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Examining Flipped Learning in Sociology Courses: A Quasi-Experimental Design

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It is advocated that flipped learning environment has the potential to affect student learning outcomes in a positive way. However, very few previous research findings are available to support this. Additionally, postulated that flipped learning has not caught on in social sciences. The current study explored whether students' specific learning outcome measures in sociology are different between those in flipped learning courses and those in a traditional lecture course, and between male and female students. A quasi-experimental design was employed in one unit of introductory sociology courses to examine six outcome measures (Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam). Results suggested that the flipped learning group performed better on the Race/Ethnicity Quiz, the traditional lecture group performed better (higher scores) on the Higher-Ordered Unit Exam, and there in no difference on all the measures by gender. The findings from this study reaffirmed some of findings from previous flipped learning research.

Keywords: flipped learning, sociology, college courses, active learning, taxonomy, quasi-experimental design

INTRODUCTION

Reports revealed that approximately 2,600 educators and administrators moved their schools toward a flipped learning environment since 2012 (Project Tomorrow, 2015). Although, flipped learning is not a new approach it has become a hot topic in the American education system because of the popularization through the media. *Google Trends* (2015) illustrated this spike in interest since 2012 (see Figure 1).

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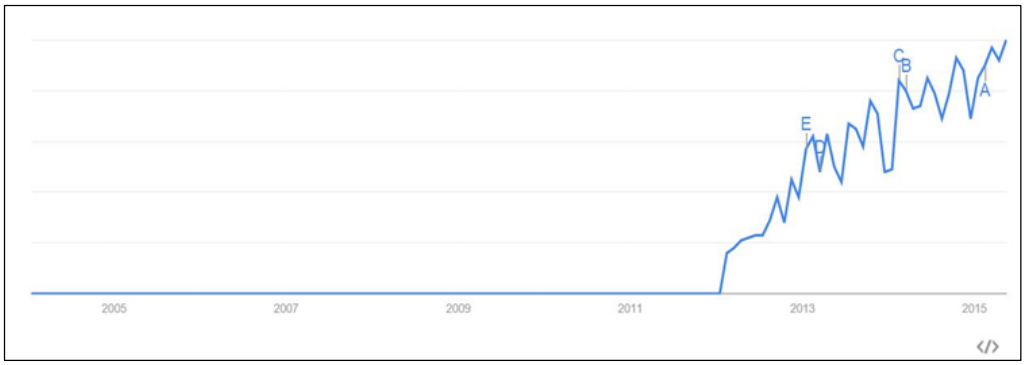

Figure 1: Google Trends Search: Overall Trends in Flipped Learning Interest over Time.

According to researchers, a flipped learning environment had the potential to affect student outcomes and satisfaction in a positive way (Bergman & Sams, 2012; Davies, Dean, & Ball, 2013; Della Ratta, 2015; Hung, 2015; Lage, Platt, & Treglia, 2000; McLaughlin et al., 2014). However, other researchers posited that there has been a lack of empirical and concurring outcomes and satisfaction in the field of flipped learning (Bishop & Verleger, 2013; Fulton, 2012; Hutchings & Quinney, 2015; Lane-Kelso, 2015). Additionally, Forsey, Low, and Glance (2013) postulated that flipped learning has not caught on in social sciences as it has in other disciplines.

Therefore, in the current study, we proposed to explore whether students in flipped learning courses differ using specific outcome measures in sociology, and compared students in a traditional lecture course. We analyzed the results from two comparable groups in a two-by-two quasi-experimental design in one unit of introductory sociology courses on six Outcome Measures (Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam).

LITERATURE REVIEW

THEORETICAL FRAMEWORK

As traditional learning shifted to a more technology-based approach to instruction, theoretical frameworks to research should be applied (Kates, Byrd, & Haider, 2015). The foundations for this study incorporated active learning and the ordered learning realized in taxonomy.

Active learning. Around the world, students outperformed American students in 21st Century skills as well as mathematics and sciences (Stronge, Grant, & Xu, 2015; Hanushek, Peterson, Woessmann, Hanushek, & Lastra-Anadon, 2011). In part, some of the disadvantages of student learning were due to the passive learning environments most often encountered in the American education system (Weiss & Pasley, 2004). According to Baepler, Walker, and Driessen (2014), active learning traced back to a physics course at North Carolina State University and developed out of the tenets of constructivism (Kates et al., 2015). Baepler et al. went on to indicate that research has shown that students in active learning spaces perform better than students in traditional classrooms. Freeman et al. (2014), through a meta-analysis, found students in passive lecture courses were more likely to fail than students in active learning courses. Roehl, Reddy, and Shannon (2013) stated that the use of an active learning, flipped classroom allowed educators to engage with millennial learners-who tend to be more hands on and interact with technology at a younger age than other groups of learners.

Prince (2004) defined active learning as "instructional method that engages students in the learning process" (p. 1). In addition, Prince pointed out that collaborative learning was a method for small groups of learners to work together, and in these groups students attempt to develop and meet goals (i.e., collaborative and cooperative). A final type of active learning was problem-based in which students solve problems relevant to lessons to increase higher-order learning. Prince went on to explore research in active learning, finding that students appeared to have better attitudes towards learning, were more motivated, and writing improved.

Active learning has had examples in the field of flipped classrooms and flipped learning environments. Morgan, McLean, Chapman, Fitzgerald, Yousuf, and Hammond (2015) established a flipped gynecological classroom in college courses. In the model, students viewed 10-minute videos regarding gynecological oncology topics outside class and inside class students engaged in active learning processes such as discussions about specific cases, students replied to short answer questions via laptops, and completed assessments. They uncovered the majority of students viewed the videos and attended class, and in evaluations students conveyed the activities were useful and beneficial. Hung (2015) attempted to understand if flipped learning, and implementing an active learning WebQuest, could help English language learners prosper. Traditional lecture course students compared to a flipped learning group in a quasi-experimental design and the findings showed significant differences between groups. Supporting Prince's results, Hung found flipped learning students reported feeling more satisfied and more confident in their learning. Like Hung, Harrington, Basch, Schoofs, Beelbates, and Anderson (2015) probed student outcomes in a quasi-experimental design. The two groups were randomly assigned to a traditional lecture or flipped learning class. However, there were no differences between groups; students' outcomes across both groups were not significantly different. These two studies represented the ambiguous suppositions throughout the field of flipped learning.

Taxonomy. The origins of taxonomy developed out of psychology informally at an American Psychological Association meeting (Bloom, 1994). The three domains of categorization were cognitive, affective, and psychomotor; but originally, student behaviors were categorized under the cognitive domain. Taxonomy was not advanced as a theory, but as a set of detailed objectives that should be used in conjunction with a theory and educators' skills. Anderson, Krathwohl, and Bloom (2001) examined and adapted the taxonomy cultivated approximately 50 years earlier. The adaptation created a two-dimensional continuum of knowledge and cognitive processes. At each level of the cognitive processes, the knowledge dimensions occurred.

According to Weigel and Bonica (2014), the traditional situation of the professor at the lectern, dispensing his or her knowledge to students may not be the most effective method of teaching 21st Century students. According to Nederveld and Berge (2014), a flipped classroom experience freed educators to help students develop higher-order learning as compared to a traditional classroom (analyze, evaluate, create; see Anderson et al., 2001). Overmyer (2014) stated that the flipped classroom allowed for both orders of learning; at home students read, watched videos, and reviewed lectures and by such they began lower-ordered learning; and in class, students engaged in higher-ordered cognitive work.

Taxonomy, as a means for engaging students in higher-ordered learning, was realized in the flipped classroom literature. Garver and Roberts (2013) operated a study in which students used clickers in a flipped classroom. The findings demonstrated that students engaged in every type of higher-ordered learning, unlike the students in traditional lecture courses.

For the purposes of this study, knowledge was included at each level of the cognitive dimensions and the foci were these six elements: remember, understand, apply, analyze, evaluate, and create. Remembering and understanding were considered lower-ordered learning and paved the way for the higher-ordered learning processes of apply, analyze, evaluate, and create.

For the current enquiry, flipped learning was defined as an educator-guided learning environment in which students engage in higher-ordered learning behaviors inside the classroom and lower-ordered learning outside of class. Activities were planned to engross students in lower- and higher-ordered learning. Instructor-recorded lectures, previously recorded videos, music, and assignments supplemented readings and opened class time to hands on learning (Lee, 2016).

FLIPPED LEARNING LITERATURE

Research has been conducted in the field of flipped learning. The research ranged from practitioner articles to peer reviewed journals. For the purposes of the current study, the major research trends from quasi-experimental outcomes were examined. Throughout the literature synthesis, previous findings were ambiguous.

In the current study, differences between students in flipped and traditional learning groups were examined on specific Outcome Measures. Previous researchers conducted quasi-experimental design research to determine if differences existed between a flipped learning and traditional lecture environment. Scientists used a combination of videos and recorded lectures in the design of flipped learning groups and in some cases compared previous semesters to a treatment semester. Across grade-levels and disciplines they observed students performed equally well, significantly better than, or the findings were ambiguous in the flipped learning groups as compared to the control or traditional classrooms.

No significant differences between groups. Davies et al. (2013) set up a quasi-experimental design in collegiate technology courses with three groups: traditional, independent study, and flipped learning. All posttest grades increased, however, the independent learning group preformed significantly worse than the traditional and flipped learning group. No significant differences existed between the traditional and flipped learning course (Davies et al., 2013). Baepler et al. (2014) conducted experiments in college chemistry classes, comparing traditional students in one semester to flipped learning students in subsequent semesters. They discovered that students in an active flipped learning environment performed as well as students in the traditional course (Baepler et al., 2014). Velegol, Zappe, and Mahoney (2015) conducted a quasi-experimental design in an undergraduate engineering course by comparing a traditional lecture to a flipped learning semester. The use of a flipped learning design did not have an impact on final test scores (Velegol et al., 2015).

Students in flipped learning environment earned significantly higher grades than in the control group. Garver and Roberts (2013) arranged a quasi-experimental situation in an undergraduate statistics course and compared a flipped learning group to students in previous, traditional courses. A comparison of final exam scores showed that students preformed significantly better in the flipped learning approach (Garver & Roberts, 2013). In a similar design of a pharmacology course, students in the flipped learning group preformed significantly better on midterm tests than students in a traditional class (Geist, Larimore, Rawiszer & Sager, 2015). In another pharmacology course with a between semester control and treatment (flipped learning) group, Pierce and Fox (2012) observed that students in the flipped learning semester did significantly better on a final assessment. Talley and Scherer (2013) used a between semester quasi-experimental design to examine

differences in an undergraduate psychology course. They determined that students in the flipped learning group earned higher functioning scores than in previous semesters.

Wilson (2013) compared two psychology semesters to determine if a new flipped learning method would improve student scores on coursework, exams, and pretest and posttest assessments. Wilson found students in the new learning method performed better (higher scores) in all areas except the pretest in which all students functioned similarly. In an undergraduate nursing course, students spent half of the semester engaged in flipped learning and the second half in traditional course structure (Della Ratta, 2015). Students preformed significantly better than in previous semesters where only traditional learning occurred (Della Ratta, 2015; Wong, Ip, Lopes, & Rajagopalan, 2014).

Ambiguous differences between groups. In the study by Geist et al. (2015), college healthcare students performed better on midterms when in the flipped learning group; however, there were no significant difference on final exam scores. In Kong's (2014) work, even though there were significant gains these were due to the addition of more materials for the flipped learning group, not any learning differences. Touchton (2015) observed that students in an undergraduate statistics course produced significantly higher quality work but that these discoveries were not important because the magnitude was small (p. 38).

Jensen, Kummer, and Godoy (2015) compared students in flipped and traditional learning groups from an undergraduate program at a private university. They found no significant differences between groups and implied that if educators create active learning, flipped learning has no impact (Jensen et al., 2015). Tune, Sturek, and Basile (2013) created a flipped learning design for first year graduate students in a mammalian physiology course. With all outcomes taken together, students in the flipped learning group earned higher assessment scores. Although exams on the renal system were higher, they were not statistically significant between groups.

In a college history course, a flipped learning group was compared to students in a traditional class (Murphree, 2014) on a pretest and posttest instrument and overall letter grade. Student grades went from a "C" to a "B" average; however, Murphree considered this an anecdotal difference. The pretest and posttest findings were less clear. Murphree indicated 67% of the sample answered posttest questions correctly but no discussion regarding the differences between groups were addressed. Pretest and posttest assessments were offered by and scored by the university, and students were not required to complete these assessments. This made scoring and relating the two groups difficult (Murphree).

In conclusion, the quasi-experimental designs in the literature produced three major outcomes. In several of the articles, there was an indication of "no group differences." More simply, students in the experimental or flipped learning group performed as well as students in the traditional lecture classes. The second major finding was that students in the experimental group scored significantly higher on learning outcomes measures than the students in the control group. The third and final trend was that the reported findings were ambiguous. For instance, student in the experimental group earned higher scores on one exam and the same on all other measures.

SOCIOLOGY IN FLIPPED LEARNING

Data collection occurred in introductory sociology courses. Therefore, it was of import to scrutinize research already conducted in this area. Like gender and flipped learning, social sciences have been understudied in this field.

According to Forsey et al. (2013), by the end of the term student attendance at lectures dwindles considerably. Anecdotally, this has been the experiences around the sociology water cooler. Forsey et al. (2013) indicated that sociologists and the American Sociological Association have been reluctant to implement flipped learning preferring the

traditional classroom experience. Forsey et al. (2013) used sociology face-to-face classes to establish a flipped classroom. Through the investigation, they wanted to understand student perceptions about the flipped learning. They found that approximately 53% of students agreed that the classroom met their needs and 82% thought it was a good educational experience (Forsey et al., 2013). In focus groups, students stated that they were satisfied with the experience, they felt more productive in the flipped classroom, but students struggled with technology and felt this approach would result in lost content. Ravenscroft and Luganga (2014) conducted a study in an introductory sociology course. Compared to previous years, students in the flipped learning semester scored higher and were more engaged.

Kim, Kim, Khera, and Getman (2014) included three flipped learning environments in their design: engineering, sociology, and humanities. Students in the three courses completed surveys and a sample of students were interviewed. In all three courses, students reported being satisfied with the flipped learning environment and described that this approach was oriented toward student learning. As in the general literature in flipped learning, the students' qualitative accounts affirmed that they were exposed to materials before class motivating them to prepare. The structure afforded plenty of time to complete assignments, and that feedback was active and helpful (Kim et al., 2014). Based upon so few examples, it appeared that flipped learning in sociology classes was similar to the larger body of research.

RESEARCH QUESTIONS

The purpose of the study was to explore whether students' specific learning outcome measures in sociology are different between those in flipped learning courses and those in a traditional lecture course, and between male and female students. A two-by-two design was established. The two grouping variables were *Learning Environment* and *Gender*. Learning Environment was expressed as the traditional learning or control group and the flipped learning or treatment group. Gender, reported by students, was categorized as Female and Male. The *Outcome Measures* consisted of the Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam.

The general research question addressed in the study was: Do groups (by Learning Environment and by Gender) differ significantly in the six Outcome Measures? Specifically, the following three sub-questions were examined:

1. Are there significant differences by Gender in the Outcome Measures?
2. Are there significant differences between Learning Environments in the Outcome Measures?
3. Are there significant interaction effects between Learning Environments by Gender in the Outcome Measures?

METHODS

SETTINGS AND PARTICIPANTS

The research took place at a Western College in the United States. In order to add to research in the field, the study was conducted in sociology courses. Enrolled students in sociology courses represented a convenience sample. All students completed the same assignments, quizzes, exams, and other work as part of the course. Students in the enrolled courses completed all of the coursework typical to an introductory sociology course, whether or not they participated in the study.

The demographic data included gender, age, and grade level for the participants. Of the 111 participants (N = 111), 58 were Female and 44 were Male. Nine participants did not provide a gender category and were displayed as missing. Ages ranged from 17 to 42 and 23 students left their age blank. The majority of participants were listed as freshmen and sophomores. Ten students did hold a junior or senior grade level.

Table 1. *Demographic Information: Gender, Age, and Grade Level*.

Demographic Variable	Participant Reponses	*N*	Percentage
Gender			
	Male	44	39.60
	Female	58	52.30
	Missing	9	8.10
	Total	111	100.00
Age			
	17	1	.90
	18	18	16.20
	19	16	14.40
	20	23	20.70
	21	4	3.60
	22	6	5.40
	23	4	3.60
	24	3	2.70
	25	2	1.80
	26	2	1.80
	27	1	.90
	29	2	1.80
	31	1	.90
	32	1	.90
	34	1	.90
	37	2	.90
	42	1	.90
	Missing	23	20.70
	Total	111	100.00
Grade Level			
	Freshman	68	61.30
	Sophomore	31	27.90
	Junior	7	6.30
	Senior	3	2.70
	Missing	2	1.80
	Total	111	100.00

INSTRUMENTS

Student Outcome Measures were assessed across six dependent variables. Students completed a pretest, posttest, three lower-ordered learning quizzes, and a higher-ordered unit exam. Each instrument was part of the classroom experience.

Pretest and Posttest. The assessment consisted of a 10-item, multiple-choice instrument designed to examine students' knowledge about sociology. The assessment was developed as a Computer Assisted Report (CAR) of student sociological understanding (Truckee Meadows Community College). Pretest and Posttest model was used in other flipped learning literature (e.g., Davies et al., 2013; Geist et al., 2015; Jensen et al., 2015; Kong, 2014; Mattis, 2014). Students completed the Pretest assessment on the first day of classes and again at the end of the learning unit (as the Posttest).

Chapter quizzes. Students completed three brief 10-item quizzes to cover the content of the learning unit on social divisions and inequality, specifically Stratification, Sex/Gender, and Race/Ethnicity. Quiz questions were developed directly from course content and test banks. Test bank developers indicate lower-ordered questions as

"remember" or "understand." The general characteristics were factual and definitive. For instance,

1. Ethnic cleansing is a euphemism for _____.
   a. Affirmative action
   b. Assimilation
   c. Genocide
   d. Colonialism

Quizzes ensured students kept up with readings, lectures, and/or videos and students engaged in lower-ordered learning: understanding and remembering. Researchers reported significant differences between groups through quiz scores (Garver & Roberts, 2013; Geist et al., 2015; Mason, Shuman, Cook, 2013; McLaughlin & Rhoney, 2015; Velegol et al., 2015). Higher scores demonstrated that students understood/remembered course content.

Higher-Ordered Unit Exam. After students completed the three chapters making up the unit on social division and inequality, an exam over the entire unit was administered. The Higher-Ordered Unit Exam consisted of three chapters (Stratification, Sex/Gender, and Race/Ethnicity) and corresponding supplemental readings, lectures, and videos. The Higher-Ordered Unit Exam included 65 multiple-choice questions. The Higher-Ordered Unit Exam questions consisted of applied and evaluative questions focusing on higher-ordered learning (Anderson et al., 2001) and questions were gathered from multiple test banks in the field. The test bank designers labeled these questions as apply or evaluate. Higher scores were indicative of higher-order learning. For example:

1. Tina is member of the working poor. When she can find work, it tends to be temporary work that requires her to travel far from where she lives. Often she ends up working a double shift just to make as much money as she can at the time because she does not know how long the job will last. What was her likely voting behavior in the last election?
   a. She voted mostly for Democrats.
   b. She voted mostly for Republicans.
   c. She voted for independent and write-in candidates only.
   d. She did not vote.

PROCEDURES AND DATA COLLECTION

As part of the course, students completed all coursework, quizzes, and exams. Measures from one learning unit, over social inequality, was used in the analyses for each participant. On the first day of class, all students were introduced to the learning management system ([LMS]; e.g., Blackboard). The students were shown how to access materials through the LMS, submit assignments, and complete quizzes. Then the specific procedures for the control group and treatment group were addressed in the classroom. Inside and outside class activities were explained to the groups. There were differences between the control group or traditional lecture group and the treatment group or flipped learning group.

Control group inside class activities. The control group students were to come to class prepared with their at-home activities complete. The class was opened to questions directed by the students and their at-home activities were submitted online through the LMS. Then, there was an ensuing lecture of that section. This lecture was identical in content to that of the treatment groups' except that it occurred face-to-face instead of as a recording, and throughout the lecture, students

were asked questions to spur discussion, creating an active learning environment. After the chapters were sufficiently covered, one week per section, approximately, the students completed an inside class unit exam. Before the unit exam, students were supplied a study guide in the form of a set of applied questions to study from.

Control group outside class activities. The traditional lecture group engaged in many of the same outside class activities as the treatment group. The control group completed assigned readings from the textbook and supplemental materials such as journal articles and news stories. The students in the control group viewed the same movies and listened to the same music. This group was not exposed to the learning materials, such as recorded lectures, before class. Participants completed at-home activities from the supplemental materials that were submitted online as homework. For example, students addressed the theme/themes brought up in a music video and applied one of the major sociological theories to support the argument. Participants in the traditional lecture group completed the same fact/concept based quizzes as the flipped learning group, and the quizzes were administered through the LMS.

Treatment group inside class activities. First, students were asked if there were any questions about the recorded lecture, readings, or other materials. Students were asked if they had any questions about the at-home responses from the paused responses in the recorded lectures. Then students submitted their responses on the final day of the weekly sections (e.g., Wednesday or Thursday). The class opened to student-directed questions from the readings and supplemental materials. In this form students asked questions about the material provoking large group discussions. Then, they were asked specific questions about the materials. Mini-lectures were conducted for more difficult concepts such as the section on Gini coefficients. These elements created an active learning environment for students (Anderson, et al., 2001).

Once questions were answered and materials were reviewed, the participants broke into groups of four and complete activities based upon the supplemental materials and content. Activities were various. Students analyzed music videos, critiqued articles, wrote group research questions, and developed experiments, for instance. After the section chapters concluded, participants completed an in-class exam covering the three chapters. The materials were the same as those completed by students in the control/traditional lecture group. The unit exam focused on higher-ordered, applied questions. Students were provided a set of applied question examples with which to study for the exam.

Treatment group outside class activities. The treatment group engaged in content knowledge acquisition outside of class. Content delivery consisted of several different forms. The flipped learning group read the assigned textbook chapters and supplemental articles; watched sociological videos and movies for content clarity through various websites; listen to music with sociological themes; and listen to the instructor's recorded lectures and videos. The students were required to pause the lectures at certain points and answer active learning questions. For instance, in the race/ethnicity lecture, students were told to pause and answer "Is there institutionalized discrimination in the educational system? Provide specific examples." There were three to six paused responses in each lecture. Students submitted these answers in class on the last day for that section (e.g., Wednesday for a Monday/Wednesday course).

At the end of each section/chapter, students completed a 10-item quiz. The quizzes were fact/concept based questions. The participants finished the quizzes through the LMS by 11:59 pm at the end of the section. For example, participants completed the quiz over stratification on a Wednesday, the last day of review and lecture. More specifically, all content for that section was covered before students completed a quiz, as was the case in the traditional lecture group.

Data collection. Data were collected throughout the progression of the learning unit as discussed in the procedures. Students completed a Pretest on the first day of class (see Appendix). Student scores from the Stratification Quiz, Sex/Gender Quiz, and Race/Ethnicity Quiz were collected after the conclusion of the unit. The Higher-Ordered Unit Exam scores were collected at the close of the unit as well. The Pretest, Posttest, and Higher-Ordered Unit Exam was administered inside class and the Stratification Quiz, Sex/Gender Quiz, and Race/Ethnicity Quiz were completed outside class through the LMS; this was the same for both groups.

DATA ANALYSES AND RESULTS

The Outcome Measures included a Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam over Social Division and Inequality. Although students completed coursework throughout the semester only data from one learning unit was used for the study. A preliminary examination of the data provided means, standard deviations, and skew statistics. The means by Learning Environment indicated that students in the flipped learning group had higher mean scores based on the Outcome Measures than did the traditional lecture group. The one exception was the Higher-Ordered Unit Exam, in which students in the traditional lecture group had higher mean scores. Table 2 supplied the means, standard deviations, and skew statistics for the Learning Environment based on the Outcome Measures.

Table 2. *Descriptive statistics: Means, Standard Deviations, and Skew*.

Dependent Variables	Learning Environment	*M*	*SD*	Skew
Pretest	Traditional	3.97	1.44	.90
	Flipped	4.82	1.97	.43
Posttest	Traditional	7.97	1.32	-.50
	Flipped	8.38	1.73	-.65
Stratification Quiz	Traditional	7.44	1.95	-.92
	Flipped	7.80	1.73	-.51
Sex/Gender Quiz	Traditional	8.89	1.70	-1.36
	Flipped	9.00	1.58	-1.59
Race/Ethnicity Quiz	Traditional	8.17	1.68	-.66
	Flipped	9.30	1.06	-1.98
Higher-Ordered Unit Exam	Traditional	54.53	8.20	-1.71
	Flipped	51.73	8.07	-.73

To address the research question, a two-by-two design was established. Results were grouped by Learning Environment, which was expressed as the traditional learning or control group and the flipped learning or treatment group. Gender, reported by students, was categorized as female and male. The grouping variables were Learning Environment

and Gender. The Outcome Measures consisted of the Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam.

A two-way MANOVA was conducted to determine if any interaction effects or main effects existed based on Quantitative Measures. Box's M statistic tested the homogeneity of variance-covariance and was used to determine which multivariate test was used. Box's M statistic was significant ($M = 95.70$, F (63, 15607.30) = 1.33, $p = .040$); therefore, Pillai's Trace (V) test was examined.

The interaction effect of Learning Environment by Gender was examined before inspecting the individual main effects. The results were not significant ($V = .037$, F (6, 90) = .751, $p > .10$, $\eta^2_p = .037$). In other words, there was not a significant interaction effect between Learning Environment and Gender based upon the Outcome Measures. Therefore, post hoc analyses were not performed.

RESEARCH SUBQUESTION 1

Are there significant differences between Gender groups based on the Outcome Measures? The main effect for Gender on scores from Outcome Measures was reviewed. Pilliai's Trace indicated that Gender approached significance. However, there were no main Gender effects based on the combined Outcome Measures ($V = .084$, F (6, 90) = 1.371, $p > .05$, $\eta^2_p = .084$). No follow up post hoc analyses were conducted.

RESEARCH SUBQUESTION 2

Are there significant differences between groups established by Learning Environment based on the Outcome Measures? The analysis for the main effect for Learning Environment based upon the combined Outcome Measures was examined. The results indicated there was a significant main effect. The Learning Environments were significantly different based on Outcome Measures ($V = .238$, F (6, 90) = 4.692, $p < .001$, $\eta^2_p = .238$). The results necessitated follow up post hoc analyses.

The main effect for Learning Environment was significantly different. Therefore, six one-way ANOVAs were performed with Learning Environment as the grouping variable. That is, one ANOVA for each of the Outcome Measures was conducted: Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz, and Higher-Ordered Unit Exam.

The first ANOVA was conducted with Learning Environment as the grouping variable and Pretest as the Outcome Measure. The groups were not significantly different based upon the Pretest (F (1, 107) = 1.514, $p > .10$, $\eta^2_p = .014$). The traditional lecture group and flipped learning group had equivalent mean scores on the Pretest.

The next one-way ANOVA was conducted with Learning Environment as the grouping variable and Posttest as the Outcome Measure. The groups were not significantly different based on the Posttest (F (1, 104) = .449, $p > .10$, $\eta^2_p = .004$). The traditional lecture group and flipped learning group had equivalent mean scores on the Posttest.

The third one-way ANOVA was conducted with Learning Environment as the grouping variable and the Stratification Quiz as the Outcome Measure. The groups were not significantly different based upon the Stratification Quiz (F (1, 98) = .624, $p > .10$, $\eta^2_p = .006$). The traditional lecture group and flipped learning group had equivalent mean scores on the Stratification Quiz.

The next post hoc analysis was conducted with Learning Environment as the grouping variable and the Sex/Gender Quiz as the Outcome Measure. The groups were not significantly different based upon the Sex/Gender Quiz (F (1, 101) = .065, $p > .10$, $\eta^2_p =$

.001). The traditional lecture group and flipped learning group had equivalent mean scores on the Sex/Gender Quiz.

The fifth post hoc analysis was conducted with Learning Environment as the grouping variable and the Race/Ethnicity Quiz as the Outcome Measure. The groups were significantly different based upon the Race/Ethnicity Quiz (F (1, 101) = 12.969, $p < .001$, $\eta^2_p = .116$). The mean scores for the traditional lecture group ($M = 8.26$) were significantly lower than the mean for the flipped learning group ($M = 9.30$).

The final one-way ANOVA was conducted with Learning Environment as the grouping variable and the Higher-Ordered Unit Exam as the Outcome Measure. The groups were significantly different based upon the Higher-Ordered Unit Exam (F (1, 102) = 4.494, $p < .05$, $\eta^2_p = .042$). The mean scores for the flipped learning group were lower ($M = 51.75$) than those scores of students in the traditional lecture group ($M = 54.69$; see Table 3).

Table 3. *Summary of Means and Standard Deviations on* Outcome Measures *by Learning Environment.*

		Traditional classroom			Flipped learning	
Dependent Variables	*N*	*M*	*SD*	*N*	*M*	*SD*
Pretest	36	4.07	1.44	56	4.77	1.99
Posttest	36	7.93	1.26	56	8.30	1.82
Stratification Quiz	36	7.50	1.90	56	7.72	1.83
Sex/Gender Quiz	36	8.93	1.61	56	9.02	1.58
Race/Ethnicity Quiz*	36	8.26	1.65	56	9.30	1.05
Higher-Ordered Unit Exam*	36	54.69	7.99	56	51.75	8.00
Satisfaction	36	20.50	2.59	56	20.96	3.10

RESEARCH SUBQUESTION 3

Is there significant interaction effects between Learning Environment and Gender based on the Outcome Measures? The interaction effect of Learning Environment by Gender was examined before inspecting the individual main effects. The results were not significant ($V = .037$, F (6, 90) = .751, $p > .10$, $\eta^2_p = .037$). In other words, there was not a significant interaction effect between Learning Environment and Gender based upon the Outcome Measures.

DISCUSSIONS AND IMPLICATIONS

The overriding purpose of this exploratory study was to address some of the issues related to student outcomes and satisfaction in a flipped learning environment. A lack of research had been conducted on gender differences and flipped learning in social sciences. Data collected from two comparable groups was analyzed from outcomes in introductory sociology courses. Learning Environment and Gender were examined as independent variables and the effects on the Dependent Variables. The purposes came about because of the ambiguous nature and lack of empirical results and findings in the flipped learning literature (Bishop & Verleger, 2013; Fulton, 2012; Hutchings & Quinney, 2015; Lane-Kelso, 2015).

CONCLUSION BY THE RESEARCH QUESTION

The research question was supported through the two-way MANOVA. The results demonstrated that no interaction effects by Learning Environment and by Gender on the Outcome Measures. Much of the previous research did not examine interaction effects because gender was not included as an independent variable. Therefore, there was no determination if these findings were reaffirmed in the literature. The third subquestion was not supported, and there was a failure to reject the null hypothesis.

There was not a main effect for Gender on the Outcome Measures. The second subquestion was not supported because there were no mean differences by Gender based on the Outcome Measures. In other words, the researchers failed to reject the null hypothesis. In the current study, there were non-significant Gender differences. Males performed better on the Pretest, Posttest, Stratification Quiz, Sex/Gender Quiz, Race/Ethnicity Quiz and the Higher-Ordered Unit Exam. However, none of the results were significantly different. In previous research, gender differences were found (Chen, Wang, & Chen, 2015; Touchton, 2015). Touchton (2015) found that females outperformed males in the study. Also, Chen et al. (2015) discovered that gender differences existed but only in specific topics. The current study did not reflect these findings.

Confirmation for the research question came from the results of the main effect of Learning Environment on the Outcome Measures. There was a significant mean difference by Learning Environment based on the Outcome Measures. These findings necessitated post hoc analyses to determine which Outcome Measures were significantly influenced.

The results revealed that the Learning Environment had a significant effect on the Race/Ethnicity Quiz and the Higher-Ordered Unit Exam, but did not significantly affect any of the other Outcome Measures. The first subquestion was supported; Learning Environment did influence the Outcome Measures.

It is important to note, these results countered one another. The significant findings for the Race/Ethnicity Quiz demonstrated that mean scores for the traditional lecture group (M = 8.26) were significantly lower than for the flipped learning group (M = 9.30). While the means scores for the Higher-Ordered Unit Exam resulted that scores for the flipped learning group were lower (M = 51.75) than those scores of students in the traditional lecture group (M = 54.69). Previous research was unidirectional. In other words, previous findings indicated there were no differences, the flipped classroom performed better, or the traditional group had higher scores (Baepler, et al., 2014; Davies et al., 2013; Della Ratta, 2015; Garver & Roberts, 2013; Geist et al., 2015; Talley & Scherer, 2013; Wilson, 2013; Wong et al., 2014).

These, results reaffirmed previous research in which only certain components of the classroom experience were affected by the Learning Environment (Geist et al., 2015; Kong, 2014; Touchton, 2015). Furthermore, students in the flipped learning group performed better on (higher mean scores) on each of the Outcome Measures except the Higher-Ordered Unit Exam, even though those differences were not significant overall. Students in the traditional lecture group had higher mean scores on the exam. According to previous researchers, an active learning environment would support non-significant findings (Jensen et al., 2015; Murphree, 2014; Ng, 2014; Tune et al., 2013).

Implications for flipped learning. The current study did not provide a different set of results than the previous works. Students performed significantly better on the chapter quiz over Race/Ethnicity and the Higher-Ordered Unit Exam. The means for students in the flipped learning group, although not significantly different, showed they performed

better than their counterparts in the traditional lecture group did. The single exception was the unit exam in which the traditional lecture group did better (e.g., higher mean scores).

Therefore, a lack of significance and non-full support of the research question was attributed in part to the active learning and higher-ordered learning environment to which both groups were exposed. The sample size was appropriate and there was a medium effect size (Race/Ethnicity Quiz: $\eta^2 = .116$; Higher-Ordered Unit Exam: $\eta^2 = .042$). With an effect size such as this, any differences due to group would likely be captured (Cohen, 1991) and was inferred as group differences.

Implications for sociology and gender in flipped learning. There were some implications for research in the field of sociology and gender. Data were collected from students in sociology courses. There were mean differences by Learning Environment based on the Outcome Measures. The implication was that students in flipped sociology courses performed better. This corresponded to the findings in Forsey et al. (2013) and Ravenscroft and Luganga (2014).

Although the research in flipped learning and gender was limited there were some significant findings. Chen, Yang, and Hsiao (2015) declared that gender has been an important factor in educational research. For instance, women enroll in online courses at a higher rate than men (Chen et al., 2015, p. 5). They used gender as a factor for predicting student perceptions in a high school pre-calculus class. Gender was significant only when examined with topic interest. In other words, young women were significantly less interested in pre-calculus topics than their male counterparts (Chen et al., 2015). Touchton (2015) investigated gender in an advanced statistics course through a quasi-experimental design. He stated that gender was a factor in enrollment in science, technology, engineering, and mathematics (STEM) fields, with male enrollment higher even though females scored higher. The females in the sample significantly outperformed males (Touchton, 2015). In the current study, these findings were not reflected.

In the flipped learning and traditional lecture groups, students were engaged in active learning activities such as group assignments, in-class applied learning, and in-class discussion. Students were exposed to lower-ordered learning experiences through reading and note taking, and higher-order learning through an active and applied environment (e.g., applied exams, critiques, and analyses). According to Ng (2015), when students were exposed to flipped learning but the classroom environment was similar, there were no differences. Furthermore, Baepler, et al. (2014) stated that the active learning environment was more important to student outcomes and students would perform better in active learning. This was affirmed and reaffirmed by other authors (Freeman et al., 2014; Hung, 2015; Morgan et al., 2015; Prince, 2004). The active learning and ordered-learning contributed to this lack of difference found in the current study.

Based upon the findings from the current study and previous research, flipped learning can be applied to various academic fields. Researchers setting out to implement a flipped learning environment should take note of findings from previous research in flipped learning and active learning. If researchers want to focus on flipped learning, the active learning environment should not be included in the design, and vice-versa.

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APPENDIX

PRE-TEST INSTRUMENT: KNOWLEDGE ABOUT SOCIOLOGICAL CONCEPTS AND TERMINOLOGY.

1. C. Wright Mills claimed that the "sociological imagination" transformed:
   a. Common sense into laws of society
   b. Scientific research into common sense
   c. Personal problems into public issues
   d. People into supporters
2. Making use of the sociological perspective encourages:
   a. The belief that society is mysterious
   b. People to be happier with their lives as they are
   c. Accepting conventional wisdom
   d. Challenging commonly held beliefs
3. Which of the following historical changes is among the factors that stimulated the development of sociology as a discipline?
   a. The power of tradition
   b. The migration of people from the country to the cities
   c. A belief in the fates
   d. The rise of religion
4. Which is one of the early theories of sociology?
   a. Psychoanalysis
   b. Structural-functional
   c. Behavioral
   d. None of the above
5. Karl Marx was an early theorist in psychology
   a. True
   b. False
   6. Sociology is the systematic study of behavior in the context of social institutions.
   a. True
   b. False
7. Which theory posits that people in society are in a continuous struggle over scarce resources such as money or power?
   a. Conflict
   b. Feminism

c. Symbolic interactionism
d. Structural functional

8. Which research method employs the use of public records such as census data?
   a. Survey research
   b. Participant research
   c. Experiments
   d. Secondary data
9. When conducting research, all biases and previously held beliefs are removed?
   a. True
   b. False
10. Which item consists of a symbol?
   a. Eggs
   b. Pots
   c. Flag
   d. None of the above