

“Why Did You Blend My Learning?” A Comparison of Student Success in Lecture and Blended Learning Introduction to Sociology Courses

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Abstract

Introduction to Sociology at a large public university was taught in two separate formats, blended learning and lecture, during the same semester by the first author. While some similarities existed, the distinction was in delivery of course content. Additionally, the blended class had one-third less in-class time that was primarily devoted to active learning. In this quasi-experimental study, the researchers tested differences in learning using grades and pre-posttests. Although there were no statistically significant differences across sections in exams and final grades, the blended class had significantly greater improvement on the overall pre- to posttest. Additionally, students of color and non-first year students in that class had significantly greater improvement on the pre-posttest compared to those subpopulations in the lecture course. The authors conclude that blended learning, employing flipped pedagogy and centered on active learning, may be more effective than lecture, particularly in narrowing the achievement gap between white and non-white students.

Keywords

active learning, hybrid courses, introduction to sociology, learning outcomes, student learning

Limited resources, technological advances, and the shift toward faculty accountability and assessment of student learning requires that institutions of higher education and faculty consider more attractive and successful models of teaching and learning (Howard et al. 2014; Lo and Prohaska 2010). As Garrison and Vaughan (2008:7) argue, “Higher education must start delivering on its promise of providing learning experiences that engage and address the needs of society in the twenty-first century.” To that end, many universities are offering more online and *blended learning* (sometimes referred to as *hybrid*) courses that utilize computer technology and compel more active participation of students. Consistent with blended learning is *flipped* pedagogy that requires student learning of content outside of rather than in class and face-to-face time is devoted to

building conceptual understanding and cognitive skills (Baepler, Walker, and Driessen 2014).

The flipped model can have a significant role on *blended learning*, a term used to describe classes that combine online learning with face-to-face instruction (Garrison and Vaughan 2008). In most cases, blended learning courses allow students to “first meet new information, concepts and procedures” before the class physically meets (El Mansour and Mupinga 2007:243). In order to effectively use

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in-class time, flipped classes often employ *active learning* strategies (Baeppler et al. 2014). Freeman et al. (2014) contend that active learning is an empirically validated way of teaching that promotes student success. As opposed to passive learning that occurs primarily in lecture courses, active learning promotes deep learning by stimulating inquiry and interest as students gain knowledge and learn skills (McCarthy and Anderson 2000). It emphasizes students' control of their learning with guided and structured discovery that may include role-playing, problem solving, computer-based instruction, debates, games, visually based instruction, and peer teaching (Yoder and Hochevar 2005). The goal of this study is to examine whether blended learning employing a flipped pedagogical approach that is centered on active learning, as compared to traditional lecture, in Introduction to Sociology is a more effective learning experience. It is also our intent to determine for whom this redesign works, that is, whether any differences in learning exist among subpopulations of students across the two formats of the class.

At Northern Arizona University (NAU) and other institutions of higher education, the redesign of traditional courses to blended learning is encouraged and often financially supported with cost-effectiveness and increased student learning as the goals. At NAU in particular, course redesign includes effective use of technology to:

Re-envision how we use in-class time; address identified instructional problems or bottlenecks that may be solved through technology; encourage faculty to adopt proven pedagogy using technology as a lever to engage students and/or reduce faculty workload; and, encourage pairs or teams of faculty to share resources that support multiple sections of courses. (NAU, Office of the Provost 2015)

With institutional support and these goals in mind, the first author redesigned Introduction to Sociology, historically taught as a lecture-format course. Before fully committing to a blended redesign of all sections of Introduction to Sociology (SOC101), a pilot blended class that was structured in a flipped pedagogical manner was compared with a traditional lecture course, both taught by the first author during the same semester. Student learning across the two sections was measured using exam scores, final grades, and a pre-posttest that measured knowledge of sociology and critical thinking skills.

LITERATURE REVIEW AND RESEARCH QUESTIONS

Liberal studies introductory courses are important to student success as they can assimilate students into the expectations of college life, develop their critical thinking skills, foster retention, provide them with new ways of thinking about the social world, and legitimize the academic enterprise (Chambliss and Takacs 2014; Schrank 2016; Twigg 2005). As more high school graduates attend college and the demographic make-up of our student population continues to shift (Bok 2006; Schrank 2016), these courses absorb a large, diverse student body. In fact, one-third of undergraduate enrollments in four-year institutions are concentrated in introductory courses (Twigg 2005). As liberal studies courses, they often enroll students from assorted majors.

Universities have sought ways to meet students' varied learning needs while adhering to fiscal demands. Accordingly, blended learning has become increasingly popular for several reasons: It is cost-effective because it frees up classroom space and encourages more in-depth processing of course content when the class meets (El Mansour and Mupinga 2007), it makes students more conscious about taking responsibility for their learning (Geçer and Dağ 2012), and it suits different learning styles (Auster 2016; Waha and Davis 2014). For example, students cited that they appreciated the flexibility of the online portion of their classes but also valued interaction with peers and faculty in class (Waha and Davis 2014). Similarly, students in three sections of introductory sociology reported considerable use of screencasts to learn concepts and theoretical perspectives outside of class. Students further reported high satisfaction with this modality, which included face-to-face time devoted to discussion (Auster 2016). Finally, a benefit of incorporating online instruction is reduced student anxiety while online discussion boards increase self-esteem (Van Gundy et al. 2006). Although these studies help us understand the benefits of blended learning, research rarely involves a comparison with other teaching and learning approaches.

Some recent studies compared the effectiveness of online learning with face-to-face/lecture courses (e.g., Driscoll et al. 2012; Jahng, Krug, and Zhang 2007; Parkhurst et al. 2008; Sitzmann et al. 2006). For example, similar levels of satisfaction were reported by 368 students in three online and three face-to-face introductory sociology courses. However, students in the latter courses performed better on assessments, although this finding was

attributed to selection effect (e.g., stronger students were enrolled in the face-to-face sections) (Driscoll et al. 2012). Nonetheless, very few studies have compared blended learning with lecture courses. In the studies that have, there was little variance in student performance between face-to-face and hybrid courses, and in some cases, students in traditional courses did better (Bowen et al. 2014; Crowe, Silva, and Cerasola 2015; Figlio, Rush, and Yin 2013; Joyce et al. 2014). These studies sought to determine the effect of time spent in the classroom, and although the overall conclusions were varied, they showed that differences between hybrid and face-to-face classes were relatively minor (Adams, Randall, and Traustadóttir 2014). Specifically, students in a traditional section of Principles of Microeconomics scored 2.5 percent better than students in a hybrid version of that course (Joyce et al. 2014). There was also no variance between students in face-to-face and hybrid introductory microeconomics with some evidence that face-to-face was more effective for some subpopulations (Figlio et al. 2013). In introductory statistics, there was no distinction in student performance on final exams, a standardized test, and pass rates between the two approaches (Bowen et al. 2014). Likewise, in four sections of quantitative research methods with a total of 170 students, there was no difference in student learning outcomes across sections where two courses used in-class peer review with course content being delivered online while there was no peer review in the other two sections (Crowe et al. 2015).

To our knowledge, this study is unique in that it provides a side-by-side comparison of a blended learning class with a traditional lecture course in Introduction to Sociology at a large public university. It is equally valuable to understand how different subpopulations of students (e.g., by sex, major, race/ethnicity, and academic class standing) in lecture courses do in comparison to their counterparts in blended learning classes. Studies show how teaching approaches have different impacts on students from different cultural backgrounds (Eddy and Hogan 2014). This, they argue, calls into question whether the “one-size-fits-all” interventions are possible.

Women now account for 52 percent of those earning bachelor degrees (U.S. Census Bureau 2012). The reversal in the college gender gap has occurred because women have exceeded men in performance and attainment (Goldin, Katz, and Kuziemko 2006). Girls tend to be better prepared for college because they have fewer behavioral

problems in secondary education such as school disciplinary troubles or involvement in the criminal justice system, lower rates of attention deficit hyperactivity disorder, and less need for special education programs (Goldin et al. 2006). In addition, women’s growing labor force participation, increases in age at first marriage, and desires to do well in school have enabled them to blossom in higher education (Goldin et al. 2006). These findings suggest that women may be better suited for blended learning courses as the additional out-of-class demands require more discipline. Furthermore, feminist scholars argue that women’s learning is better supported in nontraditional higher education contexts (Hayes 2000) such as problem-based learning rather than lecture-based learning (Du and Kolmos 2009). In addition to comparing student success across sections of Introduction to Sociology, the authors’ second research goal is to compare the performance of women in the blended learning section with women in the lecture class.

The authors are also interested in the effect of academic major on student success in introductory sociology, but few studies have examined its effect on performance or learning. In a meta-analysis of 225 studies reporting data on exam scores or failure rates of students in science, technology, engineering, and mathematics (STEM) courses employing at least some active learning versus traditional lecture, active learning increases exam performance while lecture increases failure rates. However, there is no difference in active learning’s effect size when comparing majors versus non-majors (Freeman et al. 2014). Likewise, there was no difference in student success between majors and non-majors in two sections of introductory microbiology, one non-flipped (e.g., traditional lecture) and the other flipped (e.g., where students watched an online lecture before class and therefore had less class time) (Adams et al. 2014). Similarly, increased course structure in two types of classes (biology and a general education course) at two R1 universities with distinct student populations had similar outcomes for majors and non-majors (Eddy and Hogan 2014). The third research goal of this study, therefore, is to compare performance of social science majors and non-majors in the blended section of Introduction to Sociology with those same subpopulations in the lecture-format course.

At public universities such as Northern Arizona University (NAU), introductory courses enroll students from diverse race/ethnic backgrounds. Between 1945 and 2000, the number of bachelor degrees awarded annually grew nearly eightfold,

resulting in more diverse student bodies as many racial/ethnic minorities entered institutions of higher education across the United States (Bok 2006). Because of growing racial/ethnic diversity, some recent research has sought to determine how classroom interventions affect students from different cultural contexts. For example, Asian American and white students performed differently when asked to discuss problems orally (Kim 2002 as cited in Eddy and Hogan 2014). Likewise, positive interpersonal feelings increased performance among Mexican students but not white students (Savani et al. 2013). Similar results occurred when measuring the effect of increased course structure for groups from different racial/ethnic backgrounds such that the achievement gap between white and black students was narrowed (Eddy and Hogan 2014). More student responsibility and accountability and a sense of community in the classroom are particularly beneficial for black students because they perceive homework assignments as contributing to their learning and they may not feel as isolated in the more active versus passive classes, which contributes to their increased participation (Eddy and Hogan 2014). Researchers must consider group cultural histories in order to understand their unique learning approaches (Gutiérrez and Rogoff 2003). Thus, the fourth goal of this study is to test whether differences in learning occurred between whites and non-whites in the blended class with those same subpopulations in the lecture section of Introduction to Sociology. The authors recognize the importance of disaggregating the category of “non-whites” (Eddy and Hogan 2014), but the small sample size did not allow for this (this is further discussed in the Research Methods and Conclusion and Limitations sections).

Studies of student learning have also examined the effect of class standing, particularly in introductory courses that are typically designated for first-year students although sophomores, juniors, and seniors often enroll in them. For example, sophomores in a traditional class of introductory microbiology performed significantly better than sophomores in the hybrid/flipped course, but first-year students, juniors, and seniors performed similarly across sections (Adams et al. 2014). Likewise, in an analysis of pre-posttest data in 12 sections of thematically focused introductory sociology courses, juniors and seniors had significantly better pretest scores. When holding the pretest constant, seniors had significantly greater gains in sociological theory, although class standing across different

types of courses was not measured (Howard et al. 2014). The fifth and final goal of this study is to compare performance of first-year students and non-first year students in the blended learning class with their counterparts in the lecture section of introductory sociology.

RESEARCH METHODS

This study was conducted with two sections of Introduction to Sociology (SOC101) taught by the first author during the fall 2014 semester. One class was taught in a blended learning format employing flipped pedagogy and the other in the traditional lecture format. The classes were similar in the following ways: They were certified by an institutional program to ensure emphasis of rigor and high expectations, they had the same course description and learning outcomes, the same topics were covered, and the assessment strategies in both sections included online reading quizzes, online exams, required attendance, and in- and out-of-class assignments. The major difference was in terms of delivery of course content. For the blended learning section, students had additional responsibilities outside of class, including online learning application assignments. In addition, students were in class for 100 instead of 150 minutes per week, and class time was devoted to application of course material through discussions, activities, and assignments. For the lecture section, students listened to an in-class lecture and participated in discussion and did roughly one-third of the in-class application exercises as compared to the blended class.

This research is based on a quasi-experimental design in that students self-selected into the classes and were not randomly assigned. On the first day of the semester, the instructor did an oral survey asking students why they registered for a particular class, and only 5 out of the 64 students enrolled in the blended section indicated that they did so because it was a blended format class. A majority indicated preference for their course selection because the slated time worked well with their schedules.

Institutional Review Board Approval

The study protocol was approved by Northern Arizona University’s Institutional Review Board (IRB) (Project No. 643314-1). Students who were 18 years of age and older signed IRB-approved informed consent forms, and students 17 years of age signed IRB-approved minor assent forms, and their legal guardians signed IRB-approved consent forms.

Assessment of Student Learning

Student learning was measured using multiple assessment tools throughout the course of the semester: pre-posttests, exam scores, and final grades. As a result of institutional funding, the researchers were able to devote resources to development of the pre-posttest. Pre-posttests have high perceived value by many sociology programs (Weiss 2002), and the researchers believed it would be a reliable measure of student learning. Nonetheless, analyzing exams and final grades provides insight into student performance. The authors distinguish between performance and learning (Delucchi 2014) in the Discussion section.

Pre-posttest data were collected at the beginning and end of the semester, exam scores were collected throughout the semester, and final grades were collected at the end of the semester. Demographic information was gathered from the online pre-posttest and the online course gradebook and included sex, academic major, race/ethnicity, academic class standing, and age.

Pre-posttest. The pre-posttest consisted of 38 multiple choice questions taken from various sources, including the Sociological Proficiency Assessment (SPA) developed at the University of Montana (University of Montana 2014), the Major Field Test (MFT) in Sociology from Educational Testing Services (ETS) (Educational Testing Services 2003), and previous exam questions designed by the first author. The SPA, borrowed from the University of Montana, is administered to students each spring semester in their Classical Social Theory classes and used by faculty members as an assessment of core knowledge to the discipline of sociology (University of Montana 2014). The MFT was developed and validated by experienced faculty members representing all of the relevant areas of the discipline to determine test specifications, questions, and types of scores reported. ETS assessment experts subject each question to rigorous tests of sensitivity and reliability. Every effort is made to include questions that assess the most common and important topics and skills (ETS 2003). Exam questions devised by the first author have been used over several years in many Introduction to Sociology courses. The questions have been refined to accurately assess student knowledge based on analysis of student performance (e.g., questions were revised if a majority of the students in a class incorrectly answered them).

The pre-posttest was designed to measure sociological knowledge and critical thinking skills, and

questions were structured around the program's student learning outcomes. There are 10 program learning outcomes (PLOs) adapted from the American Sociological Association (McKinney et al. 2004), 8 of which are emphasized in SOC101 and were measured in the pre-posttest (Table 3). The researchers first determined how the course learning outcomes aligned with and were reflected in the PLOs. In order to assess those outcomes, the authors explored a database of questions utilized by the first author and selected 25 questions that assessed several PLOs. For PLOs for which questions were not available in the first author's database, the researchers looked to the MFT and the SPA, and 13 questions were selected from those sources. The questions were then classified by the authors based on the types of knowledge they assessed. Specifically, 19 *critical thinking skills* questions measured student ability to apply sociological theory, methods, and basic concepts, and 19 *sociological knowledge* questions measured student understanding of sociological theory and methods as well as basic concepts and terms associated with the subject.

Exam scores and final grades. Students in each section were given three exams, all of which were identical in content and number of points possible. In addition, final grades were collected from the online gradebook and analyzed at the end of the semester. They were based on weekly online reading quizzes, in-class exercises, exams, attendance, and assignments. The total points for the classes varied according to course format (e.g., 700 points in the blended learning class and 624 points in the lecture section), thus, final grade percentages were used for the final comparisons across sections.

Participants and Response Rates

Data were gathered from two separate samples of students during the fall 2014 semester: one lecture and one blended learning course, both of which were identical in course content but differed in course structure and delivery of material and number of points possible.

Participants. Students were asked to identify their sex, racial/ethnic background, academic major, academic class standing, and age during the pre-test. Racial/ethnic background categories included: Asian, African American, Caucasian (e.g., white), Hispanic/Latino/a, Middle Eastern, Native

Table 1. Student Participants (by Percentage).

Variable	Lecture N = 70 ^a	Blended N = 54 ^a	p Value
Sex			
Female	67.1	58.1	.13
Male	31.8	40.3	1.00
Major			
Social science	31.8	37.1	.87
Non-social science	54.1	46.8	.13
Undeclared	14.0	16.1	1.00
Race/ethnicity			
White	52.9	64.5	.65
Non-white	40.0	30.6	.14
Class			
First year	42.4	71.0	.21
Non-first year	57.6	29.0	.00*
Age (mean)	19	19	.10

^aSome of the categories may not add up to 100 percent due to some students not selecting an option to a question on the pretest and/or data were identified as an outlier and not included in the analysis.

*Indicates a statistically significant difference in samples sizes ($p < .05$).

American, and Pacific Islander. Ideally, the researchers would like to include each of these racial/ethnic categories in the analysis. However, white students significantly outnumbered each other racial/ethnic group. In fact, they accounted for 58 percent of the total student sample. The second largest group was Hispanic/Latino/a, but they accounted for only about 21 percent of the total student sample. Therefore, the authors found it necessary to create a new category of non-white in order to make the sample sizes comparable for final analyses. Additional categories were created for academic major and class standing for the same reason. Majors in the social science category included: sociology, psychological sciences, communications, anthropology, politics and international affairs, criminology and criminal justice, and social work. Other academic majors including engineering, speech pathology, dental hygiene, biomedical science, business, accounting, chemistry, English, exercise science, and nursing were classified as non-social science majors. Small portions of the samples had not declared majors at the time of data collection, but the number of students who fell into this category was too small to include in the analyses with social science and non-social science majors. Finally, class standing of recipients ranged from first year to senior students. The majority of both sections were first-year students; therefore, in order to make sample sizes comparable, class standing was collapsed into two categories: first

year and non-first year (sophomores, juniors, and seniors). The demographic categories used for all student data are listed in Table 1.

Response rates. Students had the option to participate in some or all phases of this study: pretest, posttest, and grades. Some students who consented to the pre- and posttest did not consent to the use of their grades and vice versa, creating different sample sizes for the final analyses. A high number, 82 percent of the 85 students enrolled in the lecture class and 84 percent of the 64 students in the blended class, completed both the pre- and posttest as represented in Table 1. Additionally, 96 percent of the lecture and 86 percent of the blended course consented to have their grades analyzed for the purposes of this study.

Data Collection and Analyses

Incentive to students to participate in the study included extra credit points toward their final grades. Extra credit was given for completing both the online pre- and posttests, respectively, administered at the beginning and the end of the semester. Students who chose not to participate in the study were given alternative extra credit assignments. It was suspected that some students completed the pre- and/or posttests simply for the extra credit, and measures were taken to eliminate those tests. Combing through the data and assessing patterns in

responses and the time it took students to complete the test(s) allowed the authors to determine possible outliers. The pre- and posttests consisted of multiple-choice questions with answers ranging from A to D. In construction of the tests, the researchers established no discernable pattern of correct answers. Additionally, the pre-posttests consisted of 38 multiple-choice questions that required a sufficient amount of response time from the students for each question. If students took less than 10 minutes to complete the entire test and if patterns were detected in their responses (i.e., student answered all Cs), their tests were marked as suspect, removed from the master data file, and not included in the final analyses. Three students' pre-posttests were not used in this study as their responses were viewed by the researchers as unreliable. Only student responses that took 11 minutes or more to complete and showed no identifiable patterns were used and analyzed.

Data for pre-posttest scores and exam and final grades were analyzed using difference of means tests. The data were further separated by demographic categories of students, and difference of means tests were conducted to reveal any significant differences across sections for each of the assessment tools. Additionally, binomial tests of significance allowed the researchers to determine if there were any significant differences between the proportions of students in demographic categories for each section. Tests revealed no significant differences across sections for sex, major, race/ethnicity, and age. Therefore, equal variances between the two samples and their demographic categories were assumed, and all tests were conducted using the Student's t test where $\alpha = .05$. Binomial tests did show significant differences in class standing across the two sections. Specifically, there were significantly more non-first year students in the lecture than in the blended learning course. Therefore, equal variances were not assumed when conducting the Student's t test for significant difference between non-first year students across sections.

RESULTS

The goal of this research was to compare student success across two types of introductory sociology courses—blended learning and lecture—by analyzing exam scores, final grades, and pre-posttest results using difference of means tests. In addition, the researchers sought to determine if differences in knowledge gained existed by subpopulations of students across sections.

Exam Scores and Final Grades

Comparison of mean exam and final grades show no statistically significant difference in student success across the two sections of SOC101. Grades were further analyzed by subpopulations of students (sex, academic major, race/ethnicity, academic class standing) across sections. The results indicate that there were no significant differences between most categories of students across sections; the exceptions were that non-social science majors ($t = 2.62$; $p = .01$) and white students ($t = 2.93$; $p < .01$) in the lecture class had statistically significant higher exam three scores than those same subpopulations in the blended class. Since the differences in exam scores and final grades across sections and by subpopulations of students were minor, the researchers focus the analysis on the pre-posttest results.

Pre- to Posttest

Unlike exam scores and final grades, there were several key findings when the researchers compared the results of the pre-posttest, including by subpopulations, across the two sections of introductory sociology.

Comparisons across sections. Difference of means tests were calculated on every dimension of the pre-posttest (i.e., overall, sociological knowledge, critical thinking skills, and program learning outcomes) within each section, then compared across sections to determine if either class had significantly greater gains. Although we anticipated relatively minor differences in knowledge gained across sections, our analyses reveal that the blended learning class had statistically significant greater improvement on the overall pre- to posttest results (38 questions) as compared to the lecture class as indicated in Table 2 ($t = -2.03$, $p = .04$). However, there were no statistically significant differences across sections on the pre- to posttest results on sociological knowledge (19 questions), critical thinking skills (19 questions), or the questions grouped on the basis of each of the program learning outcomes.

Across sections by subpopulations. Each dimension of the pre- to posttest results was also compared by subpopulation (sex, academic major, race/ethnicity, and academic class standing) across sections using differences of means tests as shown in Tables 2 and 3. Consistent with other studies, the researchers expected differences in knowledge gained by

Table 2. Mean Differences, Pre- to Posttest Results across Sections and by Subpopulation.

	Overall			Sociological Knowledge			Critical Thinking		
	Lecture	Blended	t	Lecture	Blended	t	Lecture	Blended	t
By section	2.60	4.43	-2.03* (.04)	.83	1.43	-1.24	1.77	2.96	-1.61
Sex									
Female	2.98	4.94	-1.82	.86	1.74	-1.62	1.94	3.20	-1.37
Male	1.65	4.00	-1.10	.75	.95	-.17	2.52	2.53	-.92
Major									
Social science	2.14	5.25	-1.77	.41	2.35	-2.47* (.02)	1.32	2.40	-.88
Non-social science	3.05	4.03	-.71	.90	.85	.07	2.38	3.19	-.07
Race/ethnicity									
White	3.54	3.97	-.32	1.39	1.19	-.30	2.15	2.78	-.60
Non-white	1.27	5.89	-3.41* (.00)	.00	2.00	-2.36* (.02)	1.24	3.33	-2.23* (.03)
Academic class									
First year	4.65	3.35	.94	1.50	.62	1.19	3.50	2.73	.77
Non-first year	1.39	7.35	-4.25* (.00)	.43	3.29	-4.65* (.00)	.75	3.47	-2.37* (.02)

*Significant findings of $p < .05$. p value indicated in parentheses.

Table 3. Mean Differences, Pre to Posttest Results in Program Learning Outcomes across Sections by Subpopulations.

Program Learning Outcome	Lecture	Blended	<i>t</i>	Student Category with Greater Gains*
1. Discipline of sociology ^a	.81	-.08	2.29* (.03)	First year (lecture)
2. Theoretical knowledge ^b	1.21	2.28	-2.02* (.05)	Non-white (blended)
	2.38	1.22	2.00* (.05)	First year (lecture)
3. Theoretical perspectives on globalization ^c	.00	1.41	-2.91* (.00)	Non-first year (blended)
4. Research methods ^d	-.22	1.00	-2.55* (.01)	Social science majors (blended)
	-.07	1.00	-2.30* (.03)	Non-white (blended)
	.02	1.71	-3.36* (.00)	Non-first year (blended)
5. Technical skills involved in retrieving data ^e			Not tested	
6. Sociological concepts ^f	No significant differences by category			
7. Culture and social structure ^g	.44	1.26	-2.35* (.02)	Female (blended)
	-.02	1.24	-2.52* (.01)	Non-first year (blended)
8. Individuals and society ^h	-.28	.83	-2.28* (.03)	Non-white (blended)
9. Diversity ⁱ	No significant differences by category			
10. Successful public communication of sociological knowledge ^j			Not tested	

*Indicates each student category with significantly better improvement than their counterparts for each learning outcome. Significant findings of $p < .05$. p value indicated in parentheses.

^aEmphasizes an understanding of sociology as a discipline, including how it is a unique social science field, how it contributes to a liberal arts education, and how the sociological imagination applies to reality.

^bStresses an understanding of the role of theory in sociology. This includes defining the major theories and their role in building sociological knowledge, comparing and contrasting them, explaining the context in which they were developed, and applying them to social reality.

^cEmphasizes sociological theoretical perspectives on the process of globalization.

^dStresses the role of empirical evidence and qualitative and quantitative methods in sociology.

^eHighlights the technical skills in retrieving data and using computer software for data analysis.

^fEmphasizes basic concepts in sociology and their theoretical interrelations.

^gHighlights how culture and social structure operate, including how institutions interlink in their effects on each other and on individuals, how social change factors affect social structures and individuals, and how culture and social structure vary across time and place.

^hStresses the reciprocal relationships between individuals and society, including understanding of the development of self, how structural factors influence individual behavior, and how social interaction influences society.

ⁱEmphasizes the internal diversity of the United States and its place in the global context.

^jStresses the relationship between sociological knowledge and successful public communication, report making, and funding proposals.

certain subpopulations of students across sections, namely, by sex and race/ethnicity. The authors also learned from a review of the literature that differences in learning by majors and non-majors should be insignificant across sections. Finally, with a limited basis with which to form an expectation, the researchers were unclear what the findings would reveal with regards to class standing.

The researchers estimated that females in the blended learning class would outperform females in the lecture course on most of the assessments. The

only significant finding by sex across sections, however, was for females in the blended class, who outperformed females in the lecture class on the pre- to posttest questions that measured program learning outcome seven (culture and social structure) as indicated in Table 3 ($t = -2.35$; $p = .02$). Otherwise, females in both sections performed similarly on all other measures, as did males in both classes.

The researchers also expected that there would be relatively minor difference in the outcomes of students by major. Nevertheless, the researchers

found that social science majors in the blended learning class had greater gains compared to those students in the lecture class on the pre- to posttest questions that measured sociological knowledge as specified in Table 2 ($t = -2.47$; $p = .02$) and pre- to posttest questions that measured program learning outcome four (research methods) as shown in Table 3 ($t = -2.55$, $p = .01$).

The researchers did anticipate differences in learning between whites and non-white students in the blended class with those same subpopulations in the lecture course. Non-white students (students of color) in the blended learning class had statistically significant greater gains compared to those same subpopulations in the lecture course in the overall ($t = -3.41$; $p < .01$), sociological knowledge ($t = -2.36$; $p = .02$), and critical thinking dimensions ($t = -2.23$; $p = .03$) of the pre- to posttest as indicated in Table 2. In addition, the researchers found that they also had greater gains in knowledge on pre- to posttest results that measured program learning outcomes (Table 3): two (theoretical knowledge) ($t = -2.02$; $p = .05$), four (research methods) ($t = -2.30$; $p = .03$), and eight (individuals and society) ($t = -2.28$, $p = .03$). There were no statistically significant differences in the performance of white students across the two sections.

Our main interest in terms of class standing was with first-year students since introductory sociology is geared toward that population. Because there is limited knowledge about the effect of class standing on student learning, the researchers were unsure whether first-year and non-first year students in the blended class would outperform those same students in the lecture class. However, the authors found that first-year students in the lecture course performed better on the pre- to posttest questions that measured program learning outcome one (discipline of sociology) ($t = 2.29$; $p = .03$) and program learning outcome two (theoretical knowledge) ($t = 2.00$; $p = .05$) compared to first-year students in the blended course as seen in Table 3, but no other differences for first-year students existed. In contrast, non-first year students in the blended class had statistically significant greater gains as compared to those same subpopulations in the lecture course in the overall ($t = -4.25$; $p < .01$), sociological knowledge ($t = -4.65$; $p < .01$), and critical thinking ($t = -2.37$; $p = .02$) dimensions of the pre- to posttest as shown in Table 2. They also outperformed in program learning outcome three (theoretical perspectives on globalization) ($t = -2.91$; $p < .01$), program learning outcome four (research methods) ($t = -3.36$; $p < .01$), and program learning outcome

seven (culture and social structure) ($t = -2.52$; $p = .01$), as depicted in Table 3.

DISCUSSION

Many universities are offering blended learning classes that incorporate computer technology and require more active student participation. Oftentimes, blended learning is implemented in a flipped fashion where students learn content outside of class while face-to-face time is devoted to active learning. Overall, this study suggests that blended learning employing a flipped pedagogical approach and centered on active learning, as compared to traditional lecture in Introduction to Sociology, may produce better student learning outcomes. This is particularly true for certain subpopulations of students.

Comparison across Sections

Very few studies have compared blended learning with lecture, but for those that have, there was little to no difference in student performance between the two formats, and in some cases, students in lecture courses outperformed students in blended learning courses (Bowen et al. 2014; Crowe et al. 2015; Figlio et al. 2013; Joyce et al. 2014). Contrary to those findings, the results of this study reveal significantly greater improvement on the overall pre- to posttest for the blended learning students. This illustrates that even though students in the blended course spent one-third less time in the classroom, they did better or just as well as the lecture students. This conclusion resonates with Baepler et al. (2014), who argue that less face-to-face instruction promotes student learning when in-class and online instruction are blended and when the instructional experience is flipped such that students engage course content outside of class and in-class time is devoted to application. They also argue for a third component—classrooms specifically designed for active learning—but since the classrooms in this study were auditorium style, this variable was not tested. Additionally, when each of the measures across sections by categories of students were examined, the researchers found that some subpopulations of students in the blended class had greater improvements, with one exception.

Comparison across Sections by Subpopulations

Differences in knowledge gained was compared by categories of students in the blended class with

those same subpopulations in the lecture course (e.g., by sex, academic major, race/ethnicity, and academic class standing), and our expectations were both substantiated and unsubstantiated.

By sex. Consistent with Du and Kolmos (2009) and Hayes (2000), the researchers expected females in the blended class to outperform females in the lecture class. This was true to a limited extent. Females in the blended class outperformed females in the lecture class on the pre- to posttest questions that measured culture and social structure. This result may be because of the additional assignments centered on how culture and social structure operate. Specifically, each class was required to complete an online reading quiz and an in-class application exercise, both with similar completion rates by females who consented to use of their grades. The blended class, however, also had two out-of-class assignments with completion rates of 78 percent and 89 percent by females. Fewer men in the blended class completed those two assignments, 70 percent and 81 percent. This implies that the additional autonomous work required of the blended class reinforced the material. Furthermore, the higher completion rate of those tasks by females compared to males provides a possible explanation as to why the only statistically significant difference between sections on this learning outcome was for females. Additionally, females in the blended class performed just as well as females in the lecture class on all other assessments even though less time was spent in class. This suggests that blended learning as the first author employed it is a “female-friendly” curriculum that provides opportunities for application and collaboration (Du and Kolmos 2009). This type of pedagogy tends to be more consistent with women’s experiences and ways of learning (Hayes 2000).

By major. Findings from previous studies showed no difference when comparing majors and non-majors across hybrid and lecture courses (Adams et al. 2014; Eddy and Hogan 2014; Freeman et al. 2014). However, the researchers of this study found that social science majors in the blended class had greater gains in sociological knowledge and research methods in the social sciences compared to that subpopulation in the lecture class. The additional active learning exercises required of the blended students may explain why they did better, a finding consistent with Freeman et al.’s (2014) overall conclusion. A greater proportion of the blended class’s final grade was on assignments (23

percent) compared to the lecture class (18 percent), suggesting that the blended students had more opportunities to enhance their sociological knowledge. Likewise, when looking at the coursework devoted to research methods, both sections were required to complete a reading quiz, but the blended class had two additional application assignments, one in class and another out of class.

By race/ethnicity. Consistent with the findings of Eddy and Hogan (2014), students of color in the blended section outperformed students of color in the lecture course on all dimensions of the pre- to posttest. While exams and final grades provide insight into student performance, they do not provide direct evidence of learning (Baker 1985; Chin 2002; Garfield and Chance 2000; Lucal and Albers 2003; Wagenaar 2002; Weiss 2002 as cited in Delucchi 2014). Delucchi (2014) argues that whereas learning is increased knowledge, performance is demonstrating mastery such as in a correct answer on an assignment or test. The distinction is important because students enter courses with unequal levels of skills, experience, and knowledge. A pretest therefore allows us to measure prior knowledge, and the posttest allows us to measure learning. Utilizing the pre-posttest as an effective measure of learning, our results indicate that students of color in the blended learning class had greater success than students of color in the lecture course. These tests substantiate that active learning enhances student success (Freeman et al. 2014), particularly for students of color. Likewise, with increased course structure, such as through the first author’s use of graded preparatory assignments and in- and out-of-class application exercises, this study confirms that active learning interventions affect student subpopulations differently (Eddy and Hogan 2014).

By academic class standing. Because of the scant literature, the researchers were not sure what the analysis would reveal with regards to class standing. Nonetheless, sophomores, juniors, and seniors in the blended class had greater gains as compared to students of the same standing in the lecture course on several measures of the pre-posttest. A possible explanation is that non-first year students may be more disciplined when required to work autonomously as required by additional out-of-class assignments. Overall, even though non-first year students in the blended learning class had less in-class time and thus less lecture time, the extent of their learning was greater compared to those

subpopulations in the lecture class. These results are noteworthy given that there were significantly more non-first year students in the lecture course than in the blended class.

Conversely, first-year students in the lecture course had greater gains on questions that measured the discipline of sociology and theoretical knowledge compared to first-year students in the blended course. The first author has taught *Introduction to Sociology* for nearly 20 years and recognizes that certain topics pose the most difficulty for students: the uniqueness of sociology in comparison to other social sciences, how to employ the sociological perspective, and applying sociological theory. This is particularly true for first-year students who are rarely exposed to the discipline and sociological theory prior to entering college (Howard et al. 2014). Although the blended students had two additional assignments related to the sociological perspective and theory, they participated in lecture/discussion at least half that of the lecture students as determined by the number of in-class days devoted to those topics as noted in the syllabi. Over the years, the instructor learned to structure lectures in such a way that students could relate to and understand the material being presented. In fact, in an anonymous course feedback form distributed about one-quarter of the way through the semester, over half of the lecture students stated that they liked the discussion about theory, the examples given, and how the instructor made the topics relatable. Because theory and the sociological perspective, both taught during the beginning of the semester, are challenging, first-year students in the lecture course may have benefited more from lecture.

CONCLUSION AND LIMITATIONS

At the onset of the semester, this study was explained to students in both classes. Nonetheless, a few students in the blended class asked why their class was being taught differently than the other *Introduction to Sociology* courses. The response to a question similar to “Why did you blend my learning?” was that the authors wanted to improve student learning and some literature indicated that blended learning was an effective format. However, because the lecture format had a long history in the department and our instructors were good at it (as indicated by student evaluations), what the results would reveal was unclear.

In this quasi-experimental study comparing lecture with blended learning (designed utilizing

flipped pedagogy) *Introduction to Sociology* classes taught during the same semester by the same instructor, results indicate that students performed similarly when exams and final grades were analyzed. Likewise, when measuring student learning using a pre-posttest, the results were similar for students in both formats of the class in that there was no significant difference across sections in sociological knowledge or critical thinking skills. However, when the researchers analyzed the overall pre-posttest results, the blended learning students had significantly greater improvement.

Blended learning was also deemed to be a beneficial format for some subpopulations. When the authors analyzed pre-posttest results across sections by categories of students, the results indicate that non-first year students and students of color in the blended class had significantly greater improvement than those subpopulations in the lecture course. Our results echo Eddy and Hogan’s (2014) conclusion that increased course structure required by blended learning courses can have the effect of narrowing the achievement gap between white and black students, although our study classified blacks with several other non-white groups. It is important to note this limitation in this study results in consolidating non-homogenous groups. Diversity of students’ races/ethnicities brings a range of cultural, historical, and educational backgrounds, and interventions should be tested for each category (Eddy and Hogan 2014). Because of the small sample size, it was not possible to disaggregate the category of non-white students. Nonetheless, this study reveals the importance of designing courses such that a variety of teaching modalities and assessment tools are used so that student learning is approached from multiple perspectives (Lo and Prohaska 2010). For example, our findings suggest that blended learning may be a better modality of learning for females as it provides more opportunities for application and collaboration (Du and Kolmos 2009). Student success is critical for all students in introductory courses (Chambliss and Takacs 2014), and blended learning may be one way of setting up a successful entrance into college.

Another limitation of this study is that it was impossible to disentangle flipped pedagogy implemented through the blended redesign and active learning. The authors cannot say with complete confidence that the blended course structure or active learning strategies or a combination of both resulted in the significant differences. Nevertheless, this study’s findings suggest that there is merit in blended learning that employs flipped pedagogy

and active learning. As a result, the first author implemented the redesign into all of her future Introduction to Sociology courses, and other instructors are now using the model she developed.

This study corroborates Freeman et al.'s (2014) conclusion that we should move beyond using lecture as a control in our research and focus more on testing which active learning exercises are most effective. Future studies in the teaching and learning of sociology should revolve around how to use class time most effectively and what types of active learning exercises promote learning rather than performance (Delucchi 2014). In an upcoming study, the authors examine student success and satisfaction in two flipped, blended learning sections of Introduction to Sociology taught the semester following this research by the first author. Improvement in student learning is anticipated due to greater course structure with more active learning.

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