

2009

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Recommended Citation

Napier, Nannette P. and Smith, Stella, "Assessing Blended Learning: Student Outcomes and Perceptions" (2009). *AMCIS 2009 Proceedings*. 259.

<http://aisel.aisnet.org/amcis2009/259>

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Assessing Blended Learning: Student Outcomes and Perceptions

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ABSTRACT

This paper describes the conversion of an introductory computing course to the blended learning model at a small, public liberal arts college. Blended learning significantly reduces face-to-face instruction by incorporating rich, online learning experiences. We provide the motivation for the change and report initial results from a pilot study. More specifically, we compare student learning outcomes in the traditional and blended learning sections of the course and assess student satisfaction with blended learning. We found that student performance in the traditional and blended learning sections of the course were comparable. Students reported high levels of interaction with their instructor, and student satisfaction with the course increased by the end of the semester. We conclude by offering lessons learned for others interested in adopting blended learning.

Keywords

Blended learning, hybrid course, assessment, computer literacy, education

INTRODUCTION

Online learning is emerging as a significant component of course delivery in education today (Dykman and Davis, 2008). The primary driver of this movement away from the traditional classroom is the student. For students, online courses provide flexible scheduling, access to world-class programs, and self-paced instruction. Although students show a strong interest in different instructional delivery modes (Allen, Seaman and Garrett, 2005), online learning has some limitations. Learning experiences such as field training, observation, initial group collaboration meetings, and laboratory exercises may be better experienced face-to-face. In addition, students with low computer literacy skills may find it more challenging to navigate online courses (Senn, 2008). To capture the strengths of both online and face-to-face instructional delivery modes, some instructors have adopted a hybrid or blended learning approach (e.g. Hermann, Popyack, Char and Zoski, 2004; Woodworth and Applin, 2007).

Blended learning significantly reduces face-to-face instruction by incorporating rich, online learning experiences (Garrison and Vaughan, 2008). There is no one single blended model. The approaches vary from a face-to-face class that uses technology to augment the class, to a 50/50 split between face-to-face and online, to significant online activities interspersed with class meetings (Martyn, 2003). The most telling characteristic of the blended model is the physical presence of the instructor and a course design making optimal use of online resources. The blended model has experienced significant growth during the past years and this can be attributed to the following factors: the flexibility normally characteristic of a totally online course, its impact on overcrowded classrooms and a perceived improvement in the teaching and learning experience.

This paper reports on initial attempts to implement the blended learning model in an introductory computing class at a small public liberal arts college in the southeastern United States. Georgia Gwinnett College (GGC) is the newest college in the state's university system, having been in existence for only two years. The open access college is primarily a commuter campus; however, residential halls are planned for the near future. GGC is a candidate for accreditation and strives to be a model for innovative approaches to education and faculty engagement with students. GGC's focus is on a face-to-face classroom experience with portable technology solutions allowing students to learn, study, and work both on and off campus. This focus is reflected within the curriculum by requiring all students to take a two-course sequence of information technology (IT) courses.

The introductory computing course focuses on both conceptual knowledge and skills development; students learn appropriate technical terminology and get hands on experience in using software applications and hardware. After completing the course, students should be able to demonstrate proficiency in personal productivity software such as word processing, spreadsheets, and presentation graphics; effectively use computing tools to support collaborative projects; identify mechanisms for protecting themselves against computer security threats; and explain the interaction among the main hardware components of a personal computer.

Since the course was first taught in fall 2007, two challenges quickly became apparent. First, we needed to accommodate varied student backgrounds. Since the course has no technology prerequisites, entering students may have vastly different experiences with and attitudes towards IT. A key challenge for the instructor, then, is setting an appropriate learning pace that will not frustrate students because it is either too fast or too slow. With the blended learning model, we could provide online, self-paced training on selected topics. Students that wanted more hands-on instruction could request additional help from the instructor as needed. Second, we need to more efficiently use scarce resources. Like many other public institutions, GGC has faced dramatic budget cuts due to economic pressures. At the same time, the school anticipates increased enrollment and has to plan for rapid growth. Although GGC currently has fewer than 2,000 students, a consortium of senior and junior colleges previously at this location had approximately 8,000 students enrolled. Since this course is taught in a computer classroom which seats a maximum of 25 students, classroom space is at a premium. With the blended learning model, we could share this space among multiple sections by adding a significant online component to coursework.

Although the blended learning model showed promise for meeting the two challenges we faced, we wanted to be sure that students at GGC would be receptive to this approach and that their performance on learning outcomes would be similar to students in traditional courses. Therefore, we implemented a pilot study in fall 2008. The specific objectives of this research were to:

1. Compare learning outcomes in traditional and blended learning model; and
2. Assess student satisfaction with the blended learning model

In this paper, we survey existing research on blended learning, describe our research into using a blended learning approach at GGC, provide results from the pilot study, and conclude with lessons learned.

EXISTING RESEARCH

Assessment of blended learning courses typically looks at two different aspects: student satisfaction and student learning outcomes.

Several factors can influence student satisfaction with blended courses. Researchers teaching a graduate course for pre-service teachers assessed levels of student satisfaction between the on-campus traditional course and the blended distance section (Parkinson, Greene, Kim and Marioni, 2003). During the preliminary analysis of the data, five themes emerged across all the survey questions: classroom climate, learning needs, learner efficacy, interaction and appropriate format for the content. While the traditional students consistently expressed satisfaction in all of the theme areas, the students in the blended format were less satisfied. The researchers reported that these students felt it was too big of a sacrifice for their own education and enjoyment to want to do it again. In summary, the researchers urged instructors to counter the challenges posed by teaching at a distance with strong pedagogical approaches that take full advantage of technology to create community and positive educational experiences.

Whether through face-to-face, online or blended delivery, many studies show no significant differences in student learning outcomes (Albrecht, 2006; Garrison and Vaughan, 2007; Vaughan and Garrison, 2006). At the University of Central Florida, researchers found the blended model having learning outcomes comparable to, and in some cases, better than face-to-face while lowering attrition rates in comparison with the fully online students (Dziuban, Hartman and Moskal, 2004). However, a smaller number of studies do report differences. Professors at Michigan State University (Carnevale, 2002) found that students who took an economics course online did not do as well as students who took the same course in a traditional classroom. On tests related to topics in microeconomics, students in the traditional sections answered 65.5 % of the questions correctly, on average, while the online students got 61.2 % correct, on average. Students in a blended learning section of the course performed better than the online students and almost as well as the traditional sections; this third group of 258 students answered an average of 64.5 % of the questions correctly.

To increase the likelihood of positive outcomes, instructors must adopt new tools and new mindsets when designing blended learning courses (Leonard and DeLacey, 2002). Viewing the blended course as merely a less-robust version of the fully online model underestimates the effort required of the course redesign. Simply placing existing material online does not serve the students. Levy (2005) refers to this tendency as a “juxtaposition of new technology and old pedagogy.” Instead, the focus

should be on recognizing the potential of the Internet technologies to enhance learning. Garrison and Vaughn (2007) state that ideally the blended course requires these elements:

- In-class activities that link with online assignments so as to reinforce the intent of activities outside the classroom;
- Shift from teacher-centered to learner-centered activities in-class as well as online;
- Focus on student responsibility for navigating online resources and conducting online research; and
- Evaluation instruments that provide frequent and effective feedback.

Leonard and DeLacey (2002) focus on seven key principles for designing blended learning courses: recognize that learning is largely a social activity; integrate learning into life; enable learning by doing; encourage learning by discovery; remember that individuals have different mental receptors for material; make it fun; and build in assessment.

Instructors teaching a blended learning course can expect to invest more time becoming familiar with available technology, creating in-class activities, and reflecting on overall course structure. In addition, instructors are advised to take deliberate action once courses begin towards creating a community of inquiry, such as monitoring and responding to online discussion board postings (Conrad, 2005). Furthermore, instructors need to consider ongoing classroom assessment. Because of these time-consuming tasks, some advise that faculty receive additional support and resources when teaching blended learning courses for the first time (Garrison et al., 2008).

RESEARCH METHOD

To assess the effectiveness of the blended learning approach at GGC, we conducted a pilot study in fall 2008 involving two sections of the introductory computing course. Each of the authors taught a section originally scheduled to meet on Mondays, Wednesdays, and Fridays. Under the blended model, class would typically meet face-to-face only two out of those three days. In return, students were required to complete significant assignments outside of regular class time. Those assignments included extended practice with the software applications being taught, posting and responding to online discussion questions, reading and answering questions on assigned materials, conducting independent research on a computing topic, and collaborating with a group on a presentation (see Table 1).

Face-to-Face activities	Outside of class activities
Lecture	Discussion board questions
In-class discussions	Online quiz over textbook material
Demonstrations	Video-based training
Quizzes and tests	Group projects
Student presentations	Hand-written outlines of textbook
Guest speakers	Online research
	Using Web-based applications (e.g. Google Docs, delicious.com, search engines)

Table 1: Activities in Blended Learning Course

Since we anticipated that the majority of students had no experience with online or blended learning courses, the instructors tried to prepare students by explicitly emphasizing how a blended learning class is different. Students were told about the pilot study on the first day of class, directed to resources to learn more about blended learning, and told some of the pros and cons of such a course. Students were given the option to switch to a different section of the course that met 100% face-to-face with no disruption in schedule. In our case, even after hearing this, all students elected to remain in the blended sections.

Students in the blended sections were surveyed at the midpoint and the end of the semester about their perceptions of the hybrid format. Several questionnaire items were adapted from existing instruments (Garrison et al., 2007). At the midpoint, students were asked about their background (classification, major, number of credit hours taken, and experience with online courses), level of experience with the software applications used in the course, internet access, learning preferences, and level of interaction with their instructor. In addition, we asked three open-ended questions: How do you think having so much responsibility for your own learning has affected your performance in the course? What has been the most effective part of the class? What has been the least effective part of the class?

At the end of the semester, students were again asked about the level of interaction with their instructor. There were additional open-ended questions: how do you think having so much responsibility for your own learning has affected your performance in the course? What has been the most effective part of the class? What has been the least effective part of the class? What advice would you give a student considering a hybrid course for the first time? What suggestions can you provide to help strengthen this hybrid course? Considering all of the assignments and activities both in and out of class: what were the most meaningful experiences you had?

RESULTS

Thirty-five of the 40 students responded to one or both surveys. The majority were full-time, traditional college students with majors other than computing. Slightly more than half (51.4%) were freshmen with about a third (31.4%) being sophomores. More males (62.9%) responded than females. Most students had high-speed internet access at home (88.6%). For most of the students (77.1%), this was the first blended or online class they had ever taken.

Here, we compare an assessment of student learning in blended sections versus traditional sections, summarize student perceptions of the hybrid course, and share faculty insights on teaching hybrid.

Objective 1: Compare Learning Outcomes

Student performance for the course was measured against eight course goals (CG) through common questions used on the final exam and common assessments in using the personal productivity software (Word, Excel, and PowerPoint). Overall, student performance in hybrid sections was in line with student performance in traditional sections (see Figure 1: Student Learning Outcomes Figure 1).

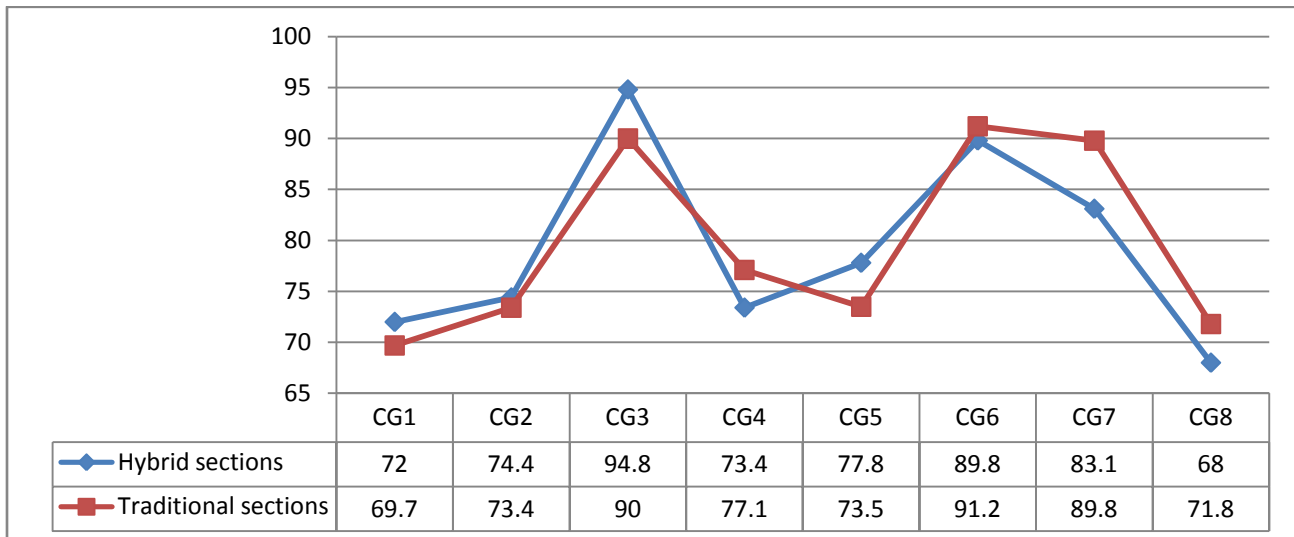


Figure 1: Student Learning Outcomes

Objective 2: Student Perceptions of Blended Learning Course Format

For the midpoint and end of semester surveys, students rated their agreement with several statements on a scale of 1= Strongly Disagree and 5 = Strongly Agree (see Figure 2). We identified several positive trends from these surveys. First, despite only holding class meetings twice per week, students rated the amount and quality of interaction with their instructor as very high. Second, many students were satisfied with the hybrid format and were interested in taking blended learning courses in the future. Third, students understood the connection between the online material and in-class work. Finally, students responded more positively about the blended learning format at the end of the semester than they did at the midpoint.

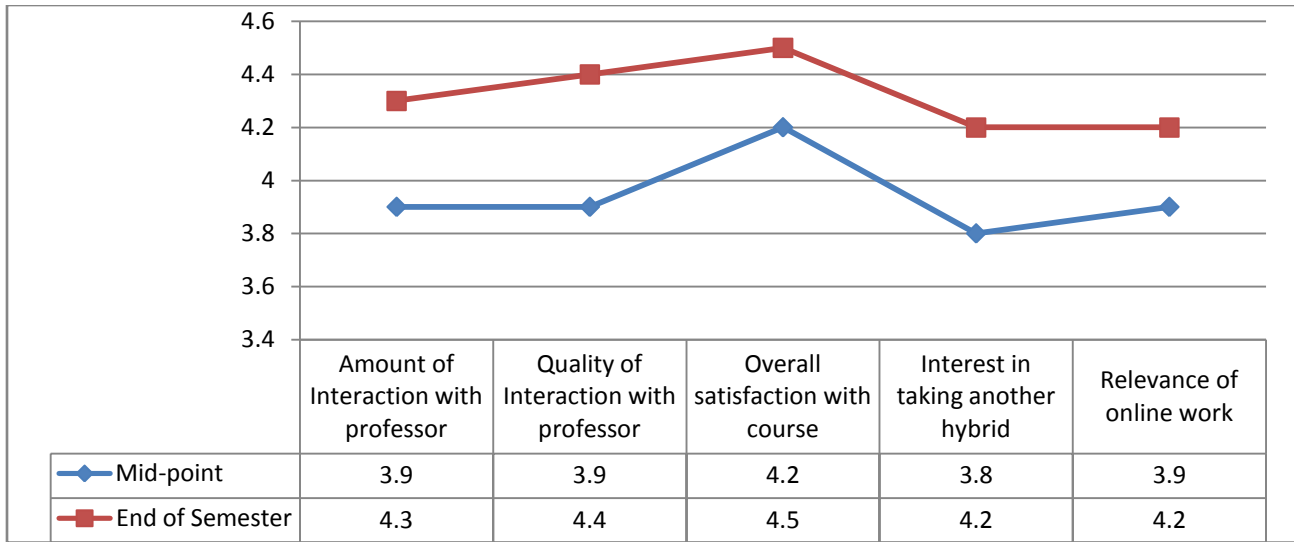


Figure 2: Student Perceptions

Comments from the open-ended portion of both surveys identified several pros and cons of the hybrid format from the students’ perspective. We have classified these comments and provided representative quotes:

- **Flexibility:** “I like having the opportunity to come in and work by myself without the pressure of HAVING to go to class. I can finish my assignment and leave rather than sitting in class for the extra hour that I don’t need.”
- **Interaction with professor:** “The most effective part of the hybrid class is being able to come in on the hybrid day and get individual help on assignments.”
- **Independent learning:** “I believe that I have learned more than I would have if I didn't have so much responsibility.” “Having responsibility, and not having an instructor there at all times to tell you to complete my assignments, has helped me to focus more on my work and take my time when completing each assignment”
- **Authenticity:** “I think that doing so much work outside of class might sometimes be challenging, but it prepares you for the real world because there is no one there to guide you, which forces you to become more independent in a way.”
- **Learning style:** “It made me really understand what I was learning and I am a very hands-on person.”
- **Social presence:** “[What I liked best was] meeting new people, learning new things, having fun doing it.”

At the same time, there were also some drawbacks to the blended learning format as expressed in these student comments:

- **Requires discipline:** “I think it has affected my grade in a bad way overall. Having this much responsibility and the same with all of my other classes made me feel like I had no life at all except for school. And when your [sic] 20 years old your [sic] suppose to be having the time of your life. I feel like I've missed out on my life during this semester”
- **Requires time management skills:** “Sometimes, I waited until last minute to start my work.” “I think the hybrid course has taught me that I need to set apart weekly time for myself to accomplish work.”
- **Requires comfort with technology:** “With so much work using technology, their [sic] is a greater responsibility of knowing how to use it.”
- **Conflicts with preferred learning style:** “I still don’t think anything was as effective as being in class and learning by doing what [my professor] asked the students to do.”
- **Requires investment of time:** “Be prepared to work outside of class. A lot!”

LESSONS LEARNED

Reflecting on several challenges in implementing this blended learning course, we offer several lessons learned from the pilot study.

First, blended learning requires significant commitment to selecting effective online resources. Designing and grading the online activities and associated tutorials takes a lot of the instructor’s time. Our suggestion would be that the online components be completed before the first day of class since the demands of the term leaves limited time for course

development. With all the required online activities, students have to be knowledgeable about due dates, location of materials and communication tools, so they have the incentive to ask questions if they are unsure about any course responsibilities. The very first or second class session must include an activity like a scavenger hunt, in which students combine in groups to search for key course components. This serves to alleviate anxieties they may have about the software platform and to prompt questions. Finally, the instructor needs to connect online material with classroom discussion. Students must feel that the investment of their time in an activity such as online discussion questions will be rewarded with enhanced classroom participation or deeper connection with the material, particularly if a peer-review component is included in the activity.

Second, blended learning does not appeal to all students. This format seems to work best for disciplined, more mature students that like to work independently. If students miss one day of class or a major assignment, it is more difficult for them to get back on track. They can often become more disconnected as a result. We also found that sometimes the non-traditional students that most wanted the flexibility of online classes did not have the computer skills needed to thrive in this type of classes. Specifically, we discovered that many students' computer expertise does not extend beyond basic communication tools such as emailing and social networking. When faced with assignments demanding critical thinking and basic math skills, they become anxious and flustered.

Finally, blended learning requires time management skills from both instructors and students. With a limited number of face-to-face classes, the class time was precious. As instructors, we were reluctant to use this time for otherwise important activities like guest speakers, additional quizzes or tests, or library instruction. We also had to resist the urge to lecture over material from the textbook during the face-to-face sessions. Rather, those sessions should be focused on collaborating with students in the learning process and promoting discussions. These active learning techniques require a significant commitment by faculty to leave the lectern and be adventuresome in what takes place in the classroom. The inclusion of activities such as group work, debates, and case studies means that the classroom becomes, as described by Jay Parini (2005, p. 88-89), "a place where sparks fly, where students confront their own best selves, thinking aloud with me or against me."

CONCLUSION

The blended learning model recognizes that some material can be delivered just as well or better online. By combining face-to-face class sessions with online learning, students can engage in learning when they are most prepared to do so, rather than on the instructor's timetable. We found that student performance in the traditional and blended learning sections of the course were comparable. Students reported high levels of interaction with their instructor, and student satisfaction with the course increased by the end of the semester. Although there was considerable time spent designing and setting up the blended course, faculty experiences were also quite positive. At GGC, we intend to expand the pilot to include more sections scheduled to meet on Monday, Wednesdays, and Fridays. In the future, we will move to 50% face-to-face and 50% online learning for this course. We also will look more systematically at the specific teaching practices that will increase student learning and satisfaction with the course.

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