

Achievement and Satisfaction in Blended Learning versus Traditional General Health Course Designs

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Abstract

Blended learning is a hybrid of classroom and on-line learning that includes some of the conveniences of on-line courses without the complete loss of face-to-face tact. **Purpose:** The purpose of this study was to evaluate student achievement and satisfaction with blended learning course delivery compared to a traditional face-to-face class format in a general health course. **Method:** Surveys were distributed to randomly selected classes during the fall 2007 semester: three blended and one traditional sections participated (n=251). **Results:** Total satisfaction scores between blended (54.986) and traditional (49.788) classes were significantly different ($p \leq 0.01$). Achievement by students of blended and traditional sections brought mixed findings, yet blended students' overall grades were significantly higher ($p=0.048$). **Conclusion:** Results indicated that a blended course delivery is preferred over a traditional lecture format, and promising data emerged to challenge teachers' traditional approach to teaching general health courses at the university level.

Keywords: Blended learning, student satisfaction, student achievement, and on-line learning

Introduction

Alternatives to traditional lecture-style delivery of education have been offered for many years (Huang, 1996-1997). Blended learning, a type of teaching alternative, uses a combination of traditional face-to-face contact with on-line learning (Taylor, 2007). Courses with high volumes of contact material are complimentary to blended course design due to placement of content material on-line, giving students the freedom to self pace through the material. The implementation of blending learning courses has been reported in education, photography, religious studies and computer science (Rovai & Jordan, 2004; Cohen & Meskin, 2004; Abrahmov & Ronen, 2008; Brunner, 2007) with mixed results. Studies

utilizing the blended approach in health education at the university level are limited (Block, et al., 2008).

Blended learning is a hybrid of traditional face-to-face and on-line learning so that instruction occurs both in the classroom and on-line, and where the on-line component becomes a natural extension of the traditional classroom learning (Falconer & Littlejohn, 2007). Blended learning is thus a flexible approach to course design that supports the merger of different times and places of learning, offering some of the convenience of fully on-line courses without the complete loss of face-to-face contact. This is one of the reasons that blended learning courses have been well-received. Dziuban and Moskal (2001) concluded that blended learning courses had equivalent or reduced student withdrawal rates and equivalent or superior success rates. Additionally, blended learning produced a stronger sense of community among students than either traditional or fully on-line courses (Rovai & Jordan, 2004).

Recently, more research has centered on student satisfaction with this type of learning as well as the grade earned for the course. In their study comparing courses entirely on-line with traditional face-to-face, Sikora and Carrol (2002) reported lower satisfaction ratings with the fully on-line course(s) compared to the traditional course(s). Additionally, Carr (2000) found higher attrition rates in fully on-line courses. Marino (2000) noted that, to be successful in fully on-line courses, the student needs to be an independent and self-regulated learner, which is not always the case. Although there are negative attributes to fully on-line courses, the blended learning format attempts to limit negative attributes by having some face-to-face interaction in the course. Certain courses naturally lend themselves to this type of design. A general health course offered at the university level provides an overview of 10-13 content areas (Insel & Roth, 2006). The large amount of information combined with typically large class sizes often hampers efforts of more "hands-on" learning. Many college health classes are exploring course enhancement tools to engage students in a more personalized approach (Block et al., 2008; Harasim, 2000).

The purpose of this study was to assess student satisfaction and student achievement in a blended learning health course. A full description of a blended college health course design can be found in Melton, Chopak-Foss & Raychowdury (under review).

Methods

Research Design

This study measured the effectiveness of a blended general health course at a midsize public university in Southeast Georgia. Research methodology employed a quantitative, pretest-posttest control group design. Use of intact classrooms, where students are not individually assigned to groups, denotes a quasi-experimental research design (McDermott & Sarvela, 1997). In this study, students' course grades were measured along with end-of-course class satisfaction and teacher evaluation. A pretest-posttest control group design is one of the strongest methodological research designs, assuring that significant differences discovered between and among groups can be attributed to the intervention (McDermott & Sarvela, 1997). With this research design, threats to internal and external validity are controlled and generalization to other similar settings is possible (Neutens & Rubinson, 2002).

Research Questions

To meet the purpose of this study, the following research questions were formulated:

1. Do students in the blended sections of a general health education course earn higher grades than students in the traditional face-to-face sections?
2. Do student ratings of instruction reflect a higher class satisfaction score in the blended sections compared to the traditional face-to-face sections?

Study Participants

Participants (n=251) included students enrolled in sections of the traditional health course (n= 153) or the blended health course (n=98) during Fall 2007. One section of the traditional health course, to serve as the control group, was randomly selected out of eight sections offered. Three sections of the blended health course were randomly selected out of 24 as the intervention group. Each student self-selected to be in the blended or traditional health course. The health course is mandatory as part of the Core Curriculum for all undergraduates. Study procedures were reviewed and approved by the sponsoring university's Institutional Review Board for the protection of human subjects. Written informed consent was obtained prior to data collection and all participants were given the opportunity to complete all testing materials.

Blended Course (Intervention) vs. Traditional Course (Control) Structures

The blended course design for the general health course consisted of two parallel layers that were performed together: the in-class portion focused on activity learning and the on-line portion aimed at the delivery of content material organized into a series of learning modules.

The in-class portion of the blended course met once a week and was limited to a maximum of 40 students per section. Each in-class meeting included a brief lecture, no more than 10 minutes, plus 40 minutes of in-class "active learning" activities: discussions, role playing, debates, worksheets, group projects, and group presentations. Class activities were designed to create an environment that fostered critical thinking, problem solving and the development of self-regulation abilities with personal reflections and action plans. The instructor served as the guide to learning and not as a disseminator of knowledge. Four exams were given, and although tests were not identical, they covered the same content material and the questions were from the publisher's test bank.

The on-line portion of the blended course focused on content delivery, course management and extension of the in-class discussion to the web. The on-line component consisted of Powerpoint presentations with a corresponding note sheet, homework assignment, and quiz each week. Materials were presented using WebCT Vista course management system (Web CT, Lynnfield, MA).

The traditional course format included two face-to-face lectures given per week assisted by the use of Powerpoint slides. Class size of the traditional courses were larger, averaging 100 to 200 students, limiting the amount and type of "active learning" activities done in class. The instructor served as disseminator of knowledge in a lecture format, delivering the information and answering questions by the students. Four random quizzes were given in-class. Four written, in-class examinations were given throughout the course. The same scope and sequence was followed by both the traditional and blended courses. The

traditional course did not have access to the same on-line course materials as the hybrid course.

Instrumentation

Demographic information was collected to obtain descriptive characteristics for students in intervention and control groups. A pretest examination was given to all study participants to assess course content prior to the presentation of any course materials. The pretest examination contained 50 randomly selected multiple choice questions from the publisher's test bank for the 12 chapters that would be covered throughout the semester. A posttest examination composed of the same 50 questions as the pretest was given at the completion of the course. The additional measurements of course achievement that were collected included individual student's scores from four class exams plus the overall course grade.

Participants completed a Satisfaction survey, which consisted of a modified Students' Evaluation of Educational Quality (SEEQ) (Centra, 1993). The SEEQ uses a 5-point Likert scale with the following variables: strongly agree (SA) 5, agree (A) 4, neutral (N) 3, disagree (D) 2, and strongly disagree (SD) 1. The participants in both groups completed this portion of the survey upon termination of the course after completing the posttest examination. Finally, end-of-the-semester Teacher/Course Evaluations, uniform across all disciplines and departments at the University, were compared. The Teacher/Course evaluations form uses a five-point scale: very good (5), good (4), satisfactory (3), poor (2), and very poor (1).

Data Analysis

Descriptive statistics and frequencies were compiled to give means and percentages for demographic data. Independent t-tests for each of the variables were computed to measure significant differences. Aggregate totals for SEEQ and the Teacher/Course evaluations allowed for the comparison of overall satisfaction scores. Two-way ANOVAs allowed for comparison among and between groups.

Blended and traditional courses were compared for acquisition of knowledge and mastery of material content. Descriptive statistics (mean and standard deviation) were reported for pretest, posttest, each of the four written exams and final course grade. Independent T-tests determined statistical significant differences between groups.

All statistical tests were performed using $p \leq 0.05$ and 0.01 as the level of significance. All data were analyzed using the statistical software package SPSS (Version 15.0).

Limitations of the Study

Limitations of the study included threats to internal and external validity. Not all participants were present on the days that the course satisfaction and teacher evaluation surveys were given. Although the total number of participants was 251, 177 completed the course satisfaction survey (70.52%) and 127 completed the teacher evaluation (50.60%). According to Sarvela and McDermott (1997), 50% or more return rate on survey research is acceptable; the researchers cannot predict how students who did not fill out the survey felt. This research reports the findings from only one university and results may not be applicable in all places, though using a control group does increase generalization (Neutens & Rubinson, 2002).

Limitations of this study were numerous, although expected in studies conducted in non-laboratory conditions where the researcher cannot control for all variables. These limitations do impact the results of this study. Face-to-face aspects of the traditional and blended courses studied were different. Hence, the finding that students preferred the blended course may be because they preferred the active face-to-face learning in this course, and not necessarily the fact that it was blended. Statistically, the researchers could not partial this effect out from their data, thus results can be open for interpretation. In addition, the graduate assistants who taught the general health course sections included in this study had varied teaching experience which may have influenced the results, although random selection of blended and control groups sought to control this threat to internal validity.

Results

Participant Profile

Participants in the study represented the university population with frequencies and percentages of demographics reflective of the total school profile (Table 1). Demographic data was retrieved from completed course satisfaction surveys which represented 106 (68.6%) students in the traditional lecture based health course and 71 (72.5 %) students in the blended courses. Participants were fairly equally divided among males (n=82, 47.1%) and females (n=92, 52.9%). Grade level distribution reflected more lower classmen comprising 90.8% of the total sample (freshman 63.2%, sophomores 27.6%) than upper classmen comprising of 9.2% (juniors 8.6%, seniors 1.1%). This general health course is geared toward freshman and sophomores, and this sample reflects the typical student that takes this course. Among participants, 67.2% (n=117) were Caucasian, 24.1% (n=42) were African American, 2.3% were Hispanic (n=4) and 7.5% were other (n=13). For total population, African Americans were over-represented and Caucasians under-represented compared to the total school population. Demographics between blended and traditional courses mirrored each other.

Table 1. Demographic Characteristics of Blended (n=71) and Traditional Students (n= 106)

	Blended n (%)	Traditional n (%)	Total (n) %
Age (years) (n=174)			
< 18	9 (12.9)	14 (13.5)	23 (13.2)
18-19	42 (60.0)	67 (64.4)	109 (62.6)
20-21	14 (20.0)	15 (14.4)	29 (16.7)
22-23	2 (2.9)	4 (3.8)	6 (3.4)
≥ 24	3 (4.3)	4 (3.8)	7 (4.0)
Sex (n=174)			
Male	33 (47.1)	49 (47.1)	82 (47.1)
Female	37 (52.9)	55 (52.9)	92 (52.9)
Year in School (n=175)			
Freshman	42 (60.0)	68 (64.8)	110 (63.2)
Sophomore	22 (31.4)	26 (24.8)	48 (27.6)
Junior	5 (7.1)	10 (9.5)	15 (8.6)
Senior	1 (1.4)	1 (1.0)	2 (1.1)
Race (n=175)			
White	55 (78.6)	62 (59.0)	117 (67.2)
Black	10 (14.3)	32 (30.5)	42 (24.1)
Hispanic	2 (2.9)	2 (1.9)	4 (2.3)
Other	3 (4.3)	9 (8.6)	13 (7.5)

Content Comparison and Overall Student Achievement

Blended and traditional courses were compared for acquisition of knowledge and mastery of material content. Descriptive statistics (mean and standard deviation) are reported for pretest, posttest, each of the four written exams, and final course grade (Table 2). The mean scores for pretest (19.13 blended, 18.88 traditional) and posttests (21.23 blended, 21.33 traditional) out of 50 shows little difference between and within groups, and reflect minimum content knowledge. Written exams demonstrate more knowledge acquisition with mean grades ranging from 72.12 to 80.80 (out of 100). The blended students had a higher average mean for Exam 1, Exam 2 and Final Course Grade.

Table 2. Independent T-Tests for Traditional and Blended sections for Overall Course Performance (n=251)

Source of Variation	Blended Mean (SD)	Traditional Mean (SD)	T Value	Sign.
PreTest	19.13 (0.58)	18.88 (0.50)	0.112	0.911
PostTest	21.24 (0.59)	21.33 (0.38)	1.019	0.985
Written Exam 1	80.80 (1.31)	77.99 (1.06)	1.665	0.097
Written Exam 2	78.59 (1.52)	73.48 (0.95)	3.011	0.003*
Written Exam 3	72.12 (2.04)	73.59 (1.11)	-0.684	0.494
Written Exam 4	73.63 (1.90)	78.15 (1.08)	-2.211	0.028*
Final Course Grade	79.62 (1.24)	76.38 (1.04)	3.245	0.048*

*p≤0.05

Independent T-Tests were calculated to determine significant differences between the blended and traditional students (Table 2). No significant differences were noted in the pretest score, post test score, pretest posttest score difference, Exam 1 or Exam 3.

Blended students significantly outscored traditional students in Exam 2, while the reverse was true for Exam 4. Final course grade was significantly higher for blended students than Traditional students, with the former mean score of 79.62 and the later of 76.38 ($p = 0.048$). This difference could be due to differences in grading rubrics because the sections for the blended course had more effort points (attendance and homework) compared with the traditional who were evaluated strictly on examination and quiz grades.

Student Course Satisfaction and Teacher Evaluations

To compare student course satisfaction, at completion of the course, all participants completed a satisfaction survey which consisted of a modified SEEQ (Centra, 1993). Of the 15 questions that comprised the SEEQ, 12 were rated higher for the blended course design (Table 3). A composite score for the SEEQ was calculated, and again the overall mean was higher for the blended course (54.99) than the traditional course (48.16).

Table 3. Mean and Standard Deviation for Students' Evaluation of Educational Quality for Blended and Traditional sections (n=177)

	Blended Mean (SD)*	Traditional Mean (SD)*
Class size is appropriate.	4.42 (0.632)	3.90 (0.950)
The class activities were engaging.	4.07 (0.781)	3.66 (0.979)
The class environment was inviting.	4.07 (0.816)	3.46 (1.065)
The class was fun.	3.63 (0.898)	2.99 (1.164)
I was bored in class.	2.75 (1.105)	3.22 (1.232)
I enjoyed going to class.	3.13 (0.985)	2.77 (1.146)
I felt comfortable to voice my opinion in class.	3.69 (0.904)	3.10 (1.074)
I learned from my peer experiences.	3.39 (0.963)	2.86 (1.032)
I felt my presence was valued in the class.	3.38 (0.947)	2.68 (1.087)
I felt comfortable approaching the instructor.	3.94 (0.939)	3.80 (1.018)
The instructor encouraged class discussion.	4.18 (0.703)	3.54 (1.056)
The class challenged my values/beliefs on health issues.	3.10 (1.071)	3.18 (1.179)
I feel better prepared to make health decisions.	3.70 (0.977)	3.99 (0.882)
I feel more sensitive to health diversities due to the class.	3.18 (0.850)	3.46 (1.010)
I would recommend this class to a friend.	3.83 (0.941)	3.52 (1.241)
**Composite Teacher Evaluation Score (Q1 – Q15)	54.99 (7.978)	48.16(12.151)

* 1= strongly disagree, 2=disagree, 3=don't know, 4=agree, 5=strongly agree

** Scoring Range: 51-60 Highly Satisfied, 41-50 Moderately Satisfied, 31-40 Satisfied, 21-30 Dissatisfied, 11-20 Moderately Dissatisfied, 1-10 Highly Dissatisfied.

Significant differences for total mean scores of SEEQ are reported in Table 4. The total scores between the blended (54.986) and traditional (49.788) were significantly different ($p \leq 0.01$) indicating that blended students judged the quality of education to be higher than traditional students.

Table 4. Independent T=Tests for Course Satisfaction between Traditional and Blended sections (n=170)

Source of Variation	Overall Sat. Mean**	Df	T Value	Sign.
Blended	54.986	168	3.464	0.001*
Traditional	49.788			

*p \leq 0.05

Additionally, overall quality educational satisfaction totals were compared by demographics Table 5, and lists only the demographics in which students were significantly more satisfied with the blended course. Demographic groupings that reported no difference in satisfaction between the different course structures included females, classifications of sophomores and above, 20 year olds and above, and minority students. Students that were significantly more satisfied with the blended course included males (p=0.002), freshman (p=0.001), 18-19 year olds (p=0.001, p=0.015) and Caucasians (p= 0.000).

Table 5. Mean and Standard Deviation of Course Satisfaction by Selected Demographics between Traditional and Blended sections (n=177)

Source of Variation	Overall Sat. Mean**	Df	F	Sig.
Gender				
Male:				
Blended	54.788	1	9.853	0.002*
Traditional	48.065			
Year				
Freshman:				
Blended	56.595	1	11.785	0.001*
Traditional	50.143			
Age				
18 & Under:				
Blended	61.667	1	15.202	0.001*
Traditional	48.917			
18-19 yrs old:				
Blended	54.714	1	6.124	0.015*
Traditional	50.031			
Race				
White/Caucasian				
Blended	54.691	1	12.936	0.000*
Traditional	48.649			

*p \leq 0.05

Standardized Teacher /Course Evaluations

As part of university protocol, standardized teacher/course evaluations were administered at the end of the semester for each course. Overall means and standard deviations are reported for each question, divided between blended and traditional course designs (Table

6). Composite teacher/course score is the aggregated total of the individual questions. Students in the blended course consistently rated the teacher and course higher. The questions included in the tables are a subset of the total questionnaire, and chosen on the basis of what faculty within the department are required to include in their annual performance review.

Table 6. Independent T-tests of End-of-Course Teacher Evaluations between Traditional and Blended reported by sections (n=127)

	Blended Mean**(SD)	Traditional Mean (SD)	T Value	Sign.
Overall, how would you rate this course?	3.78 (0.872)	3.03 (1.242)	3.976	0.000*
Degree to which important points were stressed?	3.62 (0.925)	3.67 (0.998)	0.288	0.774
Instructor's preparation for this course?	3.94 (0.938)	3.72 (0.940)	1.284	0.201
Instructor's encouragement class participation, discussion?	4.01 (0.931)	3.45 (1.157)	3.055	0.003*
Organization of course material was?	3.93 (0.863)	3.67 (1.049)	1.504	0.135
Clarity of presentation of course material?	3.94 (1.056)	3.79 (1.022)	0.804	0.423
Degree to which tests/graded activities reflected content?	3.78 (1.123)	3.55 (1.187)	1.124	0.263
Instructor's availability to students?	3.93 (0.810)	3.53 (1.158)	2.242	0.027*
Instructor's helpfulness to students?	3.90 (0.942)	3.50 (1.128)	2.171	0.032*
Degree to which class focused on course objectives?	3.96 (0.945)	3.52 (1.173)	2.370	0.019*
Instructor's interest in content/material of course?	4.10 (0.860)	3.76 (1.031)	2.043	0.043*
Overall, how would you rate the instructor?	4.12 (1.008)	3.53 (1.188)	2.985	0.003*
Level of interest in subject before taking this course?	2.84 (1.052)	2.60 (1.091)	1.244	0.216
Level of interest in subject after taking this course?	3.23 (1.250)	2.81 (1.131)	1.976	0.050*
Composite Teacher Evaluation Score (Q1 - Q14)	53.09 (9.964)	48.16(12.151)	2.5130	0.013*

* $p \leq 0.05$

** 1= very poor, 2=poor, 3=satisfactory, 4=good, 5=very good

Tests for statistical differences were conducted on individual questions as well as the composite scores (Table 6). Interestingly, blended students rated the course significantly higher than the traditional students ($p=0.000$) and felt the course focused more on course objectives (0.019). Also, blended students felt the teacher encouraged class participation and discussion ($p=0.003$), was more available to students ($p=0.027$), was more helpful to students (0.032), and was more interested in the material ($p=0.043$). Noteworthy, there was no difference between students' interest in the course prior to taking the course, yet afterwards blended students were significantly more interested in content/material of the course ($p=0.043$).

Summation

As student ways and means of knowledge acquisition transform, leaning more toward technology for rapid information dissemination and self-paced intrinsic attainment, educational structures and instructors must adapt as well. The challenge of this new educational modality lies in how to effectively teach without compromising content or losing touch with the student. This study looked at blended sections and traditional sections of a general health course to determine how to balance student need with pedagogical soundness. Promising data emerged to challenge instructors' traditional approach to teaching general health courses at the university level.

Discussion

Findings emanating from the study indicated that both the blended learning and traditional course formats effectively presented material and enhanced knowledge levels of the students enrolled during the Fall 2007 Semester. Although no significant difference was found in pre/posttest scores, students enrolled in the blended sections achieved higher in final course grades. Thus, it can be suggested that both the blended and traditional sections provided the same degree of knowledge acquisition. This finding provides a persuasive argument to the traditionalists that effective learning can take place in non-traditional or blended learning environments. Currently, there are limited studies on blended learning that compare outcomes to traditional course formats. One study did find students in a traditional, blended and on-line course in Information Systems had no significant differences between learning achievements (Rivera & Rice, 2002). There are, however, more studies that look at on-line learning compared to traditional course formats, for which researchers have found similar results of no differences between the groups (Block et al., 2008, & Allen et al., 2004).

Additionally, this study found significant differences in class satisfaction between the blended learning section and the traditional sections, with blended learners reporting a higher level of class satisfaction. The blended learning design focused on active learning in the classroom portion of the course; the students might have rated higher satisfaction due to the enjoyment of the in-class portion, and not necessarily the blended design.

A consideration when providing educational alternatives is whether students enjoy the alternative forms. The current study found that the mean satisfaction scores were significantly different between the blended and traditional courses. The analysis also revealed a significant difference in freshman males, who reported to be more satisfied than their traditional section's counterparts. Again, there is very limited research on satisfaction in the blended course format. Rovai & Jordan (2004) looked at the course satisfaction as it relates to the classroom community: connectedness and learning community. They found a higher rating of satisfaction in the blended learning course compared to traditional and on-line formats. Furthermore, Rivera and Rice (2002) found only a lower satisfaction level in on-line compared to traditional and blended learning courses, and no difference between traditional and blended courses. Several studies have looked at class satisfaction of exclusively on-line course compared to traditional with mixed findings. Allen et al. (2002) found that students in distance learning appear to be as satisfied as those in traditional formats. However, other studies have reported higher satisfaction with the on-line courses (Newlin & Wan, 2002, Althaus, 1997, and Huang, 1996-1997). Furthermore, Pereira et al., 2007, found no significant difference in satisfaction of blended learning compared to

traditional formats; yet, they found a significant difference in achievements scores, with higher achievement scores found in the blended learners. With this mixed support in the literature, the authors believe the achievement and satisfaction is dependent on the quality of the online and classroom design.

Previous studies have looked at age as it relates to on-line and traditional participation. Cooper (2001) noted the average age of on-line students to be 27, and traditional students to be 23: other studies support an increase age in on-line courses (Karber, 2002, Eastman & Owens, 2001). In the current study, researchers found younger students had reported a higher rating of course satisfaction. Further investigation into this variable is warranted.

Conclusions and Recommendations

The current study on student achievement and satisfaction scores presents interesting findings, and challenges the educator to question teaching strategies, methodologies and content delivery. The blended model seems to create a win win situation for the both instructor and student. The blended model offers to the more traditional educator a merger between classroom contact and cutting-edge technology. The millennial student, with their proficiency and use of technology, is comfortable with this pedagogical structure as well.

This research represents an initial attempt to measure student achievement and satisfaction between blended and traditional course formats. Results purporting higher learning achievement and satisfaction by the students most likely were impacted by the more active classroom teaching approach utilized in the blended format. This phenomena needs to be investigated more fully. A blended course format may actually lend itself to more active teaching due to students becoming more responsible for learning content on their own time, while classroom time is spent with application of newly acquired knowledge. Active learning may also account for the higher grades in the blended group.

Recommendations emanating from the study include repeated research on achievement and satisfaction among different course formats in general health courses, accompanied by longitudinal studies to determine any long-term effectiveness. An important consideration will be whether students can continue to have acceptable achievement and satisfaction scores when blended formats are applied to upper level courses of various degree programs with more specialized content material. One may find that initial documented success of the blended format may be limited to lower level undergraduate courses. As future research studies continue to document effectiveness of the blended articles, educators will be challenged to embrace new teaching protocols and methodologies.

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