite these three comments that are considered weaknesses of blended learning from the perspective of some students, positive comments were provided that acknowledged the effectiveness of blended learning. Some of these comments are:

- "Well prepared and used blackboard well"
- "Allow you to apply the knowledge and skills you've learned in class"
- "Very well put together course"
- "The course is pretty much helpful, new, and tends to be a good motivation to start a business or create a new idea"
- "Fantastic professor, cares about what she is teaching and wants her students to understand the material"

Among the four blended learning activities introduced in the course, it is assumed that all students like the use of the video clips which supplement the course materials as none of them complained about it (nor acknowledged it). The use of clickers also did not receive any complaint (or compliment). However, some students did not like the use of the Blackboard discussion board where points were given for participation. Blackboard discussions were viewed by some as a burden rather than a benefit. As for group projects, mixed opinions were offered by students. Some acknowledged how much they have learned from the group projects, while

others were concerned about the additional work and coordination issues imposed by the group projects.

From the instructor's perspective, there are also costs and challenges involved. Some of them are:

- Preparation and setup time for the blended learning activities
- Searching for suitable video clips
- Recording customized video clips
- Setting up clicker questions
- The importance for the instructor to be an active participant in the Blackboard discussion board as active participation by the instructor greatly facilitates and encourages students' participation
- Given that students are concerned about time commitment and coordination issues of group projects, it is helpful to not only put aside some class time for coordination of group projects as well as group discussions/meetings but also provide very clear expectations and detailed instructions in the syllabus on the group projects.

In summary, it has been a rewarding and great learning experience in implementing various blended activities in a traditional face-to-face class. I would like to acknowledge the Missouri S&T Center for Educational Research & Teaching Innovation (CERTI) for providing the funding for this project, the Provost's office for the eFellow grant which further extends the project, and Ed Tech for the many ways they have supported me in this project. I would like to specifically thank three people who have worked with me as a team to make the above project possible – Diane Hagni, Julie Phelps and Amy Skyles (in alphabetical order of last names).

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Appendix

The questionnaire uses the 7-point Likert scale from Strongly Disagree to Strongly Agree.

Measurement Items for Student Engagement (3 items)

1. I spent time on learning the concepts in the course.
2. I paid attention to learning in this course.
3. I am cognitively engaged in this course.

Measurement Items for Student Satisfaction (8 items)

1. I am satisfied with the course.
2. I am satisfied with how the course has been delivered.
3. I have enjoyed the course.
4. I am satisfied with my learning in this course.
5. I like this course.
6. The course is useful to me.
7. I like the way the course has been delivered.
8. Overall, I am satisfied with the course.

Measurement Items for Student-Instructor Interaction (5 items)

1. The amount of interaction with the instructor is in line with what I expected.
2. The course allows for good interaction with the instructor.
3. There is adequate interaction with the instructor.
4. I have interacted with the instructor.
5. Students interact with the instructor.

Measurement Items for Student-Student Interaction (3 items)

1. The course allows for good interaction with other students in the course.
4. I received feedback from other students in the course.
5. Students interact with one another in the course.