Special Issue: Blended Learning (Part 1)

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Using a Blended Approach to Teach Research Methods:
The Impact of Integrating Web-Based and In-Class Instruction

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Abstract

This study explored using a blended format (both in-class and online components) for teaching undergraduate research methods. A Traditional section met in-person twice weekly for 75 minutes (50 minute lecture with 25 minute group work). A Blended section had the same format for the first 4 weeks, but then switched to a single, 75-minute lecture per week with all group activity shifted to Web-based discussions and online homework sets. Comparisons of exam scores indicated no difference on the midterm but Blended students significantly outperformed those in the Traditional section on the final exam. Students in the Blended section also actively participated in online discussions and maintained close contact with the instructor. These results suggest the integration of online components may help improve student performance.

Introduction

Although research methodology is one of the most commonly required courses in psychology programs (Messer, Griggs, & Jackson, 1999), it is also one of the most difficult, feared, and disliked by students (Ball & Pelco, 2006; McGovern & Hawkes, 1986; McVey, 1996; Ward & Grasha, 1986). As a result, many delay taking it for as long as possible which, in turn, creates even greater problems because the information presented in a research class serves as the basis for virtually all of the other courses in the discipline. Understanding material presented in research-based content courses (e.g., cognitive development or motivation) requires that the reader have at least a basic foundation in the scientific method (Berthold, Hakala, & Goff, 2003; Chamberlain, 1986; Lutsky, 1986; Perlman & McCann, 2005; Zablotsky, 2001), and this is precisely why many departments set it as a requirement.

Given this situation, there is a clear need to develop research instruction that results in the improved comprehension of key concepts and processes and also fosters a positive change in student attitudes toward the subject matter (Brems, 1994). A potentially effective way to achieve these goals is through the use of blended instruction. According to the Sloan Consortium definition, blended courses "… integrate online with traditional face-to-face class activities in *a planned, pedagogically valuable manner* [italics added]; and…a portion (instructionally defined) of face-to-face time is *replaced by online activity* [italics added]." (Laster, Otte, Picciano, & Sorg, 2005). This is not simply posting materials or providing supplementary activities on a class website. It is the shifting of significant aspects of a course into the online environment in order to create an integrated system of instruction that capitalizes on the unique and most effective features of each of the settings.

This approach has much to offer us as we search for ways to improve research instruction. Technology-based instruction that provides realistic and relevant tasks and involves students in the production and presentation of information will help to improve student learning (Ball & Pelco, 2006; Driscoll, 2000; Forsythe & Archer, 1997) and foster attitude change about the content (Simonson & Maushak, 2001). This is easily achieved with blended learning. By moving segments of the instruction online, assignments

can be structured to be more relevant, more personal, and less restricted by the time and place of the traditional classroom. Moreover, students can become more active and assume more responsibility for their own learning, in part because they have more freedom to participate when it fits their schedules, but also because they have increased access to a wealth of materials and information via the Internet while they are studying. Additionally, post-instruction discussions, which can provide a means to clear up any errors or confusion and affect student attitudes (Simonson & Maushak, 2001), are easily conducted as immediate, yet asynchronous (not real-time), follow-ups to in-class sessions.

Students in a blended class also have easy and numerous routes for support both in and outside of the traditional classroom. Online course management systems (e.g., WebCT and Blackboard) provide for the use of password-protected and course-specific email, discussion postings, and chat rooms. At the same time, because there is still an in-class component, students are able to have regular, face-to-face contact with the instructor as well as the support of in-class lectures and interaction with fellow classmates. Again, many of these features have been shown to create a greater sense of community and satisfaction, increase motivation, and improve learning (Regan & Knickerbocker, 2007; Twigg, 2003; Woods, Badzinski, & Baker, 2007).

Present Study

The present study explored the efficacy of using a blended format for teaching research methods. Two sections of an undergraduate research methods course were studied. In one, a standard, face-to-face approach was used with students coming to class twice a week for lectures and small group work. They also completed a traditional, independent research project. In the other section, the instruction was modified so that a portion of the in-class time was replaced with web-based activity. The in-class group work used in the traditional section became online homework and discussion items for those in the blended class. Also, the traditional research project was replaced with three smaller projects that capitalized on using Internet-based materials and online discussions. The goal of the study was to see if blended instruction has the potential to improve student learning and whether students would find it an intellectually engaging experience.

Method

Participants

The participants were 63 undergraduate majors in Child and Adolescent Development. They were in enrolled in one of two sections (Traditional: $n = 31$, with 2 males and 29 females; Blended: $n = 32$, with 2 males and 30 females) of a 16-week-long research methods course. I taught both sections in succeeding years because only one section of the course is offered per academic year. Although the participants were not randomly assigned to the sections, students were not aware of the online aspects of the Blended course until the first day of class. Therefore, it was not possible for them to self-select in or out of the section prior to that point based on those features. Four students did withdraw prior to the start of classes but no one dropped from the Blended class during the semester. In contrast, 4 students who were receiving failing grades dropped before taking the final in the Traditional section.

Procedure

Traditional section. Students met on campus for a 75-minute-class twice a week for the entire semester. Most class sessions consisted of approximately 50 minutes of lecture followed by about 25 minutes of small group work on exercises that applied the concepts from that day's topics. During group work, I circulated about the classroom monitoring student progress and providing help. After about 15 minutes, I reconvened the entire class and reviewed the groups' answers. Students completed a midterm, a final, and an individual research project.

Blended section. During the first four weeks of the semester, the format for the Blended section was identical to the one used for the Traditional group. The class had two 75-minute sessions per week, each with about 50 minutes of lecture and 25 minutes of group work. However, beginning with the fifth week, several changes took place. First, the class met in-person only once a week and no longer had any in-class group work. Second, in place of the second meeting each week, I gave students an assignment to complete in an asynchronous, online discussion via WebCT. I actively monitored and participated in this activity. Postings were not graded and students were not required to participate. However, I did tell them that inactivity was essentially the same as not coming to class and, as such, could impact their performance on exams. Third, students had to start submitting homework sets. I posted a new set every week and students were required to submit 5 out of the 10 possible by WebCT email. After each homework deadline, I posted the correct answers for the entire class to view on the course website. It was their responsibility to raise questions in the appropriate discussion area if they needed additional clarification. The Blended students also took the midterm and final exams and completed three small projects that included online components.

Materials

Exams. The same midterm and final exams were given in both sections. These were non-cumulative tests and each consisted of 50 multiple-choice questions worth a total of 100 points. In order to avoid the possibility of information about the exams being shared between the two sections, testing took place under highly supervised conditions; students were allowed to have only pencils and erasers on their desks and all test forms were individually collected and counted and then stored off campus in a secure file. The proctor also actively monitored the students by walking the aisles and closely observing all activity.

Exercises/homework and discussions . The in-class group exercises that were required in the Traditional section were given to the Blended participants in the form of online homework sets and discussion items. This material ranged from basic multiple-choice and short answer-type questions to selections from the end-of-chapter activity items in the text. It also included the discussion of abstracts and brief excerpts from journal articles. Thus, although the delivery method differed between the two sections, the material covered was the same for both.

Projects. Students in the Traditional section each designed and conducted their own individual research study. In contrast, students in the Blended class completed three smaller projects, all of which took place online and not in the classroom. The smaller projects also had an applied and personal quality to them. The first (during week 5 of the semester) involved developing a hypothesis to explain some aspect of their own or a close friend's behavior as well as making suggestions for possible ways to test it (based on Cozby, 2004). The second (during week 11) required students finding and then taking and reviewing an online personality test of their own choice. The third (during week 14) had them locate and critique a journal article from an online database on a topic of direct interest to them. Each of these three projects had to be posted to the WebCT discussion board and students were required to make at least one substantive comment on another student's project. Thus, although the content of the projects completed by the two sections was not *identical*, the information covered (hypothesis development, measurement issues, and, locating and evaluating research reports) in the Blended projects was also included in the Traditional research project.

Lectures and text. Both sections were given the same lectures and used the same textbook.

Student views . Using the University's anonymous, end-of-course evaluation survey, students in both sections evaluated the effectiveness of the instructor on a 5-point scale (5 = "very effective" and 1 = "very ineffective"). Due to a change in the evaluation form during the semester the Blended section was taught, Blended students were given additional items that included: "Used intellectually challenging teaching methods," "Used assignments that enhanced learning," "Demonstrated the relevance of course content," and "Was responsive to questions and comments from students." These items used a 5-point scale

where 5 = "very strongly agree" and 1 = "strongly disagree." All students had the option of completing an open comment page on the course.

Results

In order to assess the impact of restructuring the course on students' *performance*, I compared the scores for the two groups on the midterm and the final exams. I also looked at self-report data from the course evaluations as well as activity levels within the WebCT classroom to evaluate student *satisfaction* in the Blended section. The findings suggest the value of using blended instruction.

Exams . Although there was no difference between the groups on the midterm exam [Blended, $M = 75.41$ ($SD = 10.28$) and Traditional, $M = 75.55$ ($SD = 11.29$)], there was a statistically significant difference between the two sections on the final, with the Blended students ($M = 74.5$, $SD = 12.18$) performing significantly better than the Traditional ($M = 68.07$ (12.63), $t(55) = -1.99$ (one-tailed), $p = .03$, $d = .54$ (medium effect). Four important points should be noted here. First, the overall lower scores on the final exam likely reflect the fact that the more difficult topics (e.g., higher-order designs, interactions, and statistical tests) were covered during the second half of the course. Second, excluding the four people who dropped out of the Traditional section from the analysis of the midterm scores did not affect the outcome of that analysis (Traditional, $M = 76.74$, $SD = 11.04$). Third, with only two online sessions and one project prior to the midterm, it was probably too early to see an impact on those exams due to the revised instruction. Furthermore, that no difference was found at that time helps to establish the initial comparable nature of the two sections in terms of their general ability in the subject matter. Fourth, had the four students who dropped out of the Traditional section with failing course GPAs remained and taken the final, the mean score for that section on the exam would most likely have been even lower and the difference between the two groups even greater.

Student evaluations . The ratings of instructor performance were virtually identical, Traditional, $M = 4.5$ ($SD = .50$, $Mdn = 5.0$) and Blended, $M= 4.5$ ($SD = .70$, $Mdn = 5.0$). See Table 1 for Blended student responses to the additional items they received.

Table 1: Blended Student Responses to Additional Evaluation Survey Items

Item	M	SD	Mdn
Used intellectually challenging teaching methods	4.5	.60	5.0
Used assignments that enhanced learning	4.3	.70	4.0
Demonstrated the relevance of course content	4.4	.80	5.0
Was responsive to questions and comments from students	4.5	.90	5.0

The open-ended comments reflected similar positive views across both sections. However, only 4 of the students in the Traditional section chose to complete this optional section of the form in contrast to 14 of those in the Blended class. Examples of comments from the Blended students specifically on the value of the online activities were

- "WebCT was extremely helpful in being responsible for homework…class discussions were a great way of learning difficult material."
- "I like the WebCT teaching."
- "I loved her teaching methods…not only was there group work, online discussions, but great lectures…"
- "I can email her anytime I have questions."

There were no negative comments made about the online aspects of the class.

WebCT participation . Overall, the participation in the weekly discussions was quite active as measured by the number of postings. (M = 151, SD = 91.34, Mdn = 154, R = 23 to 298). Every student posted in some area of the class website (M = 55.72, SD = 32.80, Mdn = 53, R = 9 to 171) with 17 of 32 students making over 50 postings. Students varied in the number of "hits" (i.e., accessing the home page or using a tool) made while in the WebCT classroom (M = 739.25, SD = 485.38, Mdn = 650.50, R = 140 to 2,068) with 18 making over 500 and 8 of those over 1,000. Two students had in excess of 2,000 hits.

WebCT communication . The Blended students were also active communicators. Within the WebCT system, we exchanged over 250 email messages and 125 postings were made to "Ask Mary" which was an area of the discussion board that I set up for students to post any questions they had for me and felt comfortable asking in a public forum. (For private issues, I suggested students contact me either during my office hours or by email.) Fifteen students also exercised the option to create a homepage for others in the class to view.

Discussion

What is it about the blended format that may have contributed to the improved performance and levels of activity seen here? The findings support previous research that highlights the importance of creating responsible and active learners (Ball & Pelco, 2006; Simonson & Maushak, 2001), who are well supported (Twigg, 2003; Woods et al., 2007) as they work on realistic and personally relevant assignments (Driscoll, 2000; Simonson & Maushak, 2001).

Responsible and Active Learners

Blended students were encouraged to take a personally responsible and active role in the learning process in several ways. With some of the traditional in-class group work turned into required homework sets that students had to monitor and review on their own, it was no longer possible to sit back and allow more on-task classmates to do much of the work—as is often the case in group situations. Moreover, although the remaining in-class activities were shifted to *optional* online discussions, most students clearly stepped up and took an active part in those sessions. If we were to translate the average number of comments made in the weekly discussions into the traditional 75-minute class structure, it would represent more than two comments made every minute for the entire period. This finding clearly alludes to the power of the online environment over the standard in-class setting for encouraging high levels of participation and discussion. Anecdotally, several students reported they felt less self-conscious and freer to join in the conversations when they occurred online and not in the classroom.

Furthermore, the overall number of emails, postings, and hits within the course site as a whole reflect a highly active and engaged group of students. Student evaluations support the importance of all these activities for learning in that they reported that the assignments helped them learn and they found them intellectually stimulating. The comments on open-ended items provided even more specific praise for these features.

Beyond the way in which the assignments were structured, the fact that part of the learning for Blended students took place online may have inherently encouraged student activity and responsibility. Because of the public and permanent nature of online work, students may have felt a greater need to engage in (and thus put more effort into) self-monitoring. Concerns that incorrect answers or hastily developed responses become a part of the permanent class record—an aspect of online discussions that contrasts with the often more fleeting nature of many in-class comments—may be highly motivating in this regard.

Additionally, the simple act of preparing written responses for the online discussions may result in more self-monitoring and reflection. As a process, writing may encourage more introspection than does extemporaneous participation in a classroom setting. Furthermore, being able to read other students' responses, having the opportunity to ponder what was said, and *then* going on to plan a reply most likely encourages a more in-depth examination of one's understanding of the material.

Easy and Effective Support

The Blended students appear to have benefited from the support that is so readily available in an online setting. Student comments on the open evaluation form and their views of my responsiveness to their questions indicate this was true, as do the number of emails exchanged with me and postings made to the "Ask Mary" section. Additionally, the number of students who chose to create an optional homepage suggests they saw the online classroom as a good way to connect with their classmates.

From an instructor's point of view, I felt the online discussions were central to my ability to give students the support they needed. Students' online comments seemed longer and more detailed than is typical for in-class situations, and the devil was in those details. The more students wrote, the more likely it was that errors and misconceptions appeared; and, because they were written, I was able to review thoroughly all of their comments and answers. This meant I could catch even the more subtle misunderstandings that might otherwise slip past in a traditional classroom setting and respond almost immediately to clear up confusion.

Simply having a printed record of the discussions may benefit those students who lack effective note-taking skills or who have difficulty getting the most out of traditional in-class discussions due to a range of other issues (e.g., limited hearing, poor language skills, or learning disabilities). Moreover, all students could read and re-read the exact transcript of what was said at their own convenience and as often as necessary.

Realistic and Personal Assignments

The projects for the Blended section were designed to provide real world and personally relevant activities that could capitalize on the online environment. For example, students' test critiques were based on commonly available measures they each found and then took via the Internet. The value of this type of project is supported by the end-of-course evaluations in which students reported seeing the assignments as relevant and contributing to their learning of the course material. However, an important issue that must also be considered here is whether the projects were truly comparable across the two sections.

As mentioned previously, the content of the projects assigned to each of the two groups was not identical; those given to the Blended section were modified in order to be more realistic and meaningful and to take advantage of the blended nature of the course. However, each of the three topics covered in the Blended course (hypothesis development, measurement issues, and location and evaluation of research reports) was also addressed within the context of designing and implementing the Traditional research study. Therefore, if content alone were the key factor, those in the Traditional section should have been more likely to do well on the exam because they conducted a study from start to finish, and thus were exposed to a broader range of methodology topics (e.g., statistical testing). Given this scenario, it seems doubtful that the superior performance of the Blended students was due to content differences between the two types of project assignments.

The number of projects (three versus one) also seems an unlikely source for the difference in final exam scores. The three Blended projects were unrelated to each other in terms of the specific tasks involved (for both content and process) so there would appear to be no opportunity for carryover or practice effects to have played a role in the higher exam scores for this group.

Finally, perhaps the most important point is that in order to capitalize on the benefits offered by blended instruction, the character of the assignments (in this case the projects) must vary at least somewhat from those found in the more restrictive environment of the traditional classroom. The creation of a truly blended course is not simply a matter of moving existing coursework "as is" to an online setting. Rather, it involves the modification and development of assignments that take advantage of the affordances of online learning so that significant and meaningful work actually takes place online. Students in the Blended section worked on projects that used the Internet and the WebCT classroom. The realistic and

personally meaningful quality of the activities, as well as the posting of work online and the related discussions, are all likely to have contributed to student performance on the final.

Summary

Students in the Blended section outperformed the Traditional students on the final exam, reported a high degree of satisfaction with their instruction, and demonstrated active engagement in the course. These findings highlight the potential efficacy of integrating online and in-class components for teaching research methods. Blended instruction pairs the support of the classroom with the flexibility and richness that technology, and in particular the Internet, has to offer. As students and teachers become increasingly savvy about the use of technology and as new forms of media are created, the future of blended instruction as a powerful tool for improved instruction seems bright.

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