



JoSoTL

JOURNAL OF THE SCHOLARSHIP OF TEACHING AND LEARNING

Volume 11, Number 4, December 2011

www.iupui.edu/~josotl

JoSoTL is a collaboration between
The Mack Center for Inquiry on
Teaching and Learning and the
Faculty Colloquium on Excellence
in Teaching, Indiana University.

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Using clickers in large college psychology classes: Academic achievement and perceptions

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Abstract: This research study explored the effects of the use of clicker technology as a means of formative assessment in large, college introductory psychology courses. Academic achievement, as measured by performance on tests of knowledge, was compared between students who used clickers and students that did not use clickers. There was a significant difference between the two groups, although a small effect was noted. Students using the clickers responded to survey items created to solicit information regarding student perceptions of increased understanding, ability to self-identify content deficits, fun, and financial value of clickers. Data from the survey indicated that the majority of students perceived the usage of clickers increased their understanding of and ability to self-identify concept areas. All of the students reported that using clickers was fun, although approximately only one third of those same students reported that purchasing a clicker was worthwhile. Implications for administrators are discussed and alternative technologies are explored.

Keywords: clickers, psychology, formative assessment, education technology

It is not uncommon for undergraduates in public colleges and universities to find themselves faced with their first college lecture in an auditorium-style classroom (Kenwright, 2009; Mayer et al., 2009). Lecture-hall classrooms accommodate large numbers of learners, and lessons are delivered using a teacher-centered lecture format. Within this context, researchers and faculty from a small public college in the southeast United States located in a diverse urban community sought to establish effective instructional supports for large, lecture-style classes, specifically through the use of class wide electronic response systems. The purpose of this research is to examine the use of clicker technology on student achievement and perception. In the spirit of Boyer's (1990) call to action, the research team examined classroom teaching practice as a means of "transforming and extending" the knowledge base for instructors with large class enrollments (p.24).

I. Background.

Instructors of mass classes rely on traditional, lecture-style lessons to deliver information to large numbers of students; however this lesson format provides little or no interaction or discussion (Geske, 1992; Gleason, 1986). Although large lecture halls may accommodate more students by making efficient use of faculty and facility resources, student understanding of content can be compromised. This learning environment may seem passive and impersonal for undergraduates (Hoekstra, 2008). Hall, Collier, Thomas, and Hilgers (2005) identified two problems that

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students in mass class settings face: (1) lack of engagement in the lesson and (2) lack of meta-cognitive awareness or ability to self-identify deficits in subject area awareness. The lack of engagement coupled with the students' inability to self-identify deficits in subject area knowledge may result in an inability to master course content. Furthermore, Edmonds and Edmonds (2008) stated that mass class learning environments do not provide opportunity for instructors to gauge students' understanding of subject areas until the exam results are presented, a scenario leaving instructors and students in the dark regarding subject area understanding until it is too late to remediate misconceptions.

According to generative theory of learning, learners actively engage in cognitive processing during learning by attending to relevant material, mentally organizing the selected material, and integrating the organized material with prior knowledge (Mayer, 2001; Mayer et al., 2009; Wittrock, 1974). Therefore, instructors optimize learning by engaging in instructional activities which "prime active cognitive processing in learners" (Mayer et al., 2009, p.53). The research on generative learning theory indicates that the outcome of active cognitive processing is a meaningful learning outcome (Mayer et al., 2009). Anderson et al. (2001) theorize that learning outcomes, including the knowledge and skills learned in class, can be evaluated using a variety of measures, including academic test items of class content.

To foster the generative learning process, instructors may use questioning methods (King, 1992; Rosenshine, Meister, & Chapman, 1996). Yet, faced with the challenge of assessing student knowledge and increasing engagement in mass classrooms, how do instructors gain knowledge about student understanding to provide responsive instruction? In classes with smaller groups of students, instructors may use questioning methods to assess student understanding, as incorrect student responses provide opportunity for instructors to provide corrective feedback to change student misconceptions (Kenwright, 2009; Mayer et al., 2009). However, in large, lecture-style class's students may be intimidated by asking or responding to questions (Poirier & Feldman, 2007). One method for increasing student understanding and engagement is through the use of electronic clickers, a tool for generative learning.

Clickers, also referred to as electronic response systems, personal response systems, audience response systems, classroom communication systems, or student response systems, allow students to individually respond to closed-ended questions posed by the instructor. Anonymous student responses are gathered via a remote handheld device, commonly referred to as a "clicker", and responses are immediately provided to the instructor. The instructor may then broadcast the results to the class using a multi-media projection device. Publicly examining student responses achieves a variety of objectives, which include but are not limited to, assessment of student understanding, increasing student engagement in the lesson, and providing students with a venue for objectively self-assessing their knowledge of the subject area (Mayer et al., 2009). The clicker system is comprised of two parts: a classroom-wide response system and a set of individual, handheld, remote clicker devices. Colleges generally incur several thousand dollars in initial cost to install the classroom-wide response system, passing along the cost of the reusable handheld clicker device (between \$10 and \$40) to students. Periodic maintenance as well as technical support costs are incurred by the college over time.

Clicker-based pedagogy has the potential to counteract the passive, teacher-centered instruction often encountered in mass classes of today's colleges and universities. Teachers and students may benefit from the real-time assessment of subject area knowledge. Additionally, increased student engagement in class may result in increased perceptions of fun, providing motivation to return to class. Although there is evidence to suggest that clickers increase

academic achievement, as measured by performance on tests of knowledge, as well as provide ability to assess student knowledge, and increase student perceptions of fun, it is also critical to understand student perceptions of the value of clickers as a learning tool.

A. Utilization Of Clicker-Based Pedagogy Increases Academic Achievement.

A growing body of research has been used to provide evidence for increased academic achievement, as measured by performance on tests of knowledge, using clickers. Active learning has been linked to increased student achievement, which can be measured by final grades (United States Department of Education, 1996). A study of 11 parallel courses taught at the University of Wisconsin over two years showed a statistically significant impact of clicker use on student academic achievement (Kaleta & Joosten, 2007). Similarly, Salmonson, Andrew, and Everett (2009) reported that increasing the engagement of non-participatory students through the use of clickers resulted in an increase in grades. El-Rady (2006) found statistically significant differences in exam scores between classes compared in two consecutive semesters and furthermore found evidence to suggest that clickers improved student retention. In a comparison of clicker technology versus paper pencil technology, Mayer et al. (2009) found that students who experienced in-class questioning and responded with paper and pencil scored significantly lower on class exams than those who responded using clickers. Therefore, the research team hypothesized that the use of clickers would increase students' performance. Thus, the first research question is:

RQ₁: To what extent does the use of clickers increase student academic achievement in a large, college-level introductory psychology class as measured by final grade percentage score?

B. Increased Understanding Of Content Through Formative Assessment.

Clickers ostensibly serve as vehicles to increase student understanding of content by providing instructors with the opportunity to take on the role of agile teachers who can quickly assess student comprehension and modify instruction to student needs (Beatty, Garace, Leonard & Dufrense, 2006; Mayer et al, 2009; Mula & Kavanaugh, 2009). Researchers distinguish between pedagogy and technology, highlighting the clicker's role as a piece of formative assessment technology (Beatty et al., 2006), which provides "college instructors with a non-intrusive, effective pedagogy and students with a more engaging learning format" (Mula & Kavanagh, 2009, p. 2). Researchers suggest that clickers alone do not increase academic achievement, but rather the utilization of clickers increases opportunities for instructors to engage students by using interactive questioning methods which, in turn, are related to increased academic achievement (Mayer et al., 2009). Kaleta and Joosten (2007) reported survey results yielding that 100% of instructors appreciated the ability to assess student knowledge and understanding, while 74% agreed or strongly agreed that clickers improved student learning. The research team hypothesized that students using clicker technology would perceive an increase in understanding of the topic based on the use of clickers. Thus, the second research question is:

RQ₂: Did students using clicker technology in a large, college-level introductory psychology class perceive that clickers increased "understanding of the topic"?

C. Using Clickers To Self-Identify Content Knowledge Deficits.

While instructors report value in assessing understanding of content, clicker responses also provide valuable information for students to identify personal deficits in understanding. In an examination of meta-cognition skills of individuals, Flavell (1979) identified limitations in the ability to self-monitor comprehension, reporting that individuals were often unable to identify holes in understanding. The use of clickers may reveal misconceptions to students; when instructors broadcast anonymous responses to questions using clickers, students are able to compare individual responses to the correct answers in an unobtrusive setting. In this way, each student has the opportunity to practice formative assessment at the individual level (Beatty et al., 2006). Student-identified deficits in content knowledge have the potential to allow students to create a customized, focused plan of study. Clickers may provide one method for students to gather objective information about their learning. The research team hypothesized that students using clicker technology would perceive an increase in their ability to identify areas of deficit in their subject matter knowledge. Thus, the third research question is:

RQ₃: Did students using clicker technology in a large, college-level introductory psychology class perceive that the use of clickers helped them find out what they “still needed to study”?

D. Using Clickers to Increase Student Perception of Fun.

Although there is minimal research related to student perception of fun in a clicker-based classroom (Fies & Marshall, 2006), investigating student perceptions of clicker use is worthwhile to establish social validity of the utilization of clickers (Wolf, 1978). Beatty et al. (2006) writes, “By fostering an active, interactive classroom environment, classroom communication system-based pedagogy helps keeps students interested and attentive” (p. 6). In a large introductory psychology class, Poirier and Feldman (2007) found that students using clickers earned higher final exam scores and reported positive attitudes toward utilizing clickers in class. Researchers report that students find clicker-based classes to be more fun than non-clicker based classes (Burnstein & Lederman, 2001; Dufresne, Gerace, Leonard, Mestre, & Wenk, 1996; Fies, 2005). Based on these results, the research team hypothesized that students using clicker technology would perceive using clickers as fun. Thus, the fourth research question is:

RQ₄: Did students using clicker technology in a large, college-level introductory psychology class perceive that the use of clickers to respond to questions was “fun”?

E. Financial Value of Clickers.

A primary concern of colleges and universities using the clickers is the issue of cost. Students enrolled in classes using clicker-based pedagogy are required to purchase the handheld clicker device that may cost between \$10 and \$40. Students may re-use the device each semester, but if lost, students must purchase and register another. Although some researchers report that students “appreciate the system’s value” (Beatty, 2004, p.6), researchers of two recent literature reviews of clicker technology did not discuss whether or not students perceived the clicker was worth purchasing (Fies & Marshall, 2006; Roschelle, Abrahamson, & Penuel, 2004). Because students must incur the cost of utilizing clickers after the decision to invest in the system has already been

made by administrators, it is important to investigate whether or not students perceive the clicker is worth purchasing to establish social validity of the utilization of clickers (Wolf, 1978). The research team hypothesized that students using clicker technology would indicate that they would be willing to purchase a clicker for a class to help them learn. Thus, the fifth research question is:

RQ₅: Did students using clicker technology indicate that they would be “willing to purchase a clicker that cost \$30 - \$40” to help them learn?

II. Methodology.

A. Participants.

Participants in this study were enrolled in an urban public college located in the southeast United States in introductory psychology classes and were grouped according the section of the course in which they were enrolled. The same instructor taught both of the sections sampled for this study. The sample (N = 145) was established when students met the criteria of enrollment in the introductory course in psychology and completion of the final exam. Students self-selected their participation in the study and were not provided monetary compensation, nor were they promised any benefits not normally associated with using a learning tool. Participant information was numerically coded to maintain anonymity and all identifiable information was maintained in a secure location by the principal investigator. Participation for this study totaled 183 students across two separate introductory psychology classes and students were assigned into control and treatment groups. Of the 183 participating students, 145 students received a final grade in the course and were subsequently involved in the analysis. The control group did not receive clickers and consisted of 78 students from one class. The treatment group received clickers at varied intervals and consisted of 67 participants from two other classes. Participants responded to a demographic questionnaire, information on gender was broken down as follows: 56 of the participants were male while 127 of the participants were female, while responses to questions about ethnicity were as follows: Caucasian, 91; African-American, 52; Hispanic, 24; Asian, 2; Other, 14. Only 7 of the participants were under the age of 18, while the preponderance of the participants were between the ages of 18-24 (152), and 24 students were over 25 years old.

B. Instruments.

Primary outcomes were academic and measured by final class grades. For the purposes of this study, a common grading rubric was used for both of the introductory classes as defined in PASW as: A = 100-90%, B = 89-80%, C = 79-70%, D = 69-60%, and F = 59% or less.

Data on student perception was collected using a researcher-created questionnaire comprised of 11 items with responses on a 5-point *Likert* scale. Questions selected for use in this research study were as follows: a) Using a clicker increased my understanding of the topic, b) Using a clicker helped me find out what I still needed to study, c) Using a clicker to respond to questions was fun, and d) I would be willing to purchase a clicker that cost \$30-\$40 to help me learn. *Likert* responses were as follows: 1) I strongly disagree, 2) I somewhat disagree, 3) Neutral, 4) I somewhat agree, and 5) I strongly agree. Demographic information for all participants was collected using a 21-question survey at the beginning of the course. At the

completion of the course, the group who used the clicker technology completed a questionnaire that consisted of 10 items related to attitude toward using the clickers.

C. Data Collection and Analysis Procedures.

In this quasi-experimental study, measures of academic performance were compared across two groups of students: one class utilizing clickers (consisting of embedded questions and procedures for responding using clickers) and one class that did not utilize clickers. The same doctoral level professor with 10 years of experience taught each class, and each of the classes participating in this study met over the course of a semester. In all the courses, content was delivered via PowerPoint and lecture in a face-to-face setting. For the course with embedded questions, the average percentage of question to content slides was 21%, and the professor utilized clickers throughout the delivery of the lecture. Upon response to question, results were immediately displayed on a bar graph. If the distribution showed 10% or more of incorrect student responses, the feedback would be used to re-teach the topic by providing additional explanations or responding to questions. If more than 90% of students chose the correct response, the instructor would confirm the correct response, giving a brief explanation and then moving on. In both courses, online review quizzes allowed students to review content prior to administering class exams. The clickers system employed for the study was the iClicker manufactured in partnership with the Worth-Freeman Publishing Company.

III. Findings.

Participants in all the psychology classes totaled 183 students. Of the total student participation, 145 received a final grade for the course, 78 of the participants were in the control group and 67 participants were in the experimental group. Due to missing data, 38 cases were not included in the analysis. Thus, data was analyzed using 78.2% of the 183 total students ($N=145$). Using Predictive Analytics Software (PASW), the researchers compared the 38 missing cases to determine if the ratios of missing data were similar between groups. Results yielded similar rates of missing data when compared across groups. Of the 38 cases, 20 cases of missing data occurred in the control group (accounting for 20.5% of the total control group), while 18 cases of missing data occurred in the experimental group (accounting for a loss of 21.2% of the experimental group). Inferential statistical analysis was performed for the first research question comparing experimental and control groups. Descriptive statistics on the perception of clicker technology usage were collected on the experimental group only for research questions two through five.

RQ₁: To what extent does the use of clickers increase student performance in a large, college-level introductory psychology class as measured by final grade percentage score?

Student performance was measured by final grades, defined by a percentage score of cumulative total points earned divided by cumulative total points possible. An independent t test was conducted to determine if there was a significant difference ($p < 0.05$) in mean score of final percentage course grades of students in a college-level introductory psychology class using a clicker system versus students who did not using a clicker system. The test was conducted using an alpha of 0.05. Levene's test indicated that the assumption of homogeneity of variances was met ($F = 2.029$, $p = 0.157$). The test was statistically significant, $t(143) = 8.367$, $p < 0.05$. Students using the clicker system scored higher on average ($M = 83.43$, $SD = 11.88$) than

students not using the clicker system ($M = 76.82$, $SD = 15.13$). The 95% confidence interval for the difference between means was -11.13 to -2.09. The effect size was calculated by eta squared and found to be 0.055 indicating that approximately 6% of the variance in scores was accounted for by whether or not the student used clickers. Approximately 81.27% of the treatment group ($n = 67$) received a grade of C or better compared to 76.92% of the non-treatment group ($n = 78$). The results provide evidence to support the hypothesis that students using clickers score higher in measures of academic performance.

RQ₂: Did students using clicker technology in a large, college-level introductory psychology class perceive that clickers increased “understanding of the topic”?

In order to address the second research question, the questionnaire results ($n = 67$) from the treatment group were dichotomized based on responses. The responses of 1 or 2 were classified as “disagree” and the responses of 4 or 5 were classified as “agree,” and the response of 3 was neutral and not included in this comparison. Based on analysis, approximately 91% of students perceive that clickers increased their understanding of a topic, leaving only 9% of students in disagreement with the statement that using clickers increased their understanding. The survey results provide evidence to support the hypothesis that the majority of students perceive that using clickers increase their understanding of the topic.

RQ₃: Did students using clicker technology in a large, college-level introductory psychology class perceive that the use of clickers helped them find out what they “still needed to study”?

In response to the third research question and based on the dichotomized responses, approximately 81% of the students ($n = 67$) who responded to the survey agreed that clickers improved their ability to identify their individual deficits in the subject matter during the lecture. Only approximately 6% disagree that clickers had an impact on their ability to identify their individual deficits in the content. Once again, the survey results support the hypothesis that the majority of students perceive that clickers improved their ability to self-identify subject matter they still need to study.

RQ₄: Did students using clicker technology in a large, college-level introductory psychology class perceive that the use of clickers to respond to questions was “fun”?

Based on the dichotomized results of the survey, the fourth research question had an overwhelming positive response, with 100% of the students ($n = 67$) reporting that the use of clickers was fun as related to learning the content in an introductory Psychology course. The results of the survey support the hypothesis that using clickers in the course was fun.

RQ₅: Did students using clicker technology indicate that they would be “willing to purchase a clicker that cost \$30 to \$40” to help them learn?

Finally, for the last research question, the responses were dichotomized, however, this time the majority, approximately 35% of those who responded to the survey ($n = 67$) disagree that purchasing a clicker was worthwhile, with approximately 32% of students agreeing that purchasing a clicker was worthwhile. The results of this question on this survey were not in line with the original hypothesis.

IV. Conclusion.

Overall, there is evidence to suggest that the use of clickers in a large, college level introductory psychology class contributed positively to learning. Students using clickers performed significantly better when compared with a group of students not using clickers, although the

effect size was minimal. Students using clicker technology reported that they felt utilization of clickers increased their understanding of the topic and allowed them to self-identify areas of deficit in their learning. All of the students in the experimental group agreed that using clickers to respond to questions was fun; however, only approximately one-third of those same students thought that purchasing a clicker was worthwhile. While these students may have benefited from and enjoyed using the clickers, they do not seem to be willing to bear the expense.

This study contained limitations that may bring in to question the validity of the findings. The results may not be generalizable to other instructional settings because this research was conducted with large, college level introductory psychology classes. Researcher bias may also exist, as this study was conceptualized and conducted by researchers who were also involved in delivering instruction to the experimental and control groups. Another limitation in this study may be a consequence of the fact that the sample was not randomly selected and the conditions were not randomly assigned, leading to unequal groups. Error in measurement may exist for research questions two through five, as the measure was researcher-generated and not field-tested for reliability and validity.

Future research into the use of clickers should engage methods to compare procedures for embedding questions in lecture (e.g., pre-post lecture, throughout the lecture, etc.). To further explore the academic achievement of students using clickers, it would be worthwhile to link questions presented using the clicker system to questions on course tests, to determine if utilization of the clickers contributes to specific knowledge acquisition. Examining the reliability and validity of the researcher created measure would decrease measurement error and lend credibility to the findings of students' perceptions.

V. Implications for Higher Education Administrators and Faculty.

Since this research was conducted by professors engaging in scholarship of teaching and learning (Boyer, 1990), the researchers' aim was to improve instructional practice within the college, while at the same time informing purchasing decisions of clickers. Currently, clickers are often used in large, college-level classes to increase student engagement, allowing teachers to poll classes by posing a question and providing an opportunity for students to respond in real-time via individual clickers. It appears that the utilization of clicker technology supports the generative theory of learning, by priming the cognitive processes used when learning, as demonstrated by improved academic performance. Faculty of large, lecture-style classes seeking to engage students may be able to use clicker technology as one means of increasing generative learning, and therefore increasing student performance.

Yet, teachers, administrators, and students may question the efficacy of clickers because of the costs associated with adoption of the technology. Students are often required to purchase clickers, which range in cost from \$10 to \$40, while administrators must adopt the clickers, which require a substantial financial investment. Before assuming these costs and requiring students to make financial commitments, administrators are wise to ask whether or not the use of clickers increases student academic achievement, as well as what other options are available for formative assessment. Other options, such as Polleverywhere.com, provide instant audience feedback using mobile devices of audience members at significantly less expense (e.g., the cost of a text message). Polleverywhere.com provides free templates for PowerPoint slides which can be customized with questions about course content and embedded into existing PowerPoint presentations. Audience members are able to respond using SMS texting for the cost of a text

message, with no cost to the higher education institution for groups of up to 30 participants at a time, and \$65 per month for 250 participants at a time. As new technologies develop, higher education administrators, instructors, and students have increasingly diverse options to improve academic achievement. New developments in technology should be evaluated to determine if perceived benefits outweigh the costs.

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Creating a supportive environment to enhance computer based learning for underrepresented minorities in college algebra classrooms

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Abstract: Significant research in K-12 education has shown that computer based learning in mathematics positively impacts students' attitudes toward mathematics and greatly increases academic performance. Little research has shown, however, how this success can be replicated in a postsecondary classroom for minority students. This paper is a case study that examines the development and implementation of a complementary learning environment for a computer based College Algebra class. Preliminary results show a 15% increase in student success (earning grade C or higher) compared to national gains of 10% for computer based mathematics classrooms. Furthermore, an evaluation of student performance showed a better understanding of fundamental mathematics concepts and continued success in subsequent mathematics courses, demonstrating the need for further research in the enrichment of computer based learning environments for underrepresented minority students.

Keywords: mathematics software, multicultural education, computer based learning, support services

For many teachers, technology—calculators, computers, software—has continued to serve as a useful tool in mathematics classrooms. In particular, computer based learning has had a significant impact on the academic performance of at-risk and minority students (Schofield, 1994; Nguyen et al. 1995). Consistent with this best practice, in 2007 the Department of Mathematics and Computer Science at Central State University (CSU) adopted a blended instruction (BI) pedagogy via the integration of Educosoft mathematics software into traditional lectures for College Algebra. The BI courses consisted of online lectures and homework, quizzes, exams, and academic support in the form of online tutors or departmental tutors. After two years of implementing the software, CSU's results of a 10-12% increase in student success (earning grade C or higher) were comparable to results in studies conducted at the University of Idaho and Rio Salado College that targeted minority students respectively in Algebra and Pre-Calculus (Twigg, 2004). Seeking even better results, CSU redesigned its BI course further to enhance student learning outcomes and overall student success.

CSU, a Historically Black College and University (HBCU), is an open access institution in Wilberforce, Ohio, that seeks to prepare diverse students for a professional career and/or graduate study in any field. At the time of this study, CSU had a population of approximately 2,500. Over 95% of the student body was African American and more than 59% lived below the poverty level (census.gov, 2008). Of the student population, 20% majored in a STEM (Science, Technology, Engineering, and Mathematics) field where they often struggled in gateway “killer courses” like College Algebra, English, Biology, and Chemistry (Killer courses are defined as

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those courses that have a high failure, withdrawal, and/or incomplete rate.). For remedial courses in mathematics (College Algebra and below), the success rate prior to 2007 was below 50%. In 2007, the department received a Minority Science and Engineering Improvement Program (MSEIP) grant titled BISCA (Blended Instruction to Improve Student Success in College Algebra), to incorporate Educosoft in the classroom. Since 2007, the success rate for College Algebra has risen by 10-12%. This success resulted in the use of computer based learning in other remedial courses, as well as in courses like Trigonometry and Calculus. However, for the past few years, the success rate in College Algebra has remained around 60%, indicating that computer software alone is not sufficient to produce significant success for minority students. Thus, to strengthen the BI approach, CSU introduced new complementary teaching and learning practices into the College Algebra classroom to help students transition from the drill and practice of Educosoft to a better conceptual understanding of mathematical topics, and to an increase in students' overall academic performance.

I. Literature Survey.

The Census predicts that the United States (U.S.) will double its minority population by 2050. For the U.S. to remain a leading competitor in the world, a diversified STEM workforce is imperative. Consequently, the U.S. government placed a strong emphasis on increasing the number of minority STEM graduates and professionals. Through considerable funding and changes to educational policies, the K-16 system strengthened its recruitment, retention, and support of underrepresented minorities, particularly in STEM. In 2006, for example, the National Science Foundation (NSF) reported that 21.5% of undergraduate freshmen majored in a STEM field. Of these, 20.5% were Caucasian and 20.9% were African American. Yet, graduation statistics showed that only 8.3% of African Americans earned a STEM Bachelor's degree compared to 64.7% of Caucasians. So despite tremendous government efforts, there is still much important work to be done to reach national goals. To increase graduation rates of minorities in STEM, educators and scientists have invested time and money to study certain social systems and learning environments that will enhance the educational experience for underrepresented minorities (Allen, 1992; Davis, 1991; Fleming, 1984; Noddings, 1988; Hurtado et al., 1999). Ladson-Billings (1994) provided the clearest direction for educators, calling for the use of culturally relevant practices in the classroom. The purpose of culturally relevant practices is to construct an environment where the minority student can reach his/her highest potential. HBCU's are well known for providing nurturing and supportive campus environments for minority students. These environments increase students' academic confidence and performance, and build social skills (Davis, 1991; Kozma, 1992). Many HBCU's have successfully taken at-risk or underprepared students, and through their unique campus environments, brought students' skill levels to national and above national levels.

What HBCU's are able to create outside of the classroom, like the sense of belonging, is difficult to duplicate in a classroom of a specific discipline, of course, where students' abilities and skills determine whether they belong in the class, or belong to the group of students pursuing that major (Walton et al., 2007). Moreover, in a large social system of colleges, schools, and departments, it remains difficult to maintain a culture of relevant practices that ensures a sense of belonging inside the classroom (Johnson et al., 2007). The most profound techniques of doing so inside the classroom occur in K-12 classrooms. K-12 teachers interact with their students daily to form bonds that transcend on many levels, and despite societal influences or the school's campus

environment, K-12 teachers have continued to develop successful strategies to overcome social and academic challenges for minority students.

A. Components of a Supportive Learning Environment.

The successes in K-12 computer based mathematics classrooms indicate a need to understand the unique components of such a productive and supportive environment (Allison & Rehm, 2009). Howard's (2001) study, conducted at four urban elementary schools, demonstrated that African-American students prefer to learn in classrooms that have a *family environment*. Hill (1995) adds that both *caring and authoritative environments* are preferred by minority students. Results from Grantham and Ford's (2003) high school study showed that *positive feedback, frequent meetings with mentors and/or advisors, cooperative learning, professional development sessions, engaging activities, and high expectations* were the leading strategies for academic achievement among gifted African-American students. These components are discussed in greater detail below:

a) *Caring Teachers:* A caring teacher employs a sincere commitment and relatedness to student needs-- physical, mental, and social--displays affection, and exhibits parenting and nurturing (Vogt, 2002; Rogers, 1991; Goldstein, 2000, Collier, 2005). Noddings (1988) found that teachers, mentors, and advisors, particularly those who have an ethic of caring, have the most influence on student success.

In Schofield's (1994) computer based geometry study of student attitudes and perceptions of classroom support, over 70% of high school students preferred the assistance of their teacher to computer based tutors. Despite daily use of the computers, the computer based tutors served only as a secondary resource for students in the classroom. The benefits of the online tutors were undeniably significant: 1) students who were afraid or ashamed to ask for help in front of their classmates sought answers through the online tutors without anyone else's knowledge, 2) given online privacy, students felt more comfortable acknowledging their deficiencies and working independently to become more proficient, and 3) online intervention allowed students to control how much help they received from their teachers. As a result of computer based learning, classroom behaviors toward mathematics were positive and more productive. The most striking finding from the study, however, was that even though students enjoyed learning mathematics online and learned more online than they did through traditional lectures, students still preferred to get help from their teacher rather than from the online tutor because the students preferred person to person contact, daily conversation (that did or did not include math), examples from the teacher relating concepts to their personal lives, and knowing that someone believed in them and was proud of their achievements, all of these making the teacher the primary resource in the classroom.

b) *Positive Feedback:* Hattie et al. (2007) stated that feedback had the largest impact on learning and attainment. In this study, feedback, whether positive or negative, and the way in which it was conveyed, the timing of delivery, as well as the environment in which it was delivered, affected human behavior differentially. A classroom that was

founded on positive feedback that included praise as well as a reward system enhanced student interest in academic achievement (Pfiffner et al., 1985).

For example, in a middle school study conducted by Nguyen et al. (2006), drill and practice on the computer, coupled with instant feedback and an online tutor, increased student interest in mathematics. In fact, all of the students perceived that they were better problem solvers because of the online system. Minority students felt more confident, perceived they could do more challenging problems, and had less anxiety about exams when taken on the computer. In particular, minority males felt that immediate feedback developed their problem solving skills and encouraged them to evaluate their own progress more frequently.

c) Peer Mentors/Tutors: McNamara (1995) found that tutors, student teachers, and mentors improved classroom practices, the curriculum, and the learning environment.

In Schofield's (1994) study, the friendly competition among students resulted in some students serving as "peer experts." Students began to tutor one another with the online system. This role allowed peer experts to demonstrate their knowledge by teaching their peers, multiplying the impact of everyone's learning. Peer experts also served as teaching assistants which allowed the teacher to spend more time creating bonds with other students, serving as a facilitator instead of a lecturer, and less time grading and preparing lessons.

d) Cooperative Learning/ Interdisciplinary Group Projects: Johnson, et al. (2000) defined cooperative learning as the process of working together to accomplish a shared goal. Student success, team building skills, and self-esteem increased with the use of cooperative learning in elementary and secondary classrooms (Slavin, 1980). Furthermore, Slavin (1999) found that students developed a respect for different perspectives and ideas that transcended gender, race, and ethnicity.

e) Professional Development Sessions: Academic support programs such as career services, tutoring, counseling and advising, as well as student organizations increased student achievement, retention and graduation rates. In particular, professional development sessions where students learned interviewing skills, resume writing, and tips to prepare for undergraduate and/or career placement enhanced student persistence toward professional goals (Dellana et al., 2004; McElroy 2000).

CSU's mathematics department adopted key strategies from the above studies to create an atmosphere in its computer based classroom that was more conducive for student learning. Piloted in one computer based College Algebra classroom in the fall of 2008, this unique environment led to improved student learning and overall success.

II. Methods.

This case study took place in one College Algebra class offered on Tuesdays and Thursdays in the fall semester of 2008. Students in the class were part of a learning community for STEM majors called Just Undergraduate Mentoring Program (JUMP), a retention program for freshmen biology and chemistry majors. In the learning community, students took all of their gateway

classes (Biology, English, Chemistry, and Algebra) together. There were 12 students (2 males and 10 females), all African-American, and all had an ACT score below 21.

A. College Algebra Course Design.

- a) *Blended Instruction (BI):* The College Algebra course covered five chapters: functions, logarithms, conic sections, matrices, and sequences, and was taught with traditional and online lectures. Students were graded on weekly online homework assignments, handwritten quizzes and exams, interdisciplinary projects, notebook checks, and attendance. Engaging activities such as group work, math games, and daily challenges, as well as peer teaching and grading, were also included. Extra credit assignments and assessment review packets were hand written and given often.
- b) *Mandatory Tutoring:* Mandatory tutoring helped students to appreciate that learning was not optional. A student who earned a “D” on any assessment (quiz or exam), for example, was required to meet with a tutor for two hours until the next assessment (Assessments were biweekly and only covered two or three sections at a time.). A student who earned an “F” on any assessment was required to meet with a tutor for four hours until the next assessment. Classroom tutors who were proficient in the online software were hired by the department to support lower level classes. Students were welcome to use other tutoring services offered on campus if preferred.
- c) *Online Homework:* The online homework was the second largest determinant of students’ final grades (Exams were the largest determinant). During the semester, there were 7 weekly online assignments, each consisting of 35-50 problems from two to three sections of a chapter. Eighty percent of the problems were free response, and 20% were multiple choice. The problem sets were grouped by concept so students completed 2-7 problems per concept. Each conceptual set of exercises was prefaced with a thorough explanation of the concept as well as how to solve that particular type of problem. Students could refer to this example or the online lectures for further assistance. Immediate feedback (“Correct” or “Incorrect”) was given after students entered a solution into the system. Students could enter as many solutions as they liked for a problem until they earned a “correct” response. They could also monitor their progress with the assignment in a vertical table that highlighted how many of the problems the student got right (marked green), wrong (marked red), or were incomplete (marked white). In the first half of the semester, students could only take a homework assignment once, but during the second half of the semester, students could retake any assignment from the first half of the semester as often as they liked. This was done to remediate students on past concepts in preparation for the comprehensive final exam held at the end of the semester.

B. Integration of the Complementary Supportive Environment Components into the Course Design.

The above environmental components—caring teacher, class tutors, cooperative learning, positive feedback, and professional development—were incorporated into the College Algebra

class through a learning community. A Learning Community is a group of individuals who share similar goals and/or beliefs and participate in activities guided by those goals or beliefs. Learning communities have increased student academic performance, student belonging, college satisfaction, and retention and graduation rates for underrepresented minorities, first generation students, and college freshmen (Zhao et al., 2004; Stassen 2003).

a) *Caring Teacher*- The teacher was an assistant professor of mathematics with a Ph.D. in mathematics. The teacher also had a concentration in multicultural education at the undergraduate and graduate levels, particularly pedagogy focusing on the African-American student, and had experiences using the above practices in K-12 classrooms before teaching at the university level.

b) *Class Tutors/ Peer Tutors*- The classroom tutor served as an undergraduate teaching assistant (UTA) who designed classroom games, mini-projects, and exam review packets, and graded students' in-class assignments. The UTA was a biology major who had taken the College Algebra course using the online material and earned a B in the course.

c) *Cooperative Learning/ Interdisciplinary Projects*- Students completed online work individually, in pairs, or in groups. Some homework and project grades were interdependent. That is, these grades were the average score of the pair or group working on the assignment.

Three interdisciplinary group projects demonstrating the use of mathematics in biology were used. The first project focused on graphing and interpreting a graph (i.e., identifying where the graph increases and decreases, finding the maximum and minimum points, as well as x- and y- intercepts). Students could choose a variety of datasets ranging from the harvest and sale of carrots to the number of HIV/ AIDS infections or related deaths. For the second project, students plotted scatter plots of given datasets and found the line best fit using linear regression. Students plotted cricket noise compared to temperature, planetary motion and distances to the earth, and genealogical data collected from the Genetics class. In the last project, students conducted an in-depth study on white blood cells and the effect HIV/ AIDS has on them. The students solved logarithmic and exponential word problems projecting the white blood count and life expectancy of particular human subjects.

d) *Positive Feedback*- Positive feedback was used in every form--through comments written on quizzes and exams, and praises inside and outside of the classroom from the teacher, UTA, fellow students, and the online system.

e) *Professional Development Sessions*- As a requirement of the learning community, all JUMP students were required to attend professional development workshops offered through the natural sciences department or the Center for Student Opportunities, an academic support program. The Center for Student Opportunities provided scholarships, tutoring, mentoring, internship and career placement, and professional development workshops for all students. The professional development workshops focused on communication skills, resume writing/statement of purpose, business demeanor and

dress, dinner etiquette, having a positive attitude, making great first impressions, as well as career options in the STEM fields and research talks by STEM scientists and professionals.

III. Results.

At the end of the semester, 75% of the class passed College Algebra with a grade of “C” or higher. There were two results and one finding of this new environment which led to this difference: high homework completion rates using the online system, average and above average scores on written exams and quizzes, and the discovery of a correlation between the number of completed mandatory tutoring hours and the resulting success on subsequent assessments.

A. Online Homework.

Table 1 shows the number of online assignments and how many students completed each assignment.

Table 1. Online homework completion out of 7 assignments.

Homework Assignment #	1	2	3	4	5	6	7
N = 12 students	9	12	6	11	12	7	6
(% of Completion)	(75%)	(100%)	(50%)	92%)	(100%)	(58%)	(50%)

The percentage of students in the class completing the online assignments decreased toward the end of the semester. There were no additional activities assigned to the class toward the end of the semester, so the reason for this decrease needs further investigation.

Table 2 shows the percentage of online problems that were correct for the seven homework assignments. The class scored an 80% or higher on four of the seven assignments. Very few (two to three) students in the class retook an assignment, so the percentage of correct problems on retakes (shown in grey) was not considered in this discussion.

B. Classroom Assessments.

To evaluate conceptual understanding, the class was given four written exams corresponding to homework assignments 2 (*exam 1*), 4 (*exam 2*), 5 (*exam 3*), 6 and 7 (*exam 4*) and two quizzes corresponding to homework assignments 1 and 3. On the first exam, the average score was 80% ($\sigma = 8.04$), and on the fourth exam, the average score was 75% ($\sigma = 26.84$). The class scored below a 60% on the second and third exams which can be explained by the lower homework scores on these sections (see assignments 4 and 5). For the two quizzes, the class averaged a 77.5% ($\sigma = 14.21$).

The handwritten homework assignments were not used to evaluate student performance, but were used as a tool to strengthen student understanding prior to each assessment. Two of the handwritten assignments were assigned problems from the textbook. The other handwritten assignments were review packets designed by the UTA and those results were not considered in this paper.

Table 2. Average percent of correct responses for online homework assignments by content (values in parentheses denote the percentage of correct responses for retaken assignments).

Homework Assignment #	Content	% of Correct Responses
1	Graphical Representation of a Function, Distance, Slope, and Composite Functions	88% (92%)
2	Inverse Functions, Exponential Functions, and Logarithmic Functions	82% (95%)
3	Properties of Logarithms, exponential and logarithmic equations	63% (76.92%)
4	Variations, Circles, Parabolas, and Ellipses	52% (100%)
5	Systems of linear Equations and Systems of Non-linear Equations	68% (96.77%)
6	Gauss-Jordan Method and Matrix Algebra	89% (98%)
7	Multiplication of Matrices and Inverses of Matrices	93% (98%)

The class averaged a 70% ($\sigma=13.07$) on the comprehensive final exam. The final exam consisted of printed online questions that were both free response and multiple choice.

C. Mandatory Tutoring.

Over the course of the semester, 63% of the class completed the mandatory tutoring hours, resulting in a 67% increase in students' grades on subsequent assessments. Mandatory tutoring, then, had a significant effect on student performance.

Table 3. End of the semester comparison of completed mandatory tutoring hours and percent increase for six course assessments.

# of Students	# of Tutoring Assignments	# of Tutoring Hours Assigned	# of Tutoring Hours Completed	% of students who increased their scores on subsequent assessments
12	27	94	59	67%

By analyzing particular student cases, it can be shown that those students who were the most persistent with completing tutoring hours demonstrated continued success throughout the course.

IV. Discussion.

A. Benefits.

a) Small class size: A second factor leading to the class' success was the class size. The small group size allowed for more student-teacher interaction and more peer-to-peer interaction with very few interruptions.

b) Learning Community: The learning community was the key environmental factor contributing to student success, offering a sense of belonging by discipline that was missing from other courses. Studies have shown that students participating in a learning community have a greater chance of succeeding in college than those students who do not participate in a learning community (Mlynarczyk & Babbit, 2002; Reyes et al., 1999; Zhao & Kuh, 2004). Through their unique structure, learning communities increase student engagement and overall satisfaction with the institution. Tinto (2003) argues that there are three reasons resulting in this success: *shared knowledge* (accomplished through a common curricular experience), *shared knowing* (by meeting and working with fellow students within the community), and *shared responsibility* (accomplished through mutual dependence in group/community activities). Each of these was transparent in this case study: Without being asked, the students formed study groups to prepare for upcoming exams as well as to complete homework assignments. In fact, this was a strategy students used in all of their "killer" courses. So, when students were subsequently asked to complete online assignments in pairs or to work as a group on the interdisciplinary projects, the students were comfortable doing so. For class lectures, students asked to work with a classmate or to be placed in groups to do review exercises of the day's lesson or to complete an exam review packet. Furthermore, as noted by Williams et al. (2002), making the grades of some of the homework assignments and the group projects interdependent reinforced the spirit of working together and resulted in the students completing more of the online homework assignments. Even when assigned mandatory tutoring hours, students completed the hours in pairs or in groups, and the UTA even held exam review sessions for the class. This explains why a greater percentage of tutoring hours were completed during the course.

c) Professional Development Workshops: As a requirement for participating in the JUMP program, students attended professional development workshops as well as JUMP advising meetings. The class attended at least 4 professional development workshops through the Center for Student Opportunities or the Department of Natural Sciences. Attending these workshops kept the students' career goals at the forefront of their studies and had a positive impact on student behavior in the classroom.

d) Cooperative Learning: The interdisciplinary projects reinforced career development. Students enjoyed seeing how knowledge learned in class lectures had a useful purpose in everyday life. Students used calculators and Microsoft Excel to graph and interpret functions. Through follow up word problems, students drew conclusions about their graphs and made predictions. In fact, the students liked using the solutions they found to make recommendations about problems experienced by everyday

businesses and workers. For example, through internet research, one group hypothesized that low carrot sales were due to the freezing climate which lasted longer than previous harvest seasons. Another group hypothesized that AIDS infections decreased for young adults in some locals due to abstinence initiatives and the distribution of condoms at workshops, high schools, and colleges. The most interesting response was to the third project which studied white blood cells and the impact HIV/ AIDS had on them. The majority of students were biology majors interested in pursuing a career in nursing or medicine. A majority of students knew of someone who was affected by HIV/AIDS, so students took a particular interest in the project. Students learned about different types of white blood cells, were able to classify a white blood cell count as normal or abnormal, and apply this knowledge to solve exponential and logarithmic equations. These projects, particularly the last project, increased student interest in biology and illustrated a greater appreciation of mathematics and its uses in the real world.

B. Challenges.

a) Class Schedule: On the end-of-semester course evaluations, students indicated that they would have liked to have met for less time three days a week rather than for more time two days a week. They believed they would have been just as successful meeting more frequently for a shorter period of time. In the future, a follow up study can be done to compare two College Algebra classes using the BI model that meet on different days for different periods of time and have roughly the same number of students in each class. A questionnaire can also be developed to evaluate student perceptions about the structure of the course and the use of technology.

b) Appropriate Use of Online Lectures/Homework: Some sections and chapters were taught more effectively with the online material whereas other sections were better explained using traditional chalkboard methods. The same is true of the online homework some questions were more effective in soliciting conceptual understanding than others. Determining the appropriateness of online assignments over traditional book work was a learning curve during this study, and could be mastered with continued teaching of the course.

c) Software Literacy: The Educosoft software required students to learn a new language. Even when calculations were correct, students were required to enter solutions a certain way into the system. For example, if students were asked to solve the equation $x^2 - 40 = 0$ for x , students would arrive at the solution $x = \pm \sqrt{40}$, but Educosoft would only accept $x = \pm 2\sqrt{10}$ as the correct solution. Reducing the solution in this manner provided continued practice with perfect squares and primes. The students, however, became frustrated when asked to accommodate to the electronic system in this way.

d) Implementation of New Environment: The implementation of the complementary learning environment was challenging. There were several activities happening at once which at times were difficult for the professor to manage. Having a teaching assistant qualified to carry out some of the class' formal responsibilities would have been beneficial. Because the UTA was a student, the assigned responsibilities for the UTA

were limited. Of all the activities, mandatory tutoring was the most difficult to implement. Initially, students resisted this component of the course due to a socially, negative stigma associated with tutoring. After having students who did complete tutoring hours share positive exam results with the rest of the class, other students began to favor the idea. By semester's end, most students supported the tutoring component of the course.

Overall, the implementation of the complementary learning strategies made the College Algebra learning environment dynamic and engaging. Kozma (1992) asserts that it is in these kinds of environments where computers are best used. The BI model allowed for traditional and online lectures to be used more appropriately given the topics being taught. Even though the class called for both the student and teacher to assume new roles in the classroom (O'Callaghan, 1998), the role of the in-class tutors should not be overlooked, the UTA was for some students their first contact and helped to retain them in the course (Tait, 2004). All of these components, taken together, yielded a greater conceptual understanding by students and led to an increase in student success. Over 75% of students in the class were retained in their discipline, and, according to their academic transcripts, over 80% earned a "C" or higher in subsequent mathematics courses. The success of this study has led to continued use of these practices in other mathematics courses in the department and has been disseminated across the campus and nationally at professional conferences.

V. Conclusion.

This study illustrated that for minority students in a computer based mathematics classroom, creating a complementary supportive environment increased student success by 15%, compared to national gains of 10% for computer based classrooms having no formal supportive learning environment. This study reinforces conclusions that using computer based classrooms for traditional drill and practice is not sufficient for continued academic improvement, particularly for underrepresented minorities. Additionally, support created through a dynamic learning environment (such as a learning community, a caring teacher, cooperative learning, tutors, and professional development) in a course designed with activities (computer based learning and mandatory tutoring) that will allow the learning environment to thrive is necessary to increase student understanding and student performance. Through this study, students demonstrated a broader understanding of mathematics concepts and were successful in subsequent mathematics courses. Although the results are promising, continued research is needed to learn more about complementary learning environments in computer based classrooms for minority students. This case study proposes a model for universities and colleges interested in increasing the academic performance of minority students through computer based learning within a carefully constructed supportive learning environment.

Acknowledgements

Central State University would like to thank the Department of Education's Minority Science and Engineering Improvement Program for funding BISCA (Blended Instruction for Improving Success in College Algebra).

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Academic performance and learning style self-predictions by second language students in an introductory biology course

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Abstract: Academic success in first-year college science coursework can strongly influence future career paths and usually includes a solid performance in introductory biology. We wanted to know whether factors affecting biology student performance might include learning style preferences and one's ability and confidence in self-assessing those learning preferences in order to engage in appropriate study strategies. We also wondered whether second language students who do not speak English at home differ from their classmates in either learning styles or self-assessment, in order to better understand our diverse student population. We examined these questions in a large introductory biology course at an undergraduate public university in California. In our study, students self-predicted their learning preferences using our simple survey tool and then completed the online VARK learning style tool. Results showed a good match between the survey tool's self-predictions and the VARK tool, with auditory learners showing the least accurate match. Speaking a second language other than English at home did not appear to influence learning preference profiles nor one's ability to self-predict those learning preferences. When asked to self-predict biology course grades, older students were slightly better predictors than younger students, with almost no difference between students who did and did not speak English at home. We suggest that success in introductory college science courses by second language speakers may involve factors other than learning style, or the ability to self-assess learning style and biology course performance.

Keywords: English second language, ESL, diversity, biology teaching, metacognition, self-efficacy

Undergraduate introductory biology courses are an essential foundation and part of the scientific 'gateway' for students hoping to enter careers such as those of scientists and health professionals (Wood, 2009). A solid academic performance in biology likely involves one's ability to self-assess all aspects of learning, since metacognitive awareness of learning may lead to higher achievement (Turan, et al., 2009; Young & Fry, 2008). Successful self-assessment may even improve understanding of the material being taught (Clauss & Geedey, 2010; White & Frederiksen, 1998), further enhancing a student's opportunity for academic success. These studies suggest that self-awareness of one's individual learning style may influence biology learning and ultimately course grades. In spite of the potential impact, few studies have examined science students' ability to self-assess individual learning style (Dobson, 2010).

Many factors clearly influence biology academic performance, although little is known about the factors that specifically affect second language learners. These students comprise a substantial percentage of the nation's college-age population. The students enrolled today in

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introductory biology courses were roughly represented back in the 2000 U.S. Census Report by the group of children aged 5-17 years, of which 18.4% spoke a language other than English at home (United States Census Bureau PHC-T-20 report, 2000). Indeed, nine states (i.e. Arizona, California, Florida, Nevada, New Jersey, New Mexico, New York, Rhode Island and Texas) reported that 20% or more of the children living in their states did not speak English at home, with California leading the nation at 42.6%. Population trends indicate that the percentage of second-language students continues to increase (United States Census Bureau, 2007 American Community Survey). These second language learners are also referred to as ESL (English-as-a-Second-Language) students, and they are likely to face unique challenges in learning college science.

In our university, we estimated that currently about half of the introductory biology students are second language speakers. We wanted to find out whether these second language biology students differ from their classmates in their learning style preferences along with their self-awareness and confidence in choosing those preferences. We also wondered if there is a correlation between one's learning style self-awareness and academic performance in biology. This information would help inform those involved in beginning science courses about some of the factors that may influence course performance among all students, particularly those who do not speak English at home.

II. Methodology

Recruitment occurred over two consecutive spring semesters of a first-semester course in Introductory Biology in 2009 and 2010. Participants in each of the seven laboratory sections were recruited and administered an online VARK learning style tool and our survey tool. Since attendance in the laboratory is required, data acquisition in the lab assured a more representative and larger sample of currently enrolled students as compared to the lecture. Data was acquired approximately 4-6 weeks before the end of the course, when students had become familiar with their class performance. The protocol was approved by the Institutional Review Board at San Francisco State University.

A. Participants.

Study participants were 288 men and women, aged 18-35 years old, who were enrolled in the first semester (Biology 230) of a two-semester introductory biology course at San Francisco State University (SFSU). SFSU is a public university in San Francisco, California and a member of the 23-campus California State University system, the largest comprehensive undergraduate university in the USA. Introductory Biology (Biology 230/240) is a one-year lecture/lab sequence for science majors with no prerequisites. Study participants were enrolled in the Biology 230 course, which includes course content in Cell Biology, Genetics, Plant Biology and Animal Physiology.

B. VARK Learning Style Tool.

The VARK learning style tool is a 16-item questionnaire that provides users with a profile of their learning preferences. The VARK tool has been utilized extensively due to its ease of use and availability online, and was recently validated (Leite et al., 2010). Developed by Neil

Fleming, the VARK assesses user preferences for methods of taking in and putting out information in a learning context, expressed through four possible modalities: Visual (V), Auditory (A), Read/Write (R), and Kinesthetic (K). VARK learners can be categorized as unimodal (i.e. singly V, A, R or K), bimodal (e.g. VA, VR), trimodal (e.g. VAR, ARK) or quadmodal with all 4 learning preferences (i.e. VARK).

Hard copies of the VARK tool and our own survey tool (see below) were distributed and completed in the laboratory sections approximately 4-6 weeks before the end of the term. Each student created an anonymous code for tracking purposes. Responses to the VARK learning style inventory were later inputted online by the researchers for each individual, and analyzed using VARK version 7.0 (www.vark-learn.com). In our report, participants with greater than one preference (i.e. 2-4 preferences) are grouped as 'multimodal' learners. Results of the VARK learning preference tool were distributed to students along with references for study strategies approximately 2 weeks before the end of the course. A third party (i.e. staff) was used to hold identifications and codes in order to track student course grades.

C. Survey tool.

The 12-question survey tool was developed by the authors and a copy is found in the Appendix. Questions included demographic information such as gender, age group, intended major and career. Students were asked whether or not they spoke English at home. Regarding learning preference information, students were asked to select one or more statements describing their learning preference(s) (Question #9), to rank their confidence in those selections (Question #10), whether this was their first time answering questions about learning style (Question #11) and their interest in finding out their learning style (Question #8). Students were also asked to estimate their course letter grade (Question #12).

D. Analysis.

Student learning preferences. Each student's self-predicted learning preference(s) was coded according to their selected answers on survey question #9: a=visual (V), b=auditory (A), c=read/write (R) and d=kinesthetic (K) (see Appendix). These student-generated self-predictions were compared to the results obtained by analyzing each student's individual VARK learning style tool. To determine the match between each student's self-prediction and the VARK tool data, we generated a predictability score or 'VARK score' for each student. Because learning preferences can include single or multiple modalities (e.g. V, VK, VAK), and in order to eliminate bias when generating the predictability score, a 0/1 vector system was used; a value of 1 represented a modality that was present and a value of 0 represented a modality that was not present. The VARK score values ranged from 0 to 4, which correspond to 0 (perfect match between self-prediction and VARK learning style inventory), 1 (75% accuracy), 2 (50% accuracy), 3 (25% accuracy) and 4 (0% accuracy or no match). Therefore, VARK scores ranged from 0 to 4, representing the accuracy between the self-prediction and VARK inventory data.

Student academic performance. Students self-predicted their course grades at the time of the survey, and grades were coded according to the following rubric: A (86%), B (77%), C (66%), D (56%) and F (53%). These percentages represent the low end of the range for each letter grade, therefore making a more stringent test for grade comparisons. The actual grade for each student was recorded as the exact percentage of total course points achieved by the student

at the end of the course (i.e. up to 100%). The comparison of self-predicted and actual course grades was determined by taking the absolute value of the difference between the predicted and actual grade percentages.

MATLAB Analysis. To determine any significant relationships with the VARK learning style preferences and/or course grade data, we performed a MATLAB analysis (Welch, 1990). A random permutation script was used to generate comparisons, with significance at $p < 0.05$. Fifty students were excluded from the MATLAB analysis since they did not fully complete the surveys required for cross-comparisons, yielding a MATLAB subset of 236 students. We analyzed age, gender, and language variables (items #3,6,7 on the demographic questionnaire) to determine any significant relationships with VARK learning style preferences or grade data.

III. Results

A. Demographic data and response rate.

In the spring 2009 and spring 2010 semesters, a total of 315 students enrolled, completed and received letter grades for the Introductory Biology Course (Biology 230). Of these 315 students, initially 288 respondents turned in both the VARK learning style and survey tools, yielding a 91% overall response rate for our study. Data from two students were not included in the overall analysis due to missing information, yielding 286 respondents. In the following section, we present their VARK learning preferences, self-predictions and demographic data.

As seen in Table 1, the gender profile was approximately a female:male ratio of 2:1, with 2.4% not reporting gender. The majority of students were in the youngest age grouping (18-20 years), and 43% were of freshman class standing. The majority of students (i.e. 54.5%) did not speak English at home, compared to 45.5% who did speak English at home.

Table 1: Demographic information of all respondents (n=286)

	Spring 2009	Spring 2010	Total
Gender			
Female	70	118	188
Male	13	78	91
-blank-	3	4	7
Age			
18-20 years old	44	121	165
21-25 years old	70	28	98
26-35 years old	21	2	23
Current year			
Freshman	28	96	124
Sophomore	8	24	32
Junior	38	12	50
Senior	47	18	65
Post-baccalaureate	13	2	15
Language spoken at home			
Non-English	79	77	156
English	54	76	130

We were interested to know the career aspirations of students in our study, since those pursuing science-related careers might be more motivated toward higher grades and skew our results on second language speakers. When grouped according to whether students speak or did not speak English at home (see Table 2), the vast majority of students in both groups selected careers in the health professions. Interestingly, we found that students who did not speak English at home were more apt to select health careers in the traditional health professions of medicine, dentistry, pharmacy, veterinary and optometry (i.e. 46%), compared to 34% of the students speaking English at home.

Table 2: Career aspirations of all respondents

		English at home (n=130)	Non-English at home (n=156)
My intended career is:	Pre-Health career	83%	85%
	All other careers	17%	15%

B. Learning Preferences.

We found that the majority of students were interested in finding out about their personal learning styles whether or not they speak English at home (see Table 3). Moreover, greater than 90% of the students were mildly or very interested in finding out their personal learning styles, even though many respondents (i.e. 42-43%) report that they had previously answered questions about learning style, and that most students (i.e. 62-76%) were already ‘very sure’ of their own self-predicted learning style.

Table 3: Students' interest, knowledge and confidence about learning style.

		English at home (n=130)	Non-English at home (n=156)
“What is your interest in finding out your learning style?”	Not interested	9%	6%
	Mildly interested	29%	27%
	Very interested	62%	67%
“Today is the first time I am answering questions to predict my learning style.”	True	57%	58%
	False	43%	42%
“To what degree are you confident in your self-prediction of your learning style?”	Not Sure	7%	5%
	Neutral	31%	19%
	Very Sure	62%	76%

The summary of students' self-assessed learning preferences is shown in Figure 1A. The vast majority or 72% of the students selected more than one learning preference or have 'multimodal' preferences. The number of multimodal preferences varied, although the majority selected two (i.e. 33% bimodal, 25% trimodal, 14% quadmodal selected all four VARK learning preferences). The remaining 28% of the students selected a single or 'unimodal' learning preference, with the most popular being the R or Read/Write preference.

The results of the VARK inventory tool analysis (see Figure 1B) confirmed that the majority or 67% of the students have multimodal preferences, similar to the self-prediction data (i.e. 72%). However, 47% of these multimodal learners had all four learning preferences, compared to only 14% who self-predicted all four. This suggests that many students with multimodal preferences were largely unaware that they have more than two preferred ways to input new information.

There were slightly more students with a single or 'unimodal' learning preference obtained with the VARK learning style inventory than in the self-prediction data (i.e. 33% vs. 28%, respectively). Those students with an A or 'auditory' unimodal preference were most numerous and nearly three-fold higher than the self-prediction data (i.e. 12% vs. 4%).

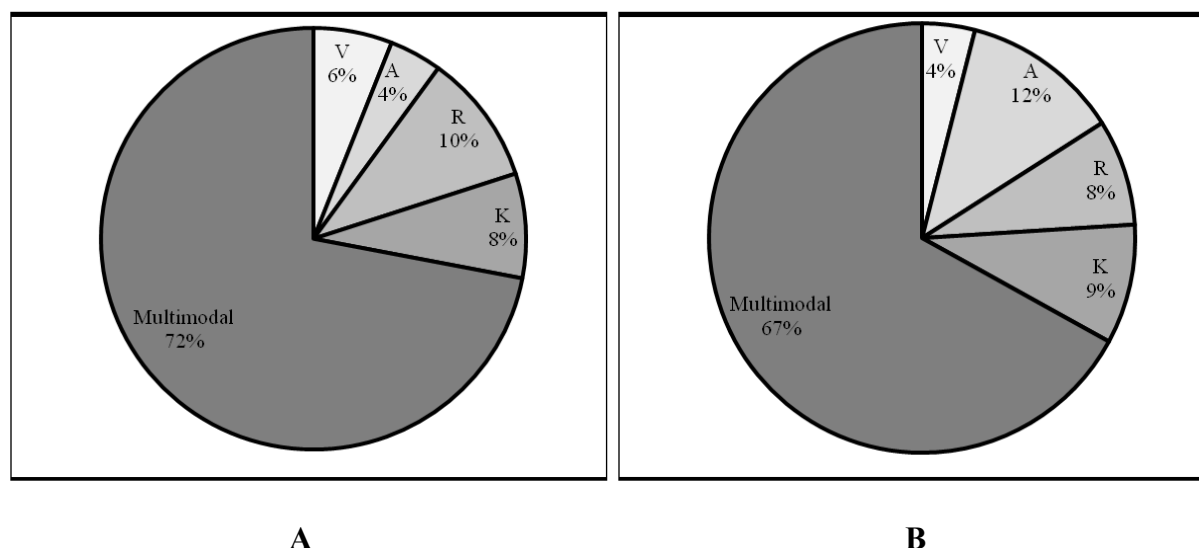


Figure 1: VARK learning preference(s) of all respondents. A) Self-prediction and B) VARK learning style inventory results.

We then determined the match between each student's individual self-perception or 'self-prediction' of their learning preferences to those results obtained with their individual VARK inventory (see methods). The match is represented by a VARK score ranging from 0 to 4, with a value of '0' representing a perfect match and 4 as no match. We grouped students according to their language at home and found similar results among the two groups as seen in Table 4. Most students had excellent to good VARK scores ranging from 0 to 2 (i.e. 77.7% of English-at-home and 75% of non-English-at-home students). Therefore, there was a fairly good match between one's individual VARK self-prediction and the VARK inventory data for approximately 3 out of 4 student respondents.

Table 4. Match between students' self-prediction and VARK inventory tool. The lower the VARK score, the greater the match between VARK self-prediction and inventory data.

VARK Score	English at home		Non-English at home	
	n	%	n	%
0	20	15.4	26	17
1	38	29.2	45	29
2	43	33.1	45	29
3	26	20	35	22
4	3	2.3	5	3
	130	100%	156	100%

We also compared the VARK scores of students with different VARK learning preferences. We first grouped students according to the VARK inventory results, and calculated the mean overall VARK score (i.e. 0-4) for that group. As seen in Table 5, students with

multimodal learning preferences on the VARK tool had self-predicted their preferences quite well. There was virtually no difference between students who spoke English at home and those who did not. Among those with unimodal preferences, the best predictors in both groups had a Visual preference and the poorest predictors had an Auditory preference. Thus, whether one speaks English at home or not appears to have little influence on one's ability to predict learning preference(s), regardless of one's preferences.

Table 5: Mean VARK scores for students grouped according to their learning preferences.
The lower the VARK score, the greater the match between VARK self-prediction and inventory data.

Learning preference(s)	English at home	Non-English at home
V	1	1.5
A	2.3	2.4
R	1.3	1.9
K	1.7	1.9
Multimodal (2-4 preferences)	1.6	1.5

We expected that students with some experience answering learning style questions were better able to self-predict or self-assess their learning style, so we included this query on our survey instrument (Question #11). However, we found very little difference between those who did or did not have experience answering learning style questions (Figure 2).

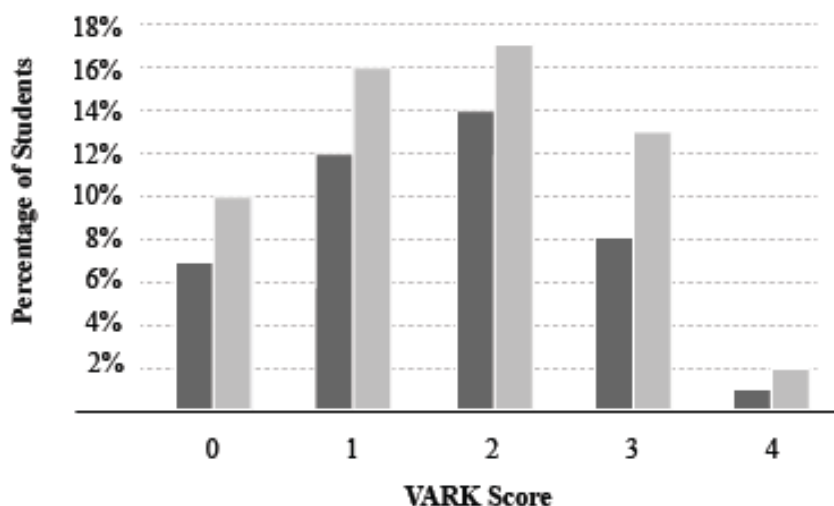


Figure 2. Student self-prediction of learning style preferences grouped according to one's prior experience answering learning style questions as a percentage of total respondents. Dark gray (not the first experience); light gray (first experience). VARK scores range from 0 to 4 (best to poorest).

C. Academic Performance Data.

Self-Prediction of Course Grade. In the following section, we analyzed a subset of 236 students who fully completed their surveys (i.e. 82% of all respondents) using the MATLAB analysis (see methods). The percentage of students in the subset not speaking English at home was nearly identical to the entire pool (i.e. 55% versus 54%, respectively). Therefore, the subset represents a cross-sectional group of second language speakers for the academic performance analyses.

As seen in Figure 3A, the largest group of students (i.e. 52%) predicted they would receive a B in the Biology 230 course. By grouping students according to whether they self-predicted a high grade, 72% of the students predicted receiving A or B, compared to 28% predicting C or D (no students predicted receipt of an 'F'). Interestingly, more second-language students predicted high grades (i.e. grades A or B) compared to their classmates who spoke English at home (42% and 30%, respectively).

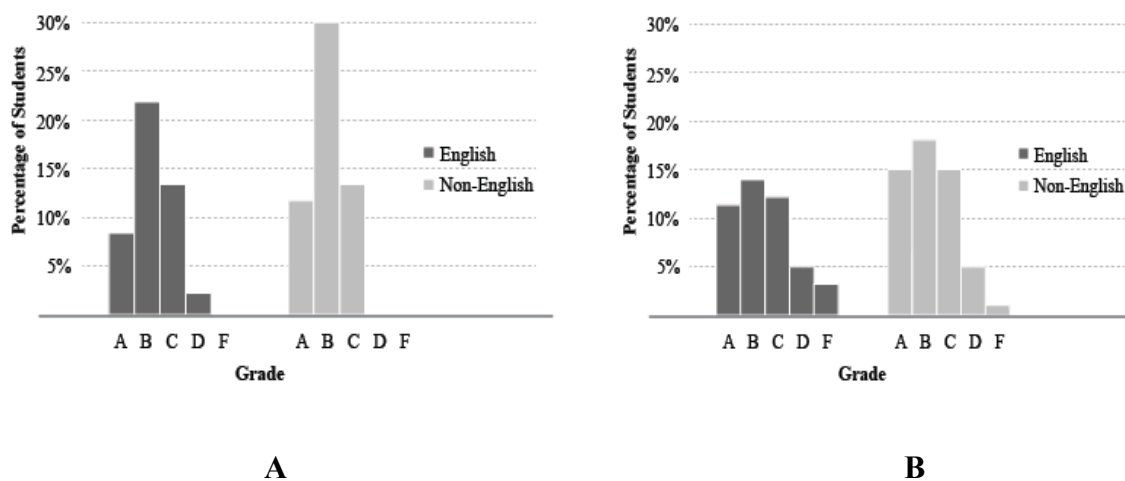


Figure 3. Introductory Biology Course Grades. Students were grouped by those who speak English at home (English) and those who do not speak English at home (Non-English). Data is shown for A) Self-predicted course grades, and B) Actual course grades.

Actual biology course grades. As seen in Fig. 3B, students who speak English at home received fairly similar course grades to those who did not speak English at home, with the largest group of students in both groups receiving 'B' grades. A smaller percentage of students in the non-English-at-home group actually failed the course and more received A grades.

Comparison of self-predicted and actual course grades. The B grade was both the most self-predicted and the most frequently received grade among all respondents. Yet both groups of students predicted higher scores than those that they actually received. When grouping students

with a ‘high grade’, the majority of student respondents received A’s or B’s (i.e. 57%), while 43% received C, D or F.

Students were also grouped according to the overall accuracy of their letter grade predictions. To obtain this information, each student’s prediction on Question #12 of the survey form was compared to the actual course letter grade that the student received after removing any + or – designations. The student either did or did not predict their letter grade correctly. As seen in Table 6, a slight majority of the students correctly predicted (i.e. matched) their introductory biology course grade to their actual course grade, regardless of whether or not English was spoken at home.

Table 6: Ability to self-predict biology course letter grades.

	English at home (n=107)	Non-English at home (n=129)
Students with a correct prediction	56%	53%
Students with an incorrect prediction	44%	47%

Students with prior experience answering learning style questions were slightly better predictors of their course grades. Using survey questions #11 and #12, we found that 58% of the students were answering questions on learning style for the first time and had an average grade percentile difference of 5.78% (i.e. absolute value of their self-prediction grade % minus the actual grade % received in the class), while 42% of the students had prior experience answering learning style questions and showed an average grade percentile difference of 4.65% (a lower value, thus reflecting a greater accuracy of self-prediction).

D. Comparison of self-prediction of one’s learning preferences and grade performance.

We calculated the mean absolute value of each student’s letter grade percentage minus the actual percentage of total points received (see above section). This was used to obtain a value known as the Grade Percentile Difference for each student, which is the self-prediction of one’s grade. To make a comparison with the VARK learning style predictions, we used the VARK scores. We first compared demographic variables to see if students differed in their predictions. We found no significant difference between the ability of males and females to predict their grades and learning preferences. Also, there was no significant difference between the ability of English-at-home and Non-English-at-home students to predict their grades and learning preferences. Among the demographic variables we tested, the only relevant factor we found was the influence of a student’s age. As seen in Figure 4, the eldest group showed the strongest ability to self-predict their own course grades, although age was not an advantage for self-predicting learning preference(s).

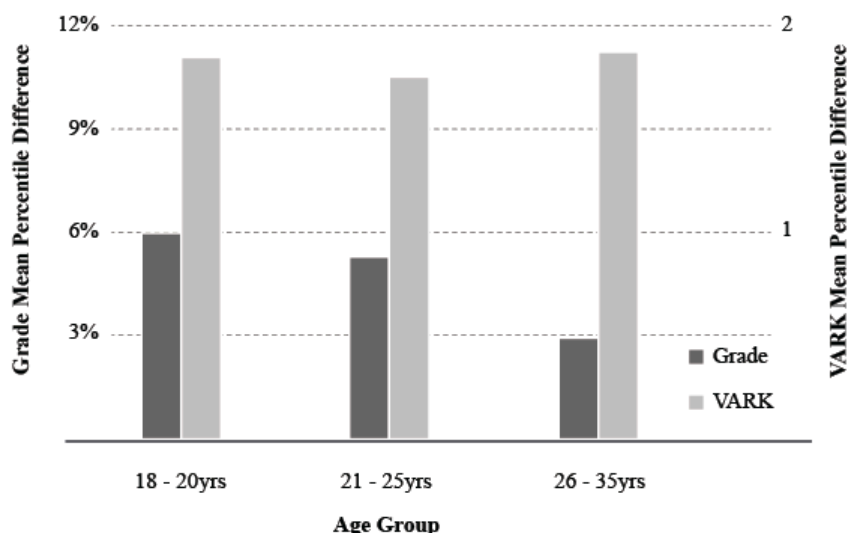


Figure 4. Ability to Self-Predict VARK Learning Preference(s) and Course Grades by student age. The average percentile differences for course grade prediction (dark gray) and VARK learning preference prediction (light gray) were determined using the MATLAB subset. The height of the bar indicates the difference between the actual and predicted values. Therefore, the smaller the height of the bar, the *greater* the accuracy or match of the self-prediction.

We used our data to gain a general idea of whether students who show the strongest self-prediction of individual learning style (i.e. VARK score) also have the highest course grades. It might follow that those who are self-aware of their personal learning preferences might engage in more successful study strategies, thus resulting in higher course performance. Although not rigorously designed to answer this research question, we compared these two variables (see Figure 5) and found that students with both good (i.e. 0-2) and poor (i.e. 3-4) VARK predictions received a wide variety of course grades. Students with good and poor scores also received roughly the same ratios of A/B/C grades compared to D/F grades. Thus, there appears to be no clear relationship between one's ability to predict VARK learning preferences and course grade. However, in comparing students by language spoken at home, the non-English-at-home students with good VARK scores tended to receive more A/B/C grades compared to English-at-home students, while those with poor VARK scores did not receive any F grades. This suggests that students who did not speak English at home tend to perform slightly better in biology, or at least achieve slightly higher grades than their classmates with similar VARK scores.

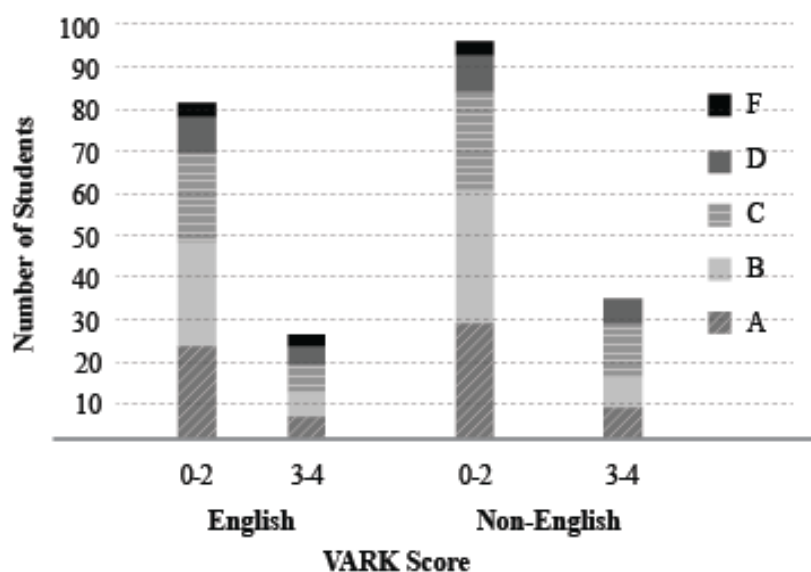


Figure 5. Relationship between VARK score and course grade. Students were grouped according to the level of their VARK scores ranging from 0 to 4, i.e. 0-2 (good scores) or 3-4 (poor scores), as compared to their final course letter grade A through F. Results are shown for students who either speak or do not speak English at home.

IV. Discussion and Conclusion

In our study on learning preferences, speaking a language other than English at home did not appear to influence learning preference profiles. This finding is possibly in contrast to reports in the community college (Lincoln & Rademacher, 2006) and K-12 institutions (Felder, 1995; Reid, 1987) where it was reported that second language speakers have different learning preferences. These differences may be accounted for by a wide variety of factors, including the academic discipline or field, educational setting and regional variation.

The majority (i.e. 3/4) of our second-language students had a strong self-awareness of their personal learning style as demonstrated by the strong match between their self-predictions and the results obtained by filling out the VARK online tool. Indeed, the biology students in our study had a high self-awareness of their learning styles whether or not they spoke English at home. This strong self-prediction result is similar to Dobson (2010) who reported that 2/3 of physiology students had a correct match between their perceived preference and the VARK tool. The reason for our slightly higher number of successful matches (i.e. 3/4 versus 2/3) may be that biology students in our study were allowed to pick multiple preferences, which resulted in multiple selections by more than 70% of our students. Dobson (2010) also reported that kinesthetic (K) learners had the weakest self-awareness of their learning style, while we found the poorest matches among those with auditory (A) learning preferences. The significance of

strong self-prediction is that self-knowledge helps students achieve self-efficacy, which ultimately helps them learn and promotes self-satisfaction (Gurpinar et al., 2010).

The present findings showed that the majority of second language speakers were pre-health students and that they felt confident about their self-predictions. This particular self-confidence is somewhat in contrast to results that showed self-confidence may be low among minority pre-health students (Koenig, 2009; Barr et al., 2010), many of whom may speak a second language at home. The reason for a lack of confidence is complex although it may partly stem from poor self-assessment skills (Cassidy, 2007). It may be that our students represent a more confident group when compared to other institutions. Conversely, our students may not be as confident as they perceive, because they also expressed the desire to know more about learning styles in spite of their self-confidence about that knowledge.

Although we had initially expected that low self-awareness of one's learning style might negatively impact biology course performance, we did not find any clear correlation between self-awareness of learning style and grades. This appears in contrast to studies showing that self-perception is related to academic performance (Lievens-Widenski & May, 2010; Young & Fry, 2008; Schraw & Dennison, 1994; Sperling et al., 2004). Our results are not in contradiction, but merely suggest that academic performance may involve aspects of self-awareness other than learning style self-awareness. Interestingly, Gal and Ginsburg (1994) showed that students' general self-perceptions of ability may actually increase anxiety and/or learning difficulties which suggests that self-awareness may sometimes negatively impact performance.

We did not observe any marked gender differences in learning style preferences among second-language students, similar to our earlier report on physiology students (Breckler et al., 2009) and agreeing with reports that gender plays a minor role in education and learning styles among humanities students (Newman-Ford et al., 2009; Kratzig & Arbutnott, 2006). However, the result is in contrast with reports that learning preference profiles may be different among male and female physiology students (Dobson, 2010; Wehrwein et al., 2007).

In our study, biology students who speak a second language at home have an academic performance similar to their classmates speaking English at home. Although second language speakers in our study performed as well as their classmates, good grades may be more difficult to obtain for this population. For instance, Hussain et al. (2009) have suggested that assessment is a concern for second language students and this might weigh heavily in expected grade outcomes. Assessment questions that involve complex sentence structures, fill-in/completion statements and essay-writing are all considered difficult assessment formats by ESL students (Teemant, 2010) and are often used in biology coursework. In contrast, Soto and Anand (2009) have proposed that learning a second language may actually improve biology performance by providing the equivalent of pre-requisite courses. Second language speakers also do better than predicted by their high school grades (Ramist et al., 1994). In spite of solid performance by second language speakers, these students may encounter other obstacles to their career goals. For example, students with reduced English language fluency might be expected to have lowered standardized test scores (Cuddy et al., 2006), networking ability, acquaintance with professors for letters of recommendation, informal advising, family financial support, and access to relevant volunteer experiences, all of which might impact student success.

Although we did not set out to measure retention rates of second language speakers, it is interesting to note that low grades and lost confidence are usually major factors for students who decide to discontinue their science coursework (Seymour & Hewitt, 1994; Barr et al., 2010). Other reasons that have been suggested include sociological factors such as cross-cultural issues,

gender and race (Barr et al., 2010; Koenig, 2009; Adamuti-Trache & Andres, 2008; Apfelthaler et al., 2006; Andreou et al., 2005; Dunn, 1993). It would be interesting to examine whether our students speaking a second language at home have similar retention rates in science coursework as their English-at-home classmates who achieve comparable grades.

As for other future studies, we don't yet know whether the actual language being spoken by an individual student influences their learning style or course performance, although this has been suggested in studies of foreign language speakers conducted by LoCastro (1994). Another potential direction may be to assess whether student's involvement in ESL remedial/preparatory classes plays a role. These programs provide academic support, reinforce different learning strategies, and encourage confidence in students (Rosenthal, 1992; Bragg et al., 2006). Based on our data, one may reason that these types of programs are successfully equipping the second language learners with the tools to identify learning strategies needed for academic success. While our study was done at single time points, it would also be interesting to design longitudinal studies on biology second language learners since it has been shown that longitudinal changes in individual learning styles occur (Busato et al., 1998), especially in ESL students (Reid, 1987).

In summary, second language students enrolled in college biology have learning style profiles similar to their classmates. They also have a strong self-awareness and confidence in their individual learning styles, as well as a solid academic performance in biology. Our results implicate that if there are differences observed in course performance by second-language speakers, the contributing factors must be something *other* than learning style. Suggestions for such factors might include pre-course GPA and attendance (Soto & Anand, 2009) and/or other factors taking place outside the classroom for first-generation college students (Soto & Anand, 2009; Newman-Ford et al., 2009).

Acknowledgements

The authors wish to thank Hao Zhang for advice on the MATLAB software, Danny Chan for performing the computer generated MATLAB values, Perry Chan for graphics assistance, and the introductory biology lab instructors for their cooperation.

Appendix 1: Survey tool

1. Month/year you started at this college:
2. Current year in school:
3. Gender: male, female
4. My intended major is:
5. My intended career is:
6. My age group is: 18-20yr, 21-25yr, 26-35yr, >35yr
7. Do you speak a language other than English at home? yes, no
8. On a scale of 1-5, please rate your interest in finding out your learning style with answers ranging from “mildly interested (1)” to “extremely interested (5)”
9. Circle one or more learning style(s) you feel best describes how you learn: a. Seeing text or diagrams helps me to take in new information. b. Hearing the material helps me to take in new information. c. Writing down what I hear or read helps me to take in new information. d. Touching or observing a physical model helps me to take in new information.
10. To what degree are you confident of your answer to the previous question? Please mark answer ranging from “Not Sure” (1) to “Very Sure” (5).
11. Please indicate as true or false: “Today is the first time I am answering questions to predict my learning style.”
12. What is your approximate, estimated grade for this course? A, B, C, D, F

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Perceived utility and knowledge of graduate teaching assistants

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Abstract: The current study examined the graduate teaching assistantship experience from the perspective of course instructors, graduate teaching assistants, and students. Specifically, the purpose of the study was to determine the degree to which these groups perceived teaching assistants as utilized and knowledgeable in their assigned tasks. Students had a high propensity to answer, “I don’t know” as to whether a teaching assistant was utilized in multiple duties. One-way ANOVAs with post-hoc analysis indicated most statistical differences in perceptions were between instructors and students. Overall, instructors perceived teaching assistants as more effective than did students.

Keywords: teaching assistants, knowledge, utility, graduate student training

Many new faculty members experience stress and dissatisfaction during their beginning years as junior professors (Magnuson, Shaw, Tubin, & Norme, 2004). Entering academia requires adjusting to a new perspective. New faculty members are making the transition from one self-image as a student to a new self-image as a professor (Magnuson, 2002). Not only are they adjusting to new identity roles, but, due to economic constraints in higher education, new professors also face increased teaching and advising responsibilities in a rapidly changing environment of technology (Savage, Karp, & Logue, 2004). Regrettably, most faculty members receive little or no teacher training (Jones, 2008) even though they report spending most of their time with teaching duties rather than in research activities (Gale & Golde, 2004; Golde & Dore, 2001; Magnuson, 2002).

I. Literature Review.

The graduate teaching assistantship is a central preparatory experience toward scholarly teaching (Nyquist, Abbott, Wulff, & Sprague, 1991; Nyquist & Woodford, 2000). Graduate teaching assistants have many of the same responsibilities professors do such as preparing and delivering lecture material, compiling examination questions, grading papers, and conducting laboratory sessions for courses. By providing proper training and mentoring to graduate teaching assistants, many of the problems experienced by first year teachers could be minimized.

The teaching assistantship was originally based on an apprenticeship model where the assistant worked directly under the professor by performing tasks like grading papers or preparing class materials. After enrollment increased in the 1960s and the 1970s, teaching assistants took on additional roles such as holding office hours, conducting laboratory sections, lecturing, and even assuming complete responsibility for courses (Nyquist et al., 1991). Currently, graduate teaching assistants (hereafter referred to as teaching assistants or TAs) fulfill diverse duties and responsibilities throughout their teaching assistant experience. Yet, similar to the junior faculty they often serve, TAs are given little or no preparation for their varied responsibilities (Golish, 1999). Often, this begins the cycle that leads to a gross lack of

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preparation for new faculty. As a result, many states are calling for improvements in doctoral education to better prepare faculty (Applegate, 2002).

How well a TA learns to teach is particularly imperative in a time when parents, employers, and legislators are interested in the quality of education provided at colleges and universities (Austin, 2002). Most departments expect TAs to teach and maintain the educational objectives of their university or college but provide very little training toward their success. As departmental budgets continue to shrink, the benefits provided by TAs become scrutinized. The degree to which TAs are utilized and knowledgeable turns into a key issue from the perspective of the institution, instructor, teaching assistant, and the student.

A. Utility.

For many graduate teaching assistants, the preparatory experience for future professional pursuits does not progress beyond clerical tasks. In many situations when they receive teaching opportunities, it is usually in response to a departmental need to cover courses or sections rather than a focus on the developmental needs of future teachers (Austin, 2002). Yet, utility as a teaching assistant in various teaching responsibilities can serve as an important preparatory experience.

Teaching assistant utility, or the tasks a teaching assistant is required to complete, is ultimately the responsibility of the supervising faculty member, regardless of university, college, or departmental responsibility designation. In order for teaching assistants to provide the most help to students, as well as gain from the interactions of working with students, teaching assistants must clearly know what the cooperating professor intends the students to know. When the professor understands a teaching assistant's abilities, experience, and goals, the professor is better able to tailor responsibilities specific to the teaching assistant.

B. Knowledge.

Recently, there have been advances in increasing and advocating quality training for doctoral students for faculty careers as evidenced in such programs as *Preparing Future Faculty* (Applegate, 2002). Boyle and Boice (1998) found that mentoring, involvement, and modeling were much more effective in developing junior faculty members and teaching assistants in the area of teaching than training programs. As Shannon, Twale, and Moore (1998) found, there is no replacement training for actually teaching experience. Therefore, actually performing the task translates into required knowledge to perform the task effectively in the future. Nonetheless, in most academic settings, the principle training for graduate teaching assistants is the completion of an introductory training workshop (Buskist, 2000).

Some scholars have examined teaching assistant relationships with students (Golish, 1999) while others have primarily focused on professors or supervisor relationships (Bernard-Rodrigues & Bond-Robinson, 2006; Bomotti, 1994; Notarianni-Girard, 1999). To date, however, no one has examined perceptions of all stakeholders involved in the teaching assistant experience. In order to have a complete understanding of the experience, perceptions from students, teaching assistants, and cooperating instructors should be examined. The purpose of the study was to determine the degree to which stakeholders perceived teaching assistants as utilized and knowledgeable in curriculum development, course maintenance, teaching responsibilities, and mentoring.

II. Methodology.

In order to determine the degree to which teaching assistants were utilized and perceived as knowledgeable, opinions from all stakeholder groups were solicited. Because of the limited information in this area of inquiry, we employed an exploratory descriptive design.

A. Participants.

A convenient sample of participants ($N = 233$), consisting of graduate teaching assistants, instructors, and students in three social science departments agreed to participate in this study. The sample was drawn from a Research I institution in the western United States. The cooperating departments were selected based on two criteria. First, their course material was similar in content, focusing on human development, behavior, and relationships. Second, they shared compatibility of departmental requirements for their graduate teaching assistantships. The sample was comprised of 21 graduate teaching assistants, 20 cooperating instructors, and 192 students enrolled in the class for which the participating graduate students were assigned. Upon IRB approval, participant recruitment proceeded in three steps. First, we solicited participation from faculty members who had teaching assistants within the departments. Of the 45 faculty members who had teaching responsibilities that required a teaching assistant, 20 (44%) agreed to participate. Participating faculty members asked their teaching assistants if they would be willing to participate. All 21 teaching assistants agreed to complete the survey. Finally, faculty members announced the purpose of the study to their students in class. Student e-mail addresses were gathered in their respective classes. Students were e-mailed a copy of the survey to complete. Of the possible 403 students, 203 eventually completed the survey. Duplicate surveys were not included, leaving 192 (48%) of the surveys sufficient to use in the data analysis. The response rate was better than expected for this type of survey design (Deutskens, Ruyter, Wetzels, & Oosterveld, 2004).

Participants completed an anonymous survey about the perceived knowledge and utility of the teaching assistant and returned it electronically. As shown in Table 1, student respondents were mostly juniors (39%) because of the make-up of the participating classes but the other years in school were also represented with freshman (17%), sophomores (16%), and seniors (28%). Most of the teaching assistants were master's students, either in their first year (33%) or their second year (29%). Half of the faculty participants (50%) were tenured/tenure track professors, with the remainder including graduate instructors, adjunct faculty, and lecturers.

B. Measurement.

We constructed three separate measures, one for each participant group. We identified four principle areas (curriculum development, course maintenance, teaching responsibilities, and mentoring) from each department requirement sheet in an attempt to identify potential duties in which teaching assistants were viewed as knowledgeable and utilized. Surveys were administered to a pilot sample of graduate student instructors who were not participating in the study, but could provide perspectives since they had fulfilled roles as students, graduate teaching

Table 1. Number of participants per participant category.

	Teaching Assistants (<i>n</i> = 21)		Instructors (<i>n</i> = 20)		Students (<i>n</i> = 192)
First-year Master's	7	Full Professor	3	Freshman	33
Second-year Master's	6	Associate/Assistant Professor	7	Sophomore	30
Third-year Master's	1	Lecturer	5	Junior	74
First-year Doctoral	4	Adjunct Faculty	3	Senior	54
Second-year Doctoral	3	Graduate Instructor	2	Other	2

assistants, and instructors. No items were eliminated based on their feedback. Various items included on the survey are included in Tables 2 through 4.

TA utility. We defined perceived utility by the frequency teaching assistants completed potential duties. Teaching assistant duties derived from combining the social science departmental requirements and separating them into separate categories based on the duty. For example, curriculum development consisted of duties pertaining to creating course materials such as examinations and lecture material. Course maintenance consisted primarily of clerical duties. Teaching responsibilities addressed teaching assistant attendance and participation in the course, such as teaching lectures. Mentoring consisted of items like tutoring students and holding office hours. There were 7 items measuring curriculum development, 11 items measuring course maintenance, 9 items measuring teaching responsibilities, and 5 items measuring mentoring. Each item was measured on a 5-point Likert scale with response options ranging from 1 = Never to 5 = Very Often.

TA knowledge. We defined perceived knowledge as the participant's agreement or disagreement of knowledge for the same potential duties, and associated items, in which teaching assistants were utilized. Perceptions of knowledge were measured using a 5-point Likert scale with response options ranging from 1 = Strongly Disagree to 5 = Strongly Agree, indicating that higher scores were associated with increased perceptions of knowledge on the specific task.

III. Results.

A. Utility.

First, we calculated frequency and percentages for each survey item across respondent groups (teaching assistants, students, and instructors) to provide a general sense of group perspectives and response distributions for the teaching assistant experience. Overall, respondent groups felt that professors utilized the teaching assistant (62% of TAs, 55% of students, and 80% of instructors). On the other hand, only 24% of teaching assistants and 27% of students felt the students utilized the teaching assistant. Instructors did not share this view, with 55% of instructors indicating that students were utilizing the teaching assistant.

Specific findings with regard to teaching assistant utility revealed that 5% of teaching assistants, 39% of students, and 30% of instructors either agreed or strongly agreed that they underutilized teaching assistants' knowledge. Interestingly, professors (65%) viewed teaching assistants as knowledgeable in their role but failed to utilize them in most (87%) of the specific tasks.

Students also had high tendencies, on average, to report, "don't know" whether their teaching assistant was utilized in curriculum development (41%), course maintenance (43%), teaching responsibilities (11%), and mentoring (41%). Furthermore, there were discrepancies between reports of perceived knowledge and reported utility. For example, 86% of teaching assistants agreed or strongly agreed they were knowledgeable in maintaining office hours. However, more than half (52%) of them reported rarely or never maintaining office hours. Another example was teaching assistants indicating they agreed or strongly agreed (81%) they were knowledgeable in tutoring students with course materials, yet only 23% of them said they had often or very often tutored students.

Based on frequency distributions in these data, mean scores indicative of utilization were set at 4.0 or above. As seen in Table 2, teaching assistants reached this standard on items in course maintenance and mentoring. Trends in the data indicated students were most likely to perceive the teaching assistant as utilized and instructors were least likely to perceive them as utilized.

A one-way ANOVA was used to compare group differences. Statistically significant mean differences were found in all four categories. For curriculum development, the group mean scores differed in how each group felt about teaching assistants developing course curriculum, $F(2, 137) = 3.47, p = 0.034$. In course maintenance, statistically significant differences were found for how often TAs recorded examination scores, $F(2, 147) = 4.89, p = 0.009$, with the student respondents ($M = 4.33, SD = 1.01$) having the highest mean scores. Mean scores were also statistically different $F(2, 172) = 5.61, p = 0.004$, for the teaching assistants' utility in remaining up to date with grade information. The greatest differences in these areas were seen between students and instructors.

All group mean scores differed, $F(2, 141) = 5.36, p = 0.006$, in how they viewed the utility of the teaching assistant task of dropping off/picking up test materials and/or promptly recording grades. Finally in course maintenance, statically significant mean score differences were found for the utility of the teaching assistants in making copies $F(2, 105) = 4.30, p = 0.016$, and meeting with the instructor $F(2, 107) = 4.42, p = 0.014$. Post-hoc tests indicated the greatest statistical differences in means were between TAs and students for these areas.

In teaching responsibilities, mean scores of participant groups differed $F(2, 228) = 3.74, p = 0.025$, in their views of teaching assistants utility for attending lectures. In mentoring, the utility of maintaining office hours had statistically significant different participant mean scores $F(2, 131) = 14.16, p < 0.000$.

B. Knowledge.

Overall, most of the respondents (57% of teaching assistants, 74% of students, and 50% of instructors) agreed or strongly agreed that the students viewed the TA as knowledgeable. At the same time, even more of the respondents (86% of teaching assistants, 78% of students, and 65% of instructors) agreed or strongly agreed that the instructor viewed the teaching assistant as knowledgeable.

Table 2. Teaching assistant, student, and instructor means and standard deviations for questions addressing teaching assistant utility.

	<i>Teaching Assistants (n = 21)</i>		<i>Students (n = 192)</i>		<i>Instructors (n = 20)</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Course Maintenance						
<i>Graded assignments</i>	4.48	0.68	4.48	0.88	4.20	0.89
<i>Returned student work in a timely manner</i>	4.19	1.21	4.29	1.00	4.15	0.99
<i>Recorded examination scores</i>	3.86	1.46	4.33	1.01	3.47	1.74
<i>Remained up to date with grade information</i>	4.05	1.28	4.24	1.03	3.28	1.71
<i>Met with the instructor regularly</i>	3.80	1.24	4.17	0.99	3.40	1.10
<i>Maintained confidentiality about student records</i>	4.81	0.51	4.69	0.72	4.88	0.33
Mentoring						
<i>Maintained office hours</i>	2.57	1.47	4.03	1.21	2.83	1.76
<i>Available through e-mail and/or telephone contact</i>	4.43	1.03	4.39	0.84	4.20	1.24

As seen in Tables 3 and 4, there were mean scores greater than 4.0 in all four major categories. However, teaching assistants, students, and course instructors did not all agree on their perceptions of knowledge for any of the six subcategories of curriculum development. Overall, trends in mean scores indicated instructors viewed teaching assistants as more knowledgeable than did the teaching assistants themselves, and the teaching assistants viewed themselves as more knowledgeable than did the students, which was a reversal from perceived utility. Mean scores of both professors and teaching assistants indicated significantly higher ratings than student respondents.

A one-way ANOVA compared group mean differences for knowledge as well. Group means differed in course maintenance where teaching assistants ($M = 4.67$, $SD = 0.48$) perceived themselves as more knowledgeable, $F(2, 195) = 3.19$, $p = 0.043$, in maintaining confidentiality with student records than instructors ($M = 4.39$, $SD = 0.70$), and students ($M = 4.21$, $SD = 0.84$). For overall perceptions of teaching assistant knowledge, the item, “the students viewed the TA as knowledgeable” was the only one in which comparison of participant mean scores was statistically significant. Students ($M = 4.08$, $SD = 0.98$) had the highest mean scores $F(2, 227) = 3.97$, $p = 0.020$, followed by instructors ($M = 3.84$, $SD = 0.90$), and teaching assistants ($M = 3.48$, $SD = 0.98$).

Table 3. Means and standard deviations for teaching assistant knowledge in curriculum development and course maintenance.

	<i>TAs</i> (<i>n</i> = 21)		<i>Students</i> (<i>n</i> = 192)		<i>Instructors</i> (<i>n</i> = 20)	
	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>
Curriculum Development						
<i>Locating outside resources</i>	3.95	0.94	3.90	0.96	4.06	0.94
<i>Preparing PowerPoint presentations</i>	3.95	1.19	4.03	1.02	4.11	0.68
<i>Reviewing drafts of course materials</i>	4.15	1.14	3.87	1.02	4.06	0.83
<i>Assisting with activities not specific to the course</i>	3.85	1.09	3.63	1.00	4.07	0.83
Course Maintenance						
<i>Grading exams</i>	4.43	0.68	4.13	0.90	4.50	0.52
<i>Grading assignments</i>	4.52	0.60	4.37	0.81	4.53	0.61
<i>Returning student work in a timely manner</i>	4.52	0.68	4.24	0.97	4.53	0.62
<i>Recording examination scores</i>	4.67	0.58	4.19	0.96	4.33	0.69
<i>Remaining up to date with grade information</i>	4.43	0.81	4.16	0.98	4.22	0.81
<i>Taking materials to e-reserve</i>	3.29	1.35	3.76	1.03	4.50	0.67
<i>Dropping off/picking up scantrons and/or promptly recording grades</i>	4.10	1.04	4.01	1.02	4.38	0.72
<i>Making copies</i>	4.48	0.81	4.00	1.00	4.31	0.70
<i>Meeting with the instructor regularly</i>	4.33	0.91	3.92	0.93	4.22	0.73
<i>Maintaining confidentiality about student records</i>	4.67	0.48	4.21	0.84	4.39	0.70
<i>Maintaining or updated Blackboard</i>	3.95	1.12	3.90	1.09	4.36	0.74

Table 4. Means and standard deviations for teaching assistant knowledge in teaching responsibilities and mentoring.

	<i>TAs</i> (<i>n</i> = 21)		<i>Students</i> (<i>n</i> = 192)		<i>Instructors</i> (<i>n</i> = 20)	
	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>
Teaching Responsibilities						
<i>Attending lectures</i>	4.48	0.98	4.03	1.19	4.00	0.71
<i>Setting up teaching equipment</i>	4.24	0.89	3.73	1.12	4.06	1.00
<i>Distributing handouts</i>	4.57	0.75	4.10	1.03	4.39	0.70
<i>Teaching classes</i>	4.29	1.06	4.28	0.89	4.25	0.68
<i>Participating in class when appropriate</i>	4.19	1.03	3.99	1.08	4.24	0.75
<i>Conducting exam reviews</i>	3.57	1.21	3.33	1.38	4.00	1.18
<i>Giving exams or supervised exam periods</i>	4.43	0.68	4.07	1.05	4.29	0.73
<i>Facilitating class discussions</i>	4.10	1.00	3.68	1.18	4.06	0.85
<i>Taking notes on in-class information</i>	4.29	1.06	3.75	1.11	4.06	0.66
Mentoring						
<i>Maintaining office hours</i>	4.14	0.96	3.85	1.00	3.73	1.10
<i>Being available through e-mail and/or telephone contact</i>	4.52	0.93	4.17	0.80	4.33	1.08
<i>Tutoring students with course material</i>	4.10	1.00	3.77	1.05	4.00	1.13
<i>Answering student's questions</i>	4.29	0.90	4.06	0.91	4.39	0.70

IV. Discussion.

The principle area of teaching assistant utilization was comprised primarily of clerical tasks. If the teaching assistantship is the primary apprenticeship for teaching, and the primary tasks they complete are clerical, there is disconnect between future goals and current practices. This could be a reflection of a number of things. The graduate students may serve as teaching assistants for employment rather than mentorship in college teaching. Instructors might only need clerical

tasks completed or either party may be uninformed of the potential tasks teaching assistants can complete. Perhaps the department and the supervising faculty member should renegotiate the assessment and designation of responsibilities to better serve as preparation for the teaching assistant's ultimate professional goals. If graduate students wish to make their teaching assistantships more pertinent to their career goals, it is also incumbent upon them to take initiative to mold their experiences to fit their professional pursuits.

The mean score comparisons for perceptions of knowledge revealed teaching assistants, students, and instructors viewed the teaching assistant experience differently. There were statistically significant differences when asked if the student viewed the teaching assistants as knowledgeable and when asked if the teaching assistant's knowledge was underutilized. Most of the observed differences were between the students and the instructors. These differences are important to understand for both form and function. Assuming a business analogy, the instructor is the employer, the teaching assistant is the employee, and the students are the consumer. There is a discrepancy between the employer and the consumer as to what the employee is actually doing and what the employee actually knows. This concept is particularly pertinent in an academic climate experiencing increased enrollment and an increased opportunity for students to actually make consumer choices concerning higher education. Universities and tenure seeking faculty members could mutually benefit from optimal learning environments (e.g., informing students of teaching assistants as a course resource) for the consumer student.

Overall, instructors felt teaching assistants were more knowledgeable than teaching assistants reported. Perhaps instructors hoped or assumed their teaching assistant was knowledgeable, otherwise they would not have been granted the employment opportunity. When comparing participant perceptions of utility and knowledge, it is interesting that instructors perceived teaching assistants as knowledgeable in tasks which the teaching assistants were not requested to complete. This brings into question how instructors conclude them as knowledgeable in tasks in which they were not utilized? Even though instructors perceived teaching assistants as knowledgeable they still did not assign them to complete many tasks that would potentially prepare the teaching assistants for future employment and careers. This may be a manifestation of what Nyquist and colleagues (1991) suggested when they proposed there is an inherent belief that if scholars know their disciplines then it is assumed they can teach within them. Perhaps the instructors assume the teaching assistants have knowledge within the discipline, which, in turn, is an assumed knowledge in task completion. Perhaps TAs experienced an "imposter phenomenon" in which they felt fake in their abilities and less competent or intelligent than they appeared to others (Clance & O'Toole, 1988).

Teaching assistants perceived they were more knowledgeable than students reported, which coincides with the findings of Twale et al. (1997) that teaching assistants tend to give themselves higher evaluations than students because they have had minimal training and/or teaching experience and so may see their performance as acceptable. Perhaps the student perception of teaching assistants as less knowledgeable coincides with the finding that students seem unaware of their responsibilities. Students are not given a list describing the potential duties a TA may fulfill. It is up to the instructor what information about a TA's responsibilities are shared in class, and how the TA is presented as a tool for the students. The teaching assistant is a potential resource for students to utilize in courses, yet students do not seem to be informed of those duties. Students should be enlightened to the duties in order to more fully utilize them.

The relationship between knowledge and utility requires further investigation. The question stands: Is a teaching assistant utilized more based on perceived knowledge or is a

teaching assistant perceived as more knowledgeable because he or she has been utilized more? How, exactly, are they gaining their knowledge of teaching when the majority of their utilization comes from completing assigned clerical tasks?

A. Limitations.

The small sample size in this study made it difficult to generalize about populations of teaching assistants, students, or instructors. Furthermore, findings should only be considered for teaching assistants in social science departments recognizing that graduate teaching assistants in other departments often have different responsibilities. We created the measures administered in this study specifically for this study and so no prior reliability information was available.

B. Implications.

This study is potentially useful for universities and departments employing graduate teaching assistants. If the majority of teaching assistants' duties are clerical, and if they are, in fact, underutilized, then there are some obvious economic implications for universities and departments, alike. Universities should encourage departments, instructors, and teaching assistants to make the most of teaching assistantships to not only improve courses but also provide career development opportunities for teaching assistants and justify the expense of keeping them on the university payroll.

Instructors would be well advised to utilize their teaching assistants, recognize a teaching assistant's necessity for experience with teaching, and to affirm they have a clear understanding of expectations and requirements of the assistantship. As noted, their utility is often the jurisdiction of the department and, ultimately, the supervising faculty member. To make economic sense, the teaching assistant should have a clear vision of what his or her duties are in order to best fulfill those duties.

Departments should also evaluate which potential duties are actually being fulfilled. If there is not a need for teaching assistants to fulfill all of the required duties and if some are not needed for full assistantship hours, then departments should consider either scaling back assistantship hours or assigning one teaching assistant to multiple instructors. On the other hand, departments could also suggest that faculty members utilize their teaching assistants more to provide a wider gamut of experience to teaching assistants and perhaps better assist faculty members.

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Applying the job characteristics model to the college education experience

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Abstract: Boredom is one of the most common complaints among university students, with studies suggesting its link to poor grades, drop out, and behavioral problems. Principles borrowed from industrial-organizational psychology may help prevent boredom and enrich the classroom experience. In the current study, we applied the core dimensions of the job characteristics model to the university classroom. In a survey of 293 students, significant relationships emerged between the five core dimensions (i.e., skill variety, task identity, task significance, autonomy, and feedback) and various affective (e.g., satisfaction) and behavioral (e.g., absenteeism) outcomes. Boredom proneness was found to be significantly and negatively related to course grade and measures of satisfaction. We conclude with suggestions for enriching the classroom experience.

Keywords: boredom, satisfaction, enrichment

I. Introduction.

A common report among students is the experience of boredom at school (e.g., Aldridge & DeLucia, 1989; Czikszenmihalyi & Larson, 1984; Larson & Richards, 1991; Mann & Robinson 2009; Shaw, Caldwell, & Kleiber, 1996; Tidwell, 1988). For instance, Aldridge and Delucia (1989) sampled 252 first year college students. They found that over 41% of students reported feeling bored “often,” while 70% stated being occasionally bored. Shaw et al. (1996) concluded that approximately 32% of high school students indicated they were bored in school. Based on the results of an open-ended survey, Vandewiele (1980) reported that almost 25% of secondary students expressed being bored at school. In a recent study by Mann and Robinson (2009), almost 60% of university students reported lectures to be boring at least half of the time.

Boredom has repeatedly been associated with negative educational outcomes; perhaps the more frequently reported relationships being between boredom and drop-out rate and absenteeism. Early work by Loken (1973) surveyed a sample of 260 dropouts in Canada. He concluded that 2/3 of school dropouts (aged 14-20) left school because of boredom and the desire for new activities. Robinson (1975) found that bored students were significantly more likely to miss class and to drop out. She also found bored students perceived school as less interesting and generally less satisfying. The association between boredom and school dropout has also been reported by Wasson (1981) and Tidwell (1988). Indeed, the number one negative aspect of school identified by high school dropouts was the perception of teachers as boring and uncaring (Tidwell, 1988). Some research suggests that boredom may be related to academic performance in college. For example, Maroldo (1986) found a small, but significant, negative correlation between college grade point average (GPA) and self-reports of academic boredom ($r = -0.15$). Ruthig, Perry, Hladkyj, Hall, Pekrun, and Chipperfield (2008) found that for first year

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college students categorized as high in perceived control, course boredom was predictive of course grade, GPA, and attrition (i.e., dropped courses).

In examining the reasons for boredom in school, the focus has been on the classroom environment. Such an approach is understandable given that students often mention such factors as contributing to their boredom. For instance, Aldridge and DeLucia found that 80% of first-year college students wanted classes that were more interesting. Early work by Morton-Williams and Finch (1968) concluded that 40% of secondary students blamed their boredom on such factors as monotony and lack of variety. Boring classroom activities was also identified as a substantial reason for school boredom in a study by Larson and Richards (1991). Belton and Priyadharshini (2007) suggested that students tend to attribute the experience of boredom at school to external sources such as a teacher's pedagogical style, which supports Robinson's (1975) claim that a change in the way pedagogy is structured may prevent boredom from occurring. Robinson concluded that boredom may be prevented if students are shown the usefulness of course material or if faculty adjust the structure of how they teach the material. In Czikszentmihalyi's (2000) conception of "flow," he noted that boredom arises when one lacks the opportunity to utilize one's skills. Therefore, if students' course assignments do not challenge them to match the level of their skills, then boredom ensues.

Individual differences may also be a contributing factor to the experience of boredom in school, with some students being more predisposed to boredom than others. Larson and Richards (1991) found some evidence for a dispositional reason for school boredom. The authors found that boredom levels at school were significantly related to self-reported boredom outside of school ($r = 0.68$). Shaw et al., (1996) also reported that students who were bored in school were significantly more likely to be bored away from school. Finally, scores on the Boredom Proneness Scale (Farmer & Sundberg, 1986) were found to be the most significant moderator of boredom in school.

The impact of boredom has been reported more frequently in the organizational psychology literature. For example, researchers found job boredom to be associated with job dissatisfaction and absenteeism (e.g., Kass, Vodanovich, & Callender, 2001; Lee, 1986) and with supervisor ratings of job performance (Watt & Hargis, 2010). One common approach to reducing the negative impact of boredom on work outcomes has been to employ job enrichment strategies (e.g., Fried & Ferris, 1987). However, boredom prone workers may not respond well to methods aimed at increasing individuals' intrinsic work motivation (Vodanovich, Weddle, & Piotrowski, 1997).

A. Job Characteristics Model Applied to School.

Hackman and Oldham's (1975) seminal research on job characteristics model (JCM) for job enrichment may help lead the way to enriching the educational setting. Hackman and Oldham proposed that workers who obtained the critical psychological states of experienced meaningfulness of work, experienced responsibility for outcomes of the work, and knowledge of the actual results of work activities would be more internally motivated, perform higher quality work, be more satisfied, and miss work less often than those who do not experience these psychological states. They further suggested that the three psychological states can be achieved by ensuring that the work environment is designed with the following five core characteristics or dimensions in mind: (a) skill variety – the extent to which the job provides workers with opportunities to use different skills or talents; (b) task identity – the extent to which workers feel

as though they complete a whole, identifiable product; (c) task significance – the extent to which work performed impacts other people in a substantial way; (d) autonomy – the extent to which the job offers workers the freedom to determine work schedules or procedures; and (e) feedback – the extent to which workers are informed about their level of work effectiveness. The dimensions of skill variety, task identity, and task significance combine to elicit the critical psychological state of experienced meaningfulness of the work. Autonomy elicits the state of experienced responsibility or control, and feedback leads to experiencing knowledge of the results of one's work efforts. Ultimately, designing work with the core dimensions in mind lead to workers experiencing the critical psychological states which, in turn, leads to the positive work outcomes described above.

JCM has been shown to be quite effective when tested in various work environments. For example, in a meta-analysis of over 200 studies, Fried and Ferris (1987) validated its use in predicting job satisfaction, motivation, absenteeism and turnover. However, Fried and Ferris found positive work outcomes to be more related to perceived increases in core dimensions rather than critical psychological states. Renn and Vandenberg (1995) also questioned the applicability of using the critical psychological states as a mediating variable. These findings suggest that changes in the psychological states are less consequential than the workers' perceptions regarding the core dimensions. In sum, though JCM may be a valid predictor of work outcomes, a simpler form of the model that links core dimensions directly to work outcomes may prove more useful.

Whereas JCM has been well tested and validated in the work environment, other researchers (e.g., Catanzaro, 1997; Jackson, Jackson, & Gaulden, 2006) have proposed its use for designing college curriculum. In one of the few studies to test the JCM in a college setting, Bloom, Yorges, and Ruhl (2000) found four of the five dimensions to be predictive of one or more of six outcomes. The current study extends these findings by examining if core dimensions are related to affective, behavioral, and performance outcomes in a university setting. That is, whereas past research demonstrated that providing employees with skill variety, task identity, task significance, autonomy and feedback is associated with greater job satisfaction and performance, and lower turnover and absences in the organizational setting, this study examines whether or not these same dimensions would similarly be associated with analogous positive outcomes in the classroom.

Hypothesis 1: Each of the core dimensions is significantly associated with affective outcomes of satisfaction (positively) and state boredom (negatively).

Hypothesis 2: The five core dimensions are negatively associated with behavioral outcomes of absenteeism and tardiness rates.

Hypothesis 3: Core dimensions are significantly and positively related to the performance outcome of course grade.

Hypothesis 4: All core dimensions are significantly and positively associated with affective outcomes of school satisfaction, ratings of the school experience, and lack of regret for choice of university.

Hypothesis 5: Each of the core dimensions is significantly and positively related to overall school performance (i.e., GPA).

Hypothesis 6: Trait boredom (BPS scores) is significantly related to all course and school outcome measures (i.e., negatively correlated with positive outcomes and positively correlated with negative outcomes).

II. Method.

A. Participants.

We recruited volunteers from a variety of courses in a mid-sized public university in the Southeast United States. The sample of 197 women and 93 men (3 missing data) ranged in age from 18 to 51 years (mean = 23.1, $SD = 5.5$). The sample consisted of 30% underclassmen (36 freshmen, 49 sophomores), 64.5% upper classmen (101 juniors, 88 seniors) and 5.8% masters students (17; 2 missing data) from over 30 different majors, with psychology constituting a majority (55.6%).

B. Procedure.

Students that agreed to participate received an email with a link to the online survey. Upon completion (or withdrawal), we thanked students by directing them to a specific site on the web. This page (containing no data) could be printed out and signed to be provided to their professors in order to receive extra course credit. We administered the surveys one week prior to final exams so that students had a good idea of how well they were performing in their classes. Respondents received extra credit for their participation.

C. Materials.

The survey consisted of modified versions of the Job Diagnostic Survey (JDS; Hackman & Oldham, 1975), the Job Descriptive Index (JDI), Work Itself facet (Smith, Kendall, & Hulin, 1969), and the Job Boredom Scale (JBS; Lee, 1986). Also included were the Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986), a demographics questionnaire, and two questions designed to assess students' satisfaction with their school experience.

Job Diagnostic Survey. The original Job Diagnostic Survey assesses the five core job dimensions with three questions each. Hackman and Oldham (1975) administered the scale to 658 employees in a variety of professions and reported the following internal consistencies for the subscales: Skill Variety ($\alpha = 0.71$), Task Identity ($\alpha = 0.59$), Task Significance ($\alpha = 0.66$), Autonomy ($\alpha = 0.66$), and Feedback from the Job Itself ($\alpha = 0.71$). For the purposes of the current study, respondents completed two modified versions of the survey; one to reflect school activities, and one to reflect activities for a specific class. Each survey had 15 items arranged in a 7-point Likert format (1 = Strongly Disagree to 7 = Strongly Agree). Examples of modified items pertaining to class activities include the following: Skill Variety (e.g., "My class provides me with the opportunity to experience many new and interesting educational practices" -- $\alpha = 0.78$); Task Identity (e.g., "My classroom experience provides me with an understanding of how the course material relates to the real world" -- $\alpha = 0.70$); Task Significance (e.g., "My performance in this class affects people other than myself" -- $\alpha = 0.42$); Autonomy (e.g., "This class allows me to do my own work on my own time" -- $\alpha = 0.59$); and Feedback (e.g., "Throughout the semester the teacher of this class provides me with feedback as to how well I am performing" -- $\alpha = 0.64$). Students completed the questions for the class in which they were receiving extra credit.

Students also completed the other modified version of the survey which pertained to their overall educational experience at the university. Internal consistencies for each of the subscales administered in this manner were as follows: Skill Variety (alpha = 0.77); Task Identity (alpha = 0.72); Task Significance (alpha = 0.67); Autonomy (alpha = 0.69); and Feedback (alpha = 0.77). The values for the school version of the JDS were comparable to those of the original values found by Hackman and Oldham (1975). Scores from the JDS can be used to compute a *Motivating Potential Score* (MPS) which reflects the relationship between the core dimensions and the critical psychological states. MPS was computed with the following formula:

$$\frac{\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}}{3} \times \text{Autonomy} \times \text{Feedback}$$

Job Descriptive Index. The JDI is a well-established measure of job satisfaction that contains 5 subscales or facets (Work Itself, Opportunities for Promotion, Co-workers, Pay, and Supervision). For the purposes of this study, only the Work Itself subscale was used. It consists of 18 adjectives in which the participant is asked to describe their individual's work environment (e.g., routine, good, respected, challenging). The response options are Yes, No, and I don't know. The original version of the JDI has proven to be quite reliable with an average internal consistency of .88 (Smith et al., 1969). For the current study, the scale items were the same as the original, but we administered it twice with two different sets of instructions. One set of instructions asked the participant to "Please indicate whether or not the following items describe this *course* by selecting the appropriate category" and the other asked the participant to "Please indicate whether or not the following items describe your *experience at this school*." The internal consistency computations for the two modified versions of the scale were comparable to the original. That is, the coefficient alpha for the *course* instructions version was 0.89, and 0.86 for the *experience at this school* version. To the authors' knowledge, this is the first study to apply the JDI to the assessment of classroom or school satisfaction.

Job Boredom Scale. The JBS consists of 17 items developed to assess one's perceived repetitiveness of work tasks (Lee, 1986). The scale is arranged on a 5-point Likert format (1=Strongly Disagree to 5=Strongly Agree). The JBS has been shown to possess high reliability with coefficient alphas found by Lee to range from 0.93 to 0.95. We modified the scale items in the current study to address boredom with one's coursework for a specific class (e.g., "My coursework is monotonous," "Class goes by too slowly," "This class is pretty much the same day after day"). The internal consistency of the modified version was comparable to that of the original (alpha = 0.94). This study may be the first to adapt the JBS for examining boredom in an educational setting.

Boredom Proneness Scale. The BPS contains 28 true-false items developed to assess one's propensity for experiencing boredom in a variety of settings (Farmer & Sundberg, 1986). For the current research, a 7-point Likert format was employed (consistent with many previous studies). Past research has found the BPS to possess acceptable levels of internal consistency reliability, ranging from 0.79 to 0.85 (e.g., Harris, 2000; Kass, Wallace, & Vodanovich, 2003; Farmer & Sundberg, 1986; Kass & Vodanovich, 1990; McLeod & Vodanovich, 1991; Vodanovich & Kass, 1990; Watt & Blanchard, 1994). In the present study, the BPS was shown to possess adequate internal consistency (alpha = 0.80).

Demographic survey. In addition to information such as age and sex, and year in school (e.g., freshman, sophomore), students self-reported their academic performance (i.e., overall GPA and course grade) using the college standard 4-point scale, and estimated the number of times they were absent or late for class. Because some classes met 2 times per week and others 3 times per week, we calculated the percentage of absences and tardiness (i.e., number of absences or late arrivals/total number of classes in the semester). The survey included two additional items. The first assessed students' satisfaction with their educational experience. That is, we asked students "How would you evaluate your entire educational experience at this institution?" on a scale from 1 (Poor) to 4 (Excellent). The other question was analogous to asking about a worker's intent to turnover or student retention (e.g., "If you could start over again, would you go to the same institution you are now attending?") with response options ranging from 1 (Definitely No) to 4 (Definitely Yes).

III. Results.

We computed Pearson product-moment correlations between core dimensions and their relevant outcomes (e.g., course or school). Core dimensions were then simultaneously entered into regression analyses to assess how much each dimension contributed to the prediction of the various outcomes. See tables 1 and 2 for the means, standard deviations, correlations, standardized regression coefficients (beta), and adjusted R^2 values for the regression equations.

A. Core Dimensions and Course Outcomes.

Students' ratings of each of the core dimensions of their courses were significantly related to course satisfaction and boredom in the expected directions (see Table 1), thus providing support for hypothesis 1. Satisfaction was most highly related to course ratings of skill variety ($r = 0.65$) and task identity ($r = 0.70$). Both of these core dimensions added significantly to the regression equation for predicting course satisfaction ($R^2 = 0.51$). All core dimensions were significantly and negatively related to ratings of class boredom with correlations being highest with skill variety ($r = -0.45$) and task identity ($r = -0.46$). Again, these two dimensions contributed significantly to the prediction of class boredom ($R^2 = 0.24$).

Ratings of core dimensions were also related to behavioral outcomes, providing some support for hypothesis 2. Absenteeism rates were significantly, negatively related to ratings on all core dimensions except autonomy, with coefficients ranging from -0.20 to -0.26. However, when entered into the regression, none of the core dimensions contributed significantly to the prediction of absenteeism ($R^2 = 0.07$). Tardiness rates were significantly related to task identity ($r = -0.18$), autonomy ($r = -0.18$), and feedback ($r = -0.15$). However, only skill variety and task identity were significant predictors, although the amount of variance accounted for was rather small ($R^2 = 0.05$). Course grade was not related to any core dimension, thus failing to support hypothesis 3.

B. Core Dimensions and School Outcomes.

Ratings of core dimensions pertaining to school experience were significantly related to the affective measures of school satisfaction, ratings of overall educational experience, and intent to stay (retention), thus providing support for hypothesis 4 (see table 2). For school satisfaction,

correlations with the core dimensions ranged from $r = 0.23$ (autonomy) to $r = 0.59$ (skill variety). However, only skill variety and feedback contributed significantly to the prediction of satisfaction ($R^2 = 0.34$). Correlations between core dimensions and educational experience ranged from 0.27 (autonomy) to 0.49 (skill variety), with only skill variety and feedback making significant contributions to the regression equation ($R^2 = 0.25$). We found a similar pattern for the retention measure with the lowest correlation being with autonomy (0.19) and highest with skill variety ($r = 0.43$). Skill variety was the only significant predictor in the regression ($R^2 = 0.18$). None of the school core dimension ratings were significantly related to performance outcome (i.e., GPA), thus failing to support hypothesis 5.

Table 1. Correlations and standardized regression coefficients (Beta) for core dimensions and course outcome measures.

		<i>Skill Variety</i>	<i>Task Identity</i>	<i>Task Significance</i>	<i>Autonomy</i>	<i>Feedback</i>	<i>Adjusted R²</i>
	<i>M = (SD) =</i>	<i>4.54 (1.45)</i>	<i>5.10 (1.31)</i>	<i>4.12 (1.20)</i>	<i>4.65 (1.22)</i>	<i>4.42 (1.26)</i>	
Course Satisfaction	38.02	0.65**	0.70**	0.39**	0.28**	0.50**	
(Beta)	(13.58)	(0.28)**	(0.48)**	(0.02)	(-0.04)	(0.03)	0.51**
Class Boredom	48.09	-0.45**	-0.46**	-0.19**	-0.14*	-0.33**	
(Beta)	(14.21)	(-0.25)**	(-0.33)**	(0.11)	(0.10)	(-0.05)	0.24**
Absenteeism	0.06	-0.23**	-0.26**	-0.20**	-0.07	-0.25**	
(Beta)	(0.07)	(-0.02)	(-0.17)	(-0.05)	(0.09)	(-0.14)	0.07**
Tardiness	0.04	-0.05	-0.18**	-0.07	-0.18**	-0.15*	
(Beta)	(.08)	(0.25)*	(-0.26)*	(0.04)	(-0.13)	(-0.12)	0.05**
Course Grade	3.03	0.02	0.05	0.05	0.04	0.06	
(Beta)	(0.73)	(-0.07)	(-0.06)	(0.03)	(0.01)	(0.04)	0.00

Note: Due to incomplete data for the various scales the usable sample size ranged from $n = 221$ to $n = 285$; Regression coefficients are in parentheses; * $p < 0.05$, ** $p < 0.01$

C. Boredom Proneness and Course and School Outcome Measures.

Only a subset of 210 participants completed the BPS. To test hypothesis 6, we computed correlations for course and school outcomes with BPS scores (see table 3). BPS scores were significantly related to all affective outcome measures, with the weakest correlation being with class satisfaction ($r = -0.17$) and the strongest school satisfaction ($r = -0.50$). BPS scores did not significantly relate to behavioral outcomes (i.e., absenteeism and tardiness rates) or GPA, but did relate to course grade ($r = -0.16$). In addition, BPS scores negatively and significantly related to MPS scores for both the course ($r = -0.20$) and the school ($r = -0.25$).

Table 2. Correlations and standardized regression coefficients (Beta) for core dimensions and school outcome measures.

		<i>Skill Variety</i>	<i>Task Identity</i>	<i>Task Significance</i>	<i>Autonomy</i>	<i>Feedback</i>	<i>Adjusted R²</i>
	<i>M</i> =	5.30	5.54	4.46	4.80	5.44	
	<i>(SD)</i> =	(1.19)	(1.03)	1.27	1.21	1.15	
School Satisfaction	42.60	0.56**	0.53**	0.28**	0.23**	0.47**	
(Beta)	(10.66)	(0.38)**	(0.17)	(0.02)	(-0.13)	(0.15)*	0.34**
Educational Experience	3.17	0.49**	0.41**	0.32**	0.27**	0.41**	
(Beta)	(0.68)	(0.34)**	(-0.06)	(0.12)	(-0.03)	(0.17)*	0.25**
Retention	3.05	0.43**	0.33**	0.24**	0.19**	0.32**	
(Beta)	(0.82)	(0.43)**	(-0.12)	(0.06)	(-0.06)	(0.14)	0.18**
GPA	3.27	0.06	0.05	0.01	0.04	0.02	
(Beta)	(0.48)	(0.07)	(0.04)	(-0.03)	(0.03)	(-0.06)	0.00

Note: Due to incomplete data for the various scales the usable sample size ranged from $n = 281$ to $n = 287$; Regression coefficients are in parentheses; * $p < 0.05$, ** $p < 0.01$

Table 3. Correlations between BP Scale scores and course and school outcomes.

	<i>BPS</i>
<i>M</i> =	92.25
<i>SD</i> =	(17.84)
Affective Outcomes	
Class Satisfaction	-0.17*
School Satisfaction	-0.50**
Educational Experience	-0.41**
Retention	-0.33**
Course Boredom	0.32**
Behavioral Outcomes	
Absenteeism	0.12
Tardiness	0.03
Performance Outcomes	
Course Grade	-0.16*
GPA	-0.11
Motivating Potential	
Course MPS	-0.20**
School MPS	-0.25**

Note: (max $n = 210$), * $p < 0.05$, ** $p < 0.01$

IV. Discussion.

Our findings indicate that job enrichment strategies, as exemplified by the JCM, may be beneficial in educational settings. Taken together, it appears that efforts to enhance the classroom environment by increasing the basic dimensions of the JCM can yield positive affective and behavioral outcomes. That is, consistent with hypothesis # 1, ratings of an enriched classroom environment (e.g., high variety, identity, autonomy) were significantly related to greater course satisfaction and lower perceived boredom in class. These results support researchers who have suggested that increasing autonomy, control, and skill variety can reduce the occurrence of boredom in school and other environments (e.g., Belton & Priyadharshini, 2007; Csikszentmihalyi, 2000; Patrick, Skinner, & Connell, 1993). It also buttresses the contention of Robinson (1975) that creating meaningfulness within school assignments can offset boredom. As anticipated (hypothesis # 2), high scores on the model's core dimensions were also associated with behavioral outcomes such as lower absenteeism and turnover. However, contrary to hypothesis # 3, we found no significant relationship between core dimension scores and course grades.

We found a similar pattern of results regarding school-based outcomes. School-level core dimension scores were significantly related to affective feelings about school, which provides support for hypothesis # 4. Specifically, high ratings on school core dimensions were significantly associated with greater satisfaction with school, a better educational experience, and a stronger intent to remain at the university. Congruent with class-based ratings, school-based core dimension scores were not significantly related to grades (overall GPA). Consequently, hypothesis # 5 was not supported.

General support was found for hypothesis # 6 pertaining to the impact of boredom proneness scores (BPS) on various measures. This was particularly true for affective outcomes. For example, high BPS scores were significantly associated with low satisfaction levels (both class and school), a poorer educational experience, less intent to stay, and greater perceived boredom in the classroom. Boredom scores were not correlated with either absenteeism or tardiness; however, high BPS scores were significantly related to lower course grades. Furthermore, greater BPS scores were significantly associated with perceptions of low class and school enrichment.

The above results offer support for earlier research that found boredom to be associated with school dissatisfaction, lower grades, and dropout rate (e.g., Mann & Robinson, 2009; Maroldo, 1982; Robinson, 1975; Ruthig et al., 2008; Tidwell, 1988; Wasson, 1981). The importance of such findings is heightened given the relatively high prevalence of boredom in school settings (e.g., Aldridge & DeLucia, 1989; Larson & Richards, 1991; Mann & Robinson 2009; Shaw et al., 1996). Indeed, the tendency to be bored may be an important individual difference factor regarding how students view their educational experience. As noted by Mann and Robinson (2009), it may be beneficial to identify students with high BPS scores and alter classroom activities to best meet their needs (e.g., greater variety and change).

A. Conclusions.

The current study supports the applicability of the JCM to enriching the university setting. Identifying which classroom core dimensions of the JCM are most in need of enrichment may aid teachers in curriculum design and pedagogy. For example, students need and desire the opportunity to use the variety of skills learned in class. Putting these skills into practice allows

students to see the connection between what they learned and the context within which it is applied, thus increasing satisfaction and internal motivation which they may demonstrate through greater class attendance and engagement. Students may also benefit by allowing them to make their own decisions and develop individualized approaches (i.e., autonomy) to completing coursework. Consistent with many different theories on training and learning, students must be provided with informative feedback to help direct efforts toward accomplishing their goals (e.g., Locke & Latham, 1990).

Several action principles have been identified by researchers to impact the five core dimensions of the JCM directly, which include combining tasks, forming natural work units, developing client relationships, vertical loading of jobs, and creating open feedback channels (e.g., Hackman, Oldam, Janson, & Purdy, 1975). Perhaps these principles can be modified for use in the classroom. For instance, creating work teams should increase both task identity and task significance. The establishment of client relationships is believed to heighten the core dimensions of skill variety, autonomy, and feedback. Therefore, one relatively straightforward approach to enhance all five core dimensions may be to require students to work in teams (work units) on projects with outside organizations (client relationships). Ruthig et al. (2008) recommended that boredom in class may be minimized if instructors expressed their own enthusiasm, involved students in discussions, and related course material to the lives of students. These techniques fit within the JCM in that they may increase the psychological state of experienced meaningfulness. Catanzaro (1997) made several other recommendations on ways to augment core dimensions. These suggestions included having students debate a topic (skill variety), offering self-paced courses (autonomy), and incorporating an integrative capstone class (task identity) into the curriculum.

B. Limitations and Future Directions.

The relationships we found between the core dimensions and performance measures (in terms of class grade and GPA) were not statistically significant in the current study. In some respects, these results are consistent with much of the social psychology literature reflecting the tenuous connection between attitudes and actual behavior, especially considering the many factors (e.g., contextual, perceptual) that can mitigate this relationship (e.g., Valdesolo & DeSteno, 2008). That is, the model may be effective for predicting one's motivation to perform well, but due to other differences such as skill level, may not predict actual performance. However, this study found significant correlations between the core dimensions and the affective and behavioral outcomes (e.g., satisfaction, class attendance, and intent to stay in school) that may be important to consider for a host of reasons. For example, increasing students' motivation to attend class and stay in school is a challenge facing most universities, particularly among first year students where almost one-third typically drop-out (e.g., Feldman, 2005). Perhaps enriching the classroom experience, in accordance with the core dimensions of the JCM, may reduce attrition and absenteeism, thereby retaining students in a learning environment.

Some caution should be taken when interpreting the results of the current study. Specifically, only those students currently enrolled in classes participated in this study. Therefore, the range in performance was restricted to the higher end. That is, most poor performing students likely dropped the course by the time we collected the data (last week of class). The overall GPA for the sample of student respondents was relatively high (3.27), perhaps because of self-selection (i.e., those still enrolled and motivated to seek extra credit). Therefore,

more research is needed to include a more representative sample of students spanning the entire spectrum of performance and motivation levels. Alternatively, it is possible that the GPAs and course grades may have been artificially inflated by the biases associated with using self-report measures in research. That is, students may either report higher grades intentionally or may not be aware of their actual grades and tend to estimate high.

Another potential limitation of the current study is that in an attempt to get a representative cross-section of courses from the university, the courses sampled likely vary on a number of characteristics, including enrollment size, teaching format (e.g., lecture vs. seminar), and whether it is required for the major or is an elective. Because this information regarding course format was not collected, we cannot know if the core dimension apply equally well to courses with different formats. For example, would autonomy provide the same results in a large class that it would in a smaller class? Additionally, further research in this area may prove beneficial for enriching the K-12 and on-line environments.

Acknowledgements

We would like to thank Adam R. Smith and Christopher A. Gregory for their assistance in developing the online surveys. We would also like to thank Dr. Jane Halonen for her editorial review and suggestions.

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Evaluating the intervention of an ethics class in students' ethical decision-making

Marquita Walker¹

In this pilot study, the author evaluated the impact of an ethics class in terms of students' ethical decision-making. The research compares aggregate responses from scenario-based pre- and post-survey open-ended survey questions designed to elicit changes in ethical decision-making by comparing students' cognitive and affective perceptions about ethical workplace behavior. Grounded in constructivist theory, which explains how individuals "know" and "come to know something" (Reeves, 2003), this intervention encourages students to make better and more informed ethical decisions in the workplace based on their understanding of their value and belief system. The findings suggest increased positive cognitive and affective changes in student perceptions that inform one's value and belief system, the student's ability to remain open-minded and reconsider previous beliefs and actions from a 360 degree perspective, and the student's ability to apply new information to ethical dilemmas in the workplace.²

Keywords: ethical decision-making, constructionist theory, cognitive and affective perceptions

I. Introduction.

An increased awareness in ethic's instruction and the concept of ethical decision making in organizations is currently prevalent in light of fraudulent, deceitful, and deceptive workplace practices which quickly impact many in a workplace environment.³ Though devious workplace practices have always existed, the increasing disregard for ethical behavior in the workplace has reached unprecedented heights as evidenced by multiple scandals in firms across the country (Anderson, 2008). Workers, defined as wage earners in management and labor, are faced with ethical dilemmas requiring choices which impact themselves and other stakeholders. The question of whether ethics, also known as moral philosophy, can or cannot be taught looms large.

The inclusion of ethics courses in higher education curriculum may help resolve this problem (Lind, 2010). Some believe ethics should be incorporated in most formal education settings to expose all students to a "common method of resolving ethical dilemmas" (Carlson & Burke, 1998, p. 1180). Some believe ethical training should at least raise awareness of ethical dilemmas (Briggs, 1993) or develop cognitive skills in solving ethical dilemmas (Kavthatzopoulos, 1993). Others suggest formal ethics training has little or no effect at all

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² Though other things might be involved in and required for disciplined thinking such as perceiving things in a desirable way yet remaining unwilling or unable to think in a rational, logical, or disciplined manner, the study did not specifically look at those components.

³ McDonald and Donleavy (1995) suggest "the initial wave of current interest in teaching business ethics in the United States coincided with the 1987 endowment to the Harvard Business School by S.R. Shad for the sum of US \$30 million. Quoted in the New York Times, Shad stated: "I've been very disturbed most recently with the large number of graduates of leading business and law schools who have been convicted felons" (Gavin, 1988, p. 25).

(Abell, 1990; Davis, 1991; Weber, 1990). Others, particularly in the management arena, believe ethics' instruction should not be included in the curriculum and add those who teach business classes should remain engaged in activities to increase profits and nothing else (Drucker, 1981; Friedman, 1970). Still others suggest an individual's value system does not necessarily translate into making good ethical decisions so instruction in ethic's training is essential (Goodpaster, 1983; Hoffman, 1982). The general consensus is currently that ethics classes are needed to raise awareness of ethical issues and to move ethical thinking and behavior in a more ethical direction (Boyd, 1981; Cohen, 1989; McDonald & Donleavy, 1995; Stead & Miller, 1988).

Since the intent of ethic's instruction is to encourage individuals to make more positive ethical decisions by changing cognitive thinking patterns, it makes sense to design studies which measure the success or failure of ethic's instruction. Part of the problem in designing studies which measure changes in ethical decision-making within a work environment is the lack of consistency in the definition of what constitutes ethical behavior in human resources and industrial relations (HRIR) or the employment relationship between labor and management (Budd, 2005; Provis, 2006). In professional fields in which ethical codes exist, ethical decisions can be judged against some standard of ethical behavior established, published, and collectively and individually agreed upon by the profession. Absent a specific ethical code, workers must make ethical decisions based on their own perceptions of right and wrong. Pimentel (2008) attributes these inconsistencies to various theoretical models and empirical findings as the result of "different foci and methodological orientations" (p. 360) and suggests the present models are insufficient because they fail to consider the impact of individual characteristics such as "'closeness,' 'relationships,' and 'moral virtue'" on ethical dilemmas. Provis (2006) points out, "the ideas of 'labor' and 'management' are not perfectly straightforward ideas" (p. 64), so the division between the free market or efficiency ethos promoted by management and the equity-based or human value ethos promoted by labor has created a "moral vacuum" (Budd, 2005, p. 2) in which little attention has been paid to the scholarship of HRIR.

Ethical Dilemmas in the Workplace, a sixteen-week semester class delivered online, is designed to explore the fundamental basis for ethical decision-making in unionized and non-unionized workplaces, to improve critical thinking skills about specific moral issues such as human dignity and respect, and to determine what actions should be taken when faced with an ethical dilemma. The course description is as follows:

This course explores the fundamental basis for ethical decision making in a workplace, both unionized and nonunionized. We will discuss specific considerations for making moral judgments within the work environment and explore the basis upon which those decisions are made. We seek to improve our thinking about specific moral issues such as human dignity and respect. This helps us determine what actions we should or should not take in our daily lives which, in turn, fashions our answers to questions affecting how society should or should not be structured. Each field of work or social activity has a code of ethical conduct which is either understood or formally written. Each individual within the profession should understand the value of this code and understand how decisions made in the workplace have an effect on the work environment and, by extension, other workers (Walker, 2011).

The first two weeks of instruction are spent exploring the philosophical underpinnings of foundational belief systems rooted in two divergent philosophical paths: Hellenistic Christianity (religion) and various forms of Aristotelian philosophy (science) which can be traced through the

various writings of philosophers (Kant, [1781] 1963; Locke, 1690; Mill, [1863] 2003). Students are encouraged to think about their own value and belief system in light of these foundational pieces. Attention is also given to Rest's (1984) four components of consistent ethical behavior: ethical or moral sensitivity, judgment, intent, and actions. The next few weeks involve learning various techniques for making personal ethical decisions based on Goree's ETHICS model (Goree, 2007), Gilligan's Caring Model (Gilligan, 1982), and Kohlberg's Justice Model (Lawrence Kohlberg, 1981). An introduction to Derrida's theory of deconstruction explores how texts can be illuminated by "reading between the gaps" and helps students to critically analyze a text (Derrida, 1978). The next four lectures explore Kantian ethical thought as well as some non-Western ethical frameworks and how those theories might fit into the current U.S. system of industrial relations (Budd, 2005). The last half of the semester moves from a theoretical approach to ethical decision-making to a practical approach to ethical decision-making. During these seven lectures, students are exposed to real-life situations in a globalized and corporatist environment in which workers, whether union or non-union, labor or management, daily faced with ethical dilemmas, must apply previously learned theories in order to make ethical choices. A required group project utilizing all the skills students have acquired during the course culminates in students, divided into teams of five, creating an ethical code for a fictitious organization which displays unethical behavior. Students are assigned one of various organizations represented: union, non-union, for-profit, not-for-profit, and faith-based. The ethical code developed must reflect ethical standards of all stakeholders in the organization: owners, managers, employees, suppliers, and consumers.

Each semester the class has between twenty-five and thirty-five students. Prior to the beginning of the semester, each student is sent a request to participate in an online survey, which asks for demographic information as well as narrative responses to nine scenario-based questions involving ethical workplace decisions. At the end of the semester, the students have the opportunity to participate in the same survey. Students self-select into the study and remain anonymous. Students' narrative responses, coded for emerging patterns which are then categorized into themes, form the basis for a comparative analysis concerning changes in cognitive and affective perceptions of ethical workplace decisions.

II. Literature Review.

Research in intervention development engages in a robust preliminary investigation of the literature especially focusing on case studies of current practices (Maslowski, 1999). It is difficult to assess the weight of various studies on the impact ethic's training has on individuals because of the varied methods and instruments used to measure assessment. Most of the literature concerning assessment is quantitative in nature, but the similarities end there. Different forms of statistical analysis, the use or lack of a theoretical foundation, and various forms of instruments for measurement shift the focus of each study, consequently numerous interpretations of the findings abound.

Most of the literature concerning the changes in cognitive thinking (Arlow & Ulrich, 1988; Stead & Miller, 1988; Weber, 1990) or behavior and attitudes (Fritzsche & Becker, 1983; Gautschi & Jones, 1998; Glenn, 1992; Martin, 1981; Weber, 1992; Wynd & Mager, 1989) of students in ethical decision making comes from the 1980s and 1990s. Current research focuses more on developing critical thinking skills which increase the chances individuals will make more ethical decisions (Carlson & Burke, 1998; Klugman & Stump, 2006; Meisel & Fearon,

2006). A literature search was conducted utilizing the key words *ethical decision making, intervention, constructionist theory, pre- and post-test surveys, and cognitive and affective perceptions* in Google Scholar. I used the bibliographies from the articles and books resulting from Google Scholar as further reference sources. I begin this review by looking at pre and post-test survey literature followed by literature reflecting a brief history of constructionist theory and cognitive moral development, and then move to literature concerning ethical decision-making in the workplace.

A. Pre and Post-Test Literature Review.

Building upon Weber's (1990) and Glenn's (1992) summary review of pre/post surveys to assess the impact of teaching ethics to students, this study provides a review to date of pre/post survey studies and their evaluations. This study furthers informs the literature by assessing the impact of an ethics course, *Ethical Dilemmas in the Workplace*, delivered in an online format to students enrolled in one large Midwestern urban university.

The use of a scenario based survey instrument for data gathering "began in 1961 with Baumhart's study of manager's values and ethics (Baumhart, 1961), [though] much of the work [using scenario based instruments for data gathering] has been published since 1985" (Weber, 1990, p. 153; Weber & Green, 1991). This study used an already established set of scenarios called vignettes developed by Fritzsche and Baker (1983). These scenarios included five categories of ethical problems in the workplace covering "coercion and control, conflict of interest, physical environment, paternalism, and personal integrity" (Fritzsche & Becker, 1983, p. 292). Fritzsche and Baker (1983) explain these scenarios were largely taken from material used at the Summer Institute on Ethical Issues in the Management of Public and Private Institutions and were chosen because they included "background information required to understand the dilemma" (p. 292) and had been pretested by a group of individuals working in the area of ethics. Building upon previous sets of already developed scenarios may allow for "cross-study comparison" (Weber, 1990, p. 154) and serve the purpose of validating or questioning past and future studies.

Since this particular study explores union as well as non-union workplaces, new scenarios were necessarily developed by the principal investigator to cover union workplaces. Weber (1990) suggests that "researchers may want to consider using a combination of contexts in their scenarios depending upon the research focus" (p. 143). Realistic scenarios were developed following a prescription designed by (Fredrickson, 1986) which emphasizes that:

the benefit of a scenario comes from its ability to present respondents with a reasonably realistic, detailed situation [in which the] context, problem, described actions, and terminology can all be written in such a way that the scenario generates interest, and therefore 'involvement', by the respondents (p. 481).

Care was taken in the use of relevant hypothetical scenarios for students who may never have been exposed to a union or a non-union workplace "since the "students' ability to understand the case and comprehend the level of decision making may be lacking" (Weber, 1990, p. 143).

B. Ethical Decision—making as it pertains to Cognitive Moral Development.

The study of ethical decision-making as it pertains to cognitive moral development has been influenced by Piaget (1932/1965), Kohlberg (1976), and Rest et al, (1999). These theorists

conceptualize ethical decision-making from a constructivist approach. Piaget married the concepts of cognitive development and moral development and explained why individuals valued certain things. Kohlberg further explained that individuals interpret situations and make meaning which translates into moral judgments. He disavowed the idea that meaning or moral judgments were derived from social stimuli (Carpendale, 2000). Kohlberg's contention was that ethical dilemmas were "ones of conflict of perspective or interest; justice principles are concepts for resolving these conflict ... a person's sense of justice is what is most distinctively and fundamentally moral" (Kohlberg, 1976, p. 40). Rest further advanced the constructivist approach to resolving ethical dilemmas by suggesting cognitive moral development occurs within a range of stages instead of moving sequentially through stages as Kohlberg posited. He developed a four component model of personal ethical development: ethical sensitivity or awareness, the ability to recognize the presence of an ethical issue; ethical or moral judgment, the ability to decide on the right course of action; ethical motivation or intent, the personal disposition to do what is right; and ethical character or behavior, the self-discipline or courage to do what is right under pressure (O'Fallon, 2005; Rest, 1986). Rest suggests all four components interact and influence each other and that moral failure occurs when an individual experiences deficiency in any one of the components.

Lind (2010) suggests an individual's moral behavior is dependent upon that individual's moral principles. To conceptualize this relationship, Lind posits the concept of cognitive structure, which he calls the power of moral thinking, impacts the "degree to which moral maxims or principles are brought to bear in specific situations," (Lind, 2010, p. 30) which he calls content or observable behavior. Based on the Kantian concept of the power of judgment, these cognitive structures help determine which moral maxims or principles to apply in any given situation based on the individual's interpretation of his or her own value and belief system or socio-moral perspective. In other words, individuals make ethical decisions, based on what they believe they know. Lind (2010) acknowledges Kohlberg's development of a stage scheme which measures individual moral development and the existence of cognitive development theory which houses the concepts of structure and content. In order to change a cognitive moral structure, we create hypothetical dilemmas (scenarios) which change the context in which the individual makes decisions. This intervention "tests the boundary between the 'artificial world' created by an education curriculum and the 'real' seemingly unchanged world of work" (Oser, 2010, p. 157).

Kohlberg's levels of moral-cognition are determined by an individual's actions based on his or her socio-moral perspective (Rest & Narvaez, 1994). These stages reflect the cognitive and affective dimensions of an individual's moral development. Utilizing Lind's concepts of structure and content, I turn to the literature reflecting the conceptual framework of the cognitive and affective perceptions of ethical decision-making and explore workers' ethical decision-making situated within the context of the workplace. I define workers as wage earners so the literature reflects workers in both labor and management.

C. Ethical Decision—making in the Workplace.

Much of the ethical-decision making literature focuses on the business or management side of the labor-management relationship within the workplace and is derived from normative ethics, the realm of moral philosophy which guides individual behavior, and more specifically descriptive or empirical ethics, a form of normative ethics, concerned with explaining and

predicting individual behavior in the workplace. A comprehensive review from 1996-2003 summarizing this literature includes over 170 studies based on Rest's (1986) theoretical model.⁴ Though this review includes findings regarding ethical decision-making in relationship to each of Rest's components, of particular interest to this paper are the conclusions drawn from the philosophy/value orientation variable as it relates to each of Rest's components. The philosophy/value orientation suggests individuals make ethical decisions based on moral awareness, judgment, or intent.

According to O'Fallon (2005), one trend in empirical research receiving attention is "the philosophy/value orientation—in particular, idealism versus relativism" (p. 400) which suggests "idealistic individuals tended to be more ethical than relativistic individuals" (p. 400). The philosophy/value orientation variable reflects the subjects' connection between idealism and deontological perspectives⁵ or relativism and teleological perspectives to ethical decision making. Of the forty-two studies relating to the philosophy/value orientation variable examined, idealism and deontology, the pursuit of noble principles and right actions, were positively related to ethical decision-making while relativism, teleology, and economic orientation, or criteria of judgment related to individuals, situations, or the environment, were negatively related to ethical decision-making.

A comprehensive review of 110 articles covering 1994-1999 finds that deontology and teleology significantly influences the decision-making process (Loe, Ferrell, & Mansfield, 2000). A comprehensive review covering 1975-1992 finds only one study concerning a philosophy/value orientation (Ford & Richardson, 1994) which suggests a positive correlation between values and positive ethical behavior in professionals (Allen & Davis, 1993).

Little research specifically devoted to the philosophy/values debate exists outside of the business or management literature, but there does exist research which explores the affective and cognitive literature in terms of ethical decision-making. The connection between philosophy and values and affects or emotions and cognition or rational thinking is very strong. Affective components, found in the models presented by Rest (1984) and Jones (1991), implicitly influence many decisions. Decision-making then becomes "introspective, and retrospective, sporadically rational, ultimately affective and altogether imaginatively unbounded" (Langley, Mintzberg, Pitcher, Posada, & Saint-Macary, 1995, p. 277). This denotes a shift in the literature on decision-making from a rational cognitive perspective toward a more affective perspective. The acknowledgement that affect plays a role in decision-making is supported by many psychologists (Blascovich, 2001; Smith, 2001) and is deemed to be complex and "bidirectional" (Forgas, 2001, p. 6). The influences of affect on ethical decision-making reflect the tension between the way things are and the way things ought to be. Therefore, affect influences the awareness or moral sensitivity of the ethical decision-making process (Rest & Narvaez, 1994). Affect also influences ethical reasoning or judgment. Deciding on the right course of action has significant consequences for the decision-maker and other stakeholders (Izard, 2000). Finally, affect links moral sensitivity and moral reasoning (Weiner, 1987). According to Weiner (1997), affect is primarily responsible for the motivation to act and is the catalyst needed to spur behavior.

⁴ James Rest (1986) advanced the field of descriptive ethics by creating a model of moral decision-making. Subsequent researchers have generally supported Rest's model.

⁵ Deontological philosophy posits an action is determined to be moral based on a comparison to some absolute truth or fixed moral principle (Brody, 1988).

Contributing to the philosophy/value orientation and affective/cognition debate, this paper explores student responses to ethical situations in workplace environments before and after the intervention of an ethic's class. The intent of this measurement is to determine if students exposed to this intervention make more positive decisions concerning ethical dilemmas than they made prior to the intervention.

III. Theory.

The theoretical rationale for this evaluation is constructivist theory, a theory about learning which explains how individuals "know" and "come to know" something. From a constructive perspective, knowledge is "temporary, nonobjective, developmental, internally constructed, and socially and culturally mediated" (Reeves, 2003). Constructivism means forming one's own opinions, values, and beliefs based on one's own knowledge and any new information which might mediate that knowledge. The classroom becomes a microcosm of society reflecting different and diverse viewpoints. Teachers assume the role of facilitator rather than lecturer. Learners take on more of an ownership role in learning and thus the social relationship between teacher and learner is one of reciprocity and mutual respect within a learning community.

IV. Methodology.

A total of 25 undergraduate students formally enrolled in the ethics class were asked to respond to one pre-semester survey and one post-semester survey which included the same nine scenario-based questions. One open-ended question asking participants to describe any changes in their belief/value system, perspectives on considering other's viewpoints in ethical decision making, and their application of new information to ethical dilemmas was added to the post-survey survey. Fourteen respondents filled out the pre-survey while 11 respondents filled out the post-survey. Ten female students and 4 male students responded to the pre-semester survey, and 8 female students and 3 male students responded to the post-semester survey. There were no prerequisites for the class, and students self-selected into the study. There were no penalties for students who did not participate. The average age of the students was 24, and the average work experience of the students was 5-10 years.

Comparisons of the pre-survey and post-survey responses to the scenarios serve as the measure of changes in ethical decision-making. Pattern, theme, and content analysis are used in the assessment of whether or not student's cognitive or affective thinking changed after completion of the course. Using open coding, the data are searched to find predominant or descriptive phrases which suggest core patterns. From these patterns, broader themes are drawn which are then channeled into broad categories. This "classifying and coding [of] qualitative data formed the framework for organizing and describing what has been collected" (Patton, 2002, p. 455) during the data collection phase of this paper and provided a foundation for the interpretative phase where comparisons of pre- and post-survey responses were made. Differences in the number of pre- and post-survey responses are noted in each category for each scenario.

The scenarios, described later in this paper, focus on ethical dilemmas in various workplace settings. In each scenario, the student is given a predetermined identity or specific role, such as manager or worker in the company, and asked what s/he would do in each of

these scenarios. The narrative responses provide data from which comparisons of changes in ethical decision-making is made.

V. Findings.

The coding from both pre- and post-survey responses resulted in the same six major categories of student action for eight of the nine scenarios: acquiescence (meaning to comply or go along with the organization's wishes/demands), repudiation (meaning not to comply with the organization's wishes/demands), whistleblowing (reporting unethical conduct to a higher authority), discussion (exploring and discussing situations prior to taking action), exiting the firm (quitting the job), and unsure. Scenario four which deals with conflict of interest yielded a seventh category of neutral. Post-survey responses reflect a change in the number of student responses which fit into each category from pre-survey responses but not a change in category. The shift in the number of responses from one category to another suggests students changed their cognitive and affective thinking from one position to another as a result of new information from ethics instruction. This fits into constructivist theory which suggests students mediate their existing knowledge with new knowledge to form new "opinions, values, and beliefs" (Reeves, 2003). Not every student responded to every pre-survey and post-survey scenario. Following is a summary of the data collected from scenario-based student responses, tables reflecting the number of pre- and post-survey responses divided by category, shortened descriptions of the findings, and a brief explanation of the cognitive and/or affective changes noted between the pre- and post-survey responses.

Scenario one dealt with coercion and control: You are the CEO of Rollfast Bicycle Company which has been barred from entering the market in a large Asian country by collusive efforts of the local bicycle manufacturers. Rollfast could expect to net 5 million dollars per year from sales if it could penetrate the market. Last week a businessman from the country contacted you and stated he could smooth the way for the company to sell in his country for a price of \$500,000. Question: What would you do in this situation?

Categories and the number of times they appear are shown in Table 1. The themes from which the categories are derived follow the category in parenthesis.

Table 1. Coercion and Control: Pre/Post Test Response Categories.

Categories	Pre-survey Responses	Post-survey Responses
Repudiations (decline)	10	10
Acquiescence (participate if legal/opportunity)	5	1
Unsure		1

This scenario suggested a way for a firm to enter a previously barred market by paying bribe money to a businessman who offers to "smooth the way for the company to sell in his country for a price of \$500,000." Pre-survey and Post-survey responses for repudiating or declining the invitation remained stable at 10. Student responses included "it is illegal," "it is not ethical to take the man's offer," and "I would turn the offer down. Even if I paid him that leaves the door open for him to blackmail me (and my company) for more especially if the any other member of the board knew of the deal (Bernie Madoff comes to mind to me)." Such responses suggest students were aware of corporate fraud in the current business environment and may have

declined to participate for fear of criminal punishment. Four student responses in the pre-survey reflected the businessman's suggestion as an opportunity. Those students disclose the transaction as "the cost of doing business" or "if there is an opportunity to make a profit, I will try to see how I could do it." One student in the pre-survey said "I would contract my lawyer and proceed from there" suggesting s/he might take the offer if the offer were deemed legal.

In post-survey responses, declining the invitation for one student was a matter of conscience. S/he responded, "First thing you do is think about the consequences of getting caught ... I would tell the man no because my conscience would know that it is wrong no matter if I got caught or not." The mention of conscience implies an ethical choice has been made to do what is right. Only one student viewed the businessman's suggestion as an opportunity saying, "Well this is going to [be] a good choice for me to make. I will rather try to see what is going to be good for my business and ... I will go for it." One student remained unsure in the post-survey.

The bulk of responses repudiated the businessman's offer both in pre- and post-survey responses. Two responses suggest a cognitive change in the acquiescence category for scenario one. Moving from five pre-survey responses to three post-survey responses which reflect students would view entry into foreign competition as an opportunity denotes a slight change in cognitive thinking toward viewing possible repercussions/backlash if the transaction turned out to be fraudulent. One student response moved into the unsure category also suggesting there should be more consideration of the issue. This shift toward taking more precautions in making this transaction suggests some students are taking a broader view of the ethical dilemma and carefully weighing their options.

Scenario two also dealt with coercion and control: You are the treasurer of your union and keep immaculate records on union income and expenditures. Because of some health problems, you have been unable to perform your duties as treasurer for three months, and another union brother has taken over the treasurer's duties. Upon your return you find some minor discrepancies in the books and investigate the unusual expenditures. You find that your union brother has secretly taken small amounts of money from the union fund, which, if not brought to anyone's attention, might go unnoticed. You are aware that your union brother has some financial difficulties and that his home is in the foreclosure process. Question: What would you do in this situation?

Table 2. Coercion and Control: Pre/Post Test Response Categories.

Categories	Pre-survey Responses	Post-survey Responses
Whistle blow (whistle blow first and then provide restitution/provide restitution and then whistle blow)	14	8
Discussion		3

The scenario, within a union setting, adds a layer of complexity to the union members' relationship with each other. There is a presumption that solidarity within the union means union brothers and sisters look out for each other while maintaining the integrity of the union as a whole. Student responses to this ethical dilemma reflect the conflict between acting in a fiscally responsible manner and taking care of a union brother.

All students in the pre-survey responded they would confront the union brother about the financial discrepancies and turn him in to the union. Five students said they would confront their union brother first and then whistle blow. Responses included:

I would approach my union brother first to give him the opportunity to make it right. If he chose not to, since the funds (sick or not) are my responsibility, I would report it. I understand financial difficulties, but taking from others in the same boat isn't the way to fix it.

Another student said:

First I would approach my union brother and try to persuade him to begin repaying the union in small amounts. I would try to explain to him that everybody has a financial downfall at some point, but if everyone acts dishonestly there would be no one to trust in times of need. If he refused I would feel forced to report him to the proper authorities.

Nine students said they would turn in their union brother for stealing. These students did not mention talking to their union brother first about making restitution and leaned toward turning him in to protect themselves from rebuke. Their comments included, "I would turn him in because if they found out I could get in trouble and lose my job which is important to me" and "I would have no choice but to report him. Why risk my job, my family, my finances and the union's reputation for a guy who chooses to steal? No telling what he would do next!" Another student said, "I would feel obligated to come forward with the information immediately. I have a mortgage and family to support also, and cannot afford to take the blame for theft." One student's action would depend on "how much money he took." If repayment could be arranged, no repercussions would follow.

Post-survey responses suggested a somewhat softer approach to the ethical dilemma which may reflect students' leaning toward helping their union brother first and then requiring disclosure of financial discrepancies second. One student response suggested they would first turn in their union brother and then seek restitution, down from six in the pre-survey. The responses said, "I will report the matter just to make my name clean and if I am able to help with his financial situation I will love to help." Six students would still whistle blow, down from seven in the pre-survey. Their responses, reflecting the issue in black and white, include, "I would expose the union brother. Stealing is not only illegal, but it is unethical," "I would turn him in, no matter what he is stealing," and "I would report my findings. There are many people having financial difficulties but that doesn't give anyone the right to steal."

Four students would confront their union brother and try to seek restitution before turning him in. They used phrases like "give him a chance to return the money," or "give him an opportunity to return the stolen funds." One student suggested the union brother should be given an opportunity to repay his "Loan" by "promot[ing] a fund raiser to help with some of the repayment."

Three students would discuss and explore solutions before exposing the fraud. Responses included, "Talk[ing] to the union brother and maybe try to arrange an ethical recovery so he didn't get in trouble. Maybe we could take donations or something" and "I would have to talk to the union president about this situation and get his advice on how to proceed."

Fourteen pre-survey and eleven post-survey responses suggested some form of whistleblowing or telling a higher authority about the ethical dilemma. This ethical dilemma primarily reflected a shift in cognitive thinking within the category of whistleblowing. The whistleblowing took two forms: whistleblowing and then helping a union brother make restitution or helping a union

brother make restitution and then whistleblowing. The cognitive shift lies in those post-survey responses which suggest students would attempt some form of restitution and/or discussion prior to whistleblowing. This cognitive shift suggests the intervention of new information in choosing between two equally unattractive alternatives shifts some responses from black and white alternatives to more nuanced responses.

Scenario three deals with conflict of interest: You are a union official. One of your members is discovered to have a history of mental illness and is going to be dismissed by his employer on that basis. You feel this is unfair. The member has appealed to you in your union role to help him protect his job. However, the other union members at the workplace share their employer's prejudices and do not want to work with this man because of his mental illness. They hold an informal meeting where they vote strongly not to support their fellow worker and convey their opinion to the union. Question: What would you do in this situation?

Table 3. Conflict of Interest Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Acquiescence (stand with mentally ill or support conditionally)	11	14
Repudiate (stand with co-workers)	1	
Discussion (research condition of mentally ill)	1	

This scenario challenges students to make a difficult ethical decision: to stand by a mentally-ill union brother or side with a majority of co-workers who do not want to work with a mentally-ill person. Pre-survey responses reflect five students stood up for the mentally ill employee. Their responses included phrases like "defend the individual," "stand for the worker's rights," and "still support the person." One student said s/he would support the coworkers because "that is the vote of the majority." Six students responded they would conditionally support their mentally ill coworker "depend[ing] upon...how severe it is," "if the illness did not hinder the member from properly executing his job, and did not endanger the well-being of other members," and "if I felt the worker was being penalized unfairly." One reply favored researching discrimination against the mentally ill and reminding coworkers of privacy issues.

All post-survey replies suggest students moved in the direction of supporting or supporting conditionally the mentally ill worker while distancing themselves from other non-sympathetic coworkers. Ten student responses supporting the mentally ill worker included phrases like "I'd stand up for the guy," "support the member," and "defend the man's job." Four responses suggested some type of conditional support for the mentally ill worker based on how the mental illness affected his work. One respondent wrote, "In my honest opinion, it would have to do with the type of mental illness," while a second respondent said, "I would help him to fight for his job in this situation if his illness did not affect his work." The shift toward favoring a helpful and supportive approach for the mentally ill coworker suggests students' ethical decision making has broadened to include a human component and not simply a profit motive.

Scenario four deals with conflict of interest: You have recently accepted a job with a young vigorous microcomputer manufacturer. The microcomputer manufacturers are engaged in intense competition to become the first on the market with a software package which utilized the English language and thus is easily used by the average consumer. Your former employer is rumored to be the leader in this software development. When you were hired, you were led to

believe your selection was based upon your management potential. The morning beginning the third week on the new job, you received the following memo from the president: "Please meet with me tomorrow at 8:15 am for the purpose of discussing the developments your former employer has made in microcomputer software. Question: What would you do in this situation?"

Table 4. Conflict of Interest Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Repudiation (no comply)	5	8
Acquiescence (comply)	2	3
Walk tightrope	4	1
Exit Firm	1	0
Discussion	1	0

This scenario places the student in an ethical dilemma between allegiance to a current employer or maintaining confidentiality of a former employer. Pre-survey responses show that five students would not comply with their current employer's request for confidential information about their former employer's microcomputers. Responses include "I would decline the invitation, deeming it unethical," and "To pass on this information is comparable to theft." Two students felt compelled to comply unless bound by nondisclosure agreements. Four responses attempted to walk a tightrope between the information requests of the current employer and the past relationship with the former employer. This balancing act resulted in "play[ing] dumb," reveal[ing] information ... if the circumstances I left under were negative," or "attend[ing] the meeting, and not saying a word." Two students felt strongly enough about the ethical dilemma to exit the firm. One student wrote, "I would quit and let my old employer know what was happening," while another student said, "I would rather lose a job than my professional reputation." One response involved discussing the conflict of interest with the president.

Scenario five dealt with physical environments: The firm for which you work, Master Millers, has developed a special milling process which yields a wheat flour which when used for bread provides a lighter more uniform texture than conventionally milled flour. Unfortunately, the process gives off more dust than the emission control equipment presently installed can handle and still maintain emissions within legal limits. Due to lack of availability, the company is unable to install new emission control equipment for at least two years; however, if it waited that long to introduce the new process, competitors would very likely beat it to the market. The general manager wants to use the new process during the third shift which runs from 10 pm until 6 am. By using the process at that time, the new flour could be introduced and the excess

Table 5. Physical Environment Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Repudiation (protest)	4	1
Acquiescence (keep quite)	1	2
Whistle blow	3	6
Discussion	4	1
Unsure	2	1
Exit the firm	1	0

pollution would not be detected due to its release in the dark. By the time demand becomes great enough to utilize a second shift; new emission equipment should be available. You are aware of this situation. Question: What would you do in this situation?

This scenario places workers in the position of remaining complacent concerning environmental hazards or exposing the firm for excess pollution, a sticky ethical dilemma. Four pre-survey responses reflected keeping quiet by “keep[ing] my mouth shut,” because “I could lose my job.” One respondent “would defiantly have to say something because I would not want to be breathing that in,” and three respondents would whistle blow by alerting a higher authority such as OSHA. Four individuals would explore or discuss the situation with the firm, and one individual was unsure of his/her response. S/he stated, “I honestly don’t know if I would do anything.” One respondent said they would exit the firm because “I would have to quit if there was no other solution to fix this temporary problem.”

Post-survey responses suggested a more proactive move toward highlighting the firm’s excessive polluting behavior. Post-survey responses reflected only one individual who would remain silent stating, “If I had to choose between accepting this breach of ethics and being unemployed, I’d accept the breach of environmental ethics in this situation.” Two individuals would passively protest but gave no sign of what their protest would consist. Six respondents said they would whistle blow by “going above the company to a higher power,” “utilize[ing] the whistleblower policy because there are health risks involved,” “confront[ing] the firm ... go to higher power,” and “tak[ing] my concerns public.” One individual would explore and discuss by trying to find “some alternative ways this new flour could be introduced without the excess of pollution;” while another individual was unsure of his/her response.

Scenario six deals with physical environments: You are the business agent for the International Brotherhood of Printers, Local 20 which represents the employees of the firm, Print It Right. Print It Right, in order to comply with environmental regulations of the disposal of hazardous waste, must switch from using chemical-based ink in their printing process to water-based ink. Therefore, Print It Right must dispose of several hundred 55-gallon drums of chemical-based ink. The chemical-based ink must be neutralized before being sealed into the drums and before shipment and off-site storage occurs or the possibility exists that a non-neutralized drum of chemical-based ink could bulge, expand, and explode. You have been notified by one of your union members that she has been ordered by management to remove one 55-gallon drum of chemical-based ink which is bulging or be disciplined with a charge of insubordination. She tells you she asked her supervisor for protective equipment (goggles, protective suit), and he told her these items were not available. Question: What would you do in this situation?

Table 6. Physical Environment Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Repudiation (no comply)	1	1
Acquiescence (comply or comply with Qualifications)	3	3
Whistle blow	5	5
Discussion (explore)	4	1
Unsure	0	1

This scenario revolves around the ethical dilemma of whether a representative of the union, a business agent, should give advice to a union member ordered to remove hazardous waste without protective clothing to comply with management's orders or to refuse to comply for safety reasons. One pre-survey response suggested a refusal to comply by telling the worker and management "not to do the job without protective gear," while one pre-survey response advised the workers to comply "because it would probably be more trouble than it's worth [to not comply]." Two responses indicated compliance with qualifications by "investing in the protective equipment or else...deal directly with the employer over time." Five students indicated they would whistle blow including comments like "since the super has no regard for his employee's safety, I would take the matter up with his supervisor and the company's safety department" and "I would report Print It Right to the proper authorities." Four responses reflected the need for discussion with management about providing protective equipment, and one of those responses suggested checking with management to see if "the union member may have been lying and didn't really ask the supervisor [for the protective equipment]."

Post-survey responses were very similar to pre-survey responses when considering compliance or noncompliance. One post-survey response indicated a refusal to comply, while another post-survey response indicated the worker should comply. Two students responded they would comply with qualifications by "secure[ing]" or "find[ing]" the protective equipment themselves. Five post-survey responses indicated they would whistle blow by "going to someone with more power," "go right over everyone's head," or "'confront' or 'talk' to the supervisor about safety precautions," and "tell him (the supervisor) that he will be reported to OSHA, EPA, and anyone else." A shift did occur from four pre-survey responses indicating discussion and exploration to only one response indicated the appropriate solution would be to discuss the situation saying, "I would fight for her to receive protective gear." Moving from discussion involving a potentially hazardous situation to more definitive action suggests students may be more concerned with finding solutions to problems than simply talking about the problem. One student was unsure of what to do.

Scenario seven deals with paternalism: You are a senior editor of J&P Publishing who has just received a manuscript from one of your most successful authors. The manuscript provides the most authoritative account yet published of the history of the development of Improvised Explosive Devices (IEDs). However, the final chapter contains a detailed description of how the IED is made. Jones has tried to convince the author to omit the last chapter stating that such information should not be made readily available to the mass market in paperback form. The author believes the chapter is critical to the success of the book and thus will not agree to its deletion. Question: What would you do in this situation?

Table 7. Paternalism Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Repudiation (not publish)	5	5
Acquiescence (publish or publish with Qualifications)	7	7
Whistle blow	1	0
Discussion	0	1

The ethical dilemma described in this scenario asks students to make a choice between publishing and disseminating potentially dangerous material or restricting an author's right of

free speech. Seven pre-survey responses lean toward protecting free speech and are littered with phrases like “I would stick up for the author’s rights,” “freedom of speech prevails,” and “we’re talking about freedom of the press here.” Five pre-survey responses leaned toward not publishing the material saying “such information should not be made public ... we are not liable for mass destruction or aided in terrorism,” “in no way does this last chapter need to be in the book,” and “I would not publish a book that is a clear violation of national security and would put people in danger.” These responses suggest very polarized dichotomies reflecting strong feelings about rights of free speech and the public’s right to know. One pre-survey response said “I would take this to the courts to see maybe what a lawyer/judge says.”

Post-survey responses seemed to move toward less polarizing stances. Only three students, down from seven, responded they would publish the material; four students replied they would not publish the material, and two students decided to publish with qualifications stating, “I would not publish the book until the last chapter has been omitted,” and “I would try and bargain with the writer as much as I can...if he did not agree to my terms then I would tell him to find another publisher.”

Scenario eight deals with paternalism: You are a union official who represents workers in a large firm that makes paper products. A new product line is to be manufactured. This restructuring means there will be jobs eliminated because the new equipment can produce more efficiently than can human labor. According to the contract, this job elimination can take place. One of the employees who will lost his job as a result of this restructuring is also your good friend who has a young son with a rare form of cancer, and he depends on the insurance from his job to cover the cost of cancer treatment. Without proper medical care, this young boy’s suffering will increase. As a union official, you have the obligation to enforce the contract between your union and management. Question: What would you do in this situation?

Table 8. Paternalism Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Repudiate (not enforce contract)	1	0
Acquiescence (enforce contract or enforce contract with qualifications)	9	5
Discussion (explore)	2	6
Unsure	2	0

Two pre-survey responses suggested enforcing the contract. The first said, “I would pray and then do my job.” This implies an ethical decision is made based on the guidance of a higher power. The second said “I would jeopardize my job for him because [his] son’s health is important.” This response also suggests a decision made between two equally unattractive alternatives: losing one’s job or sacrificing one’s friend’s job. Seven respondents implied they would enforce the contract with qualifications. Those qualifications included helping him find another job or insurance “like COBRA.” Two responses involved exploring and discussing “some way to help the company and help the family at the same time.” Two respondents said “I honestly do not know” and “that’s a tough one.”

Post-survey responses reflected a marked shift in addressing this ethical dilemma. While two post-survey respondents would still enforce the contract, only three respondents said they would enforce the contract with qualifications and no respondents said they would not enforce the contract. Six responses suggested they would discuss and explore ways to “keep a job for my

friend,” and “do whatever I could at the bargaining table to preserve jobs and insurance benefits.” This shift toward exploration and discussion suggests respondents did not see alternatives as either black and white but as gray areas in which there might exist room for compromise.

Scenario nine deals with personal integrity: Personal Integrity: You are working in product development for an auto parts contractor. Your firm received a large government bailout this summer to manufacture transaxles to be used in a new line of front wheel drive cars which a major auto manufacturer plans to introduce in the near future. The contract is very important to your firm which has recently fallen on hard times. Just prior to obtaining the bailout, half of the firm’s employees, including you had been scheduled for an indefinite layoff. Final testing of the assemblies ended last Friday, and the first shipments are scheduled for three weeks from today. As you began examining the test reports, you discovered the transaxle tended to fail when loaded at more than 20% overrated capacity and subjected to strong torsion forces. Such a condition could occur with a heavily loaded car braking hard for a curve down a mountain road. The results would be disastrous. The manufacturer’s specifications call for the transaxle to carry 130% of its rated capacity without failing. You showed the results to our supervisor and the company president who indicated they were both aware of the report. Given the low likelihood of occurrence and the fact there was not time to redesign the assembly, they decided to ignore the report. If they do not deliver the assemblies on time, they would lose future contracts and possibly have to return part of the bailout money. Questions: What would you do?

Table 9. Personal Integrity: Pre-survey and Post-survey Responses.

Categories	Pre-survey Responses	Post-survey Responses
Acquiescence (enforce contract or enforce contract with qualifications)	9	5
Acquiescence (continue production)	2	1
Whistle blow	9	6
Exit firm	1	1
Discussion	1	2
Unsure	1	2

This scenario involves whistleblowing on a firm which produces a potentially hazardous product for the public. Two pre-survey respondents suggested they would continue production with one respondent replying “the future of the company and my job could be in trouble if they [the transaxles] were not delivered on time.” Nine respondents said they would whistle blow by “report[ing] the company,” “inform[ing] the government,” “consider OSHA,” or “report to upper management.” The trend in these responses was to report to a higher authority regardless of the variation in the organizations to which the information would be delivered. One respondent would exit the firm and said “I would just try to find a job at a rival company and see if there was any way to destroy my prior company.” One response suggested discussion in an attempt to make the company “do what’s right in that situation.” One respondent would do nothing and said, the firm “would have to suffer the loss.”

Post-survey responses suggested a movement toward less whistleblowing, more discussion, and more uncertainty in choosing between unattractive choices. Post-survey responses suggested only one respondent would continue production but qualified future production by saying, “I would work to redesign the assembly.” Six responses reflected

whistleblowing, down from nine in the pre-survey responses, and the rhetoric shifted from merely whistleblowing to a higher authority to including issues of safety and human life. Responses included, “Lives are more important than money,” and “They have no right to put people’s lives in danger.” One response suggested exiting the firm, two responses said they didn’t know what they would do, and two responses reflected more exploration and discussion. One final opportunity for student feedback was given. Students were asked to: describe how this course may have changed/alterd your value/belief system, your openness to other’s perceptions/viewpoints about ethical dilemmas, or the way you make ethical decisions.

Ten responses, all positive, about the course were received. No responses reflected the course as changing/altering established value/belief systems. Two responses suggested a value/belief system was strengthened because “This course helped me to understand how I gained this sense [of morals] and why,” and “this course helped to reinforce what I already knew.” Five respondents said they were now more open to other’s perceptions/viewpoints. Comments included “I can think more rationally about decisions and consider everyone’s point of view better in my decision making;” “I will look at all sides of the situation...before making a decision;” “It showed me that before I make a judgment I should look into the whole situation,” and “I have learned to allow everyone their say in the decision process.” Two respondents’ observations reflect a changed way of making ethical decisions. They said, “I can choose to act ethically even if others will not act ethically ... I can control me,” and “I will use this model [the Justice model] as a guide to help me make the right choices.”

VI. Conclusion.

This evaluation of changed student perspectives in making ethical decisions in the workplace as a result of taking an ethics class suggests the intervention of an ethics class does encourage students to be more open in accepting other’s perspectives by taking into consideration other viewpoints and does strengthen already existing value and belief systems.

As evidenced by students’ comments concerning how the course may have altered their thinking about ethical dilemmas, the findings suggest students, as learners, used new information to better understand their own perspectives/viewpoints concerning making ethical decisions, a central tenet of constructivist theory in which the learner comes to “know” from being exposed to new information.

VII. Limitations to the Study.

This pilot study is necessarily limited by the small number of participants. Inclusion of more student responses over the course of more semesters may alter the findings. The interpretation of participants’ responses or “meaning-making” (Patton, 2002, p. 478) may be limited by the primary investigator’s knowledge, experience, and education. The responses given by participants represent the actions participants believed they would take after the culmination of an ethics class. Participant’s actual responses may vary when faced with real situations in the workplace.

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Perceived ideological bias in the college classroom and the role of student reflective thinking: A proposed model

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Abstract: This study tests a model of students' reflective thinking, perceived ideological bias among university faculty, and reactions to ideological bias in the college classroom. Participants were 187 undergraduates who completed the Reasoning About Current Issues Questionnaire and the Political Bias in the Classroom Survey. Structural equation modeling revealed that participants in lower ranges of reflective thinking had increased perceptions of ideological bias among university faculty. The model suggests that these perceptions then lead students to adversely react to the presence of such ideological bias in the classroom. Theoretical, pedagogical, and methodological implications are discussed.

Keywords: bias, reflective thinking, ideology, pedagogy, student development

The role ideology plays in the university classroom is a continual issue of debate. A common public perception has been that academics are a liberal elite, and that they, in the words of conservative activist David Horowitz, “behave as political advocates in the classroom, express opinions in a partisan manner on controversial issues irrelevant to the academic subject, and even grade students in a manner designed to enforce their conformity to professorial prejudices” (2007, p. 188). The *Chronicle of Higher Education* demonstrated how pervasive this view has become with a 2004 public opinion poll that found 51% of 1,000 individuals surveyed in the United States (U.S.) believed college faculty improperly introduced a liberal bias into their classrooms (A Special Report). In contrast, the American Association of University Professors’ Statement on Professional Ethics states “As teachers, professors encourage the free pursuit of learning in their students ... Professors demonstrate respect for students as individuals and adhere to their proper roles as intellectual guides and counselors” (2009, p. 4). There is clearly a disconnect between what faculty profess to do and what many outside of higher education perceive to be happening. If this disconnect can be addressed through changes in pedagogy, even if only partially, then such changes should be explored. This study explores how student reflective thinking, student perceptions of ideological bias, and student reactions to ideological bias interact. Understanding the relationship between these three variables may help educators communicate more effectively with students in an effort to foster open minded inquiry.

The perception of an ideological bias has reached outside the classroom as well. Campus initiatives such as freshman reading (Beach Books, 2010) and diversity education programs (Hoover, 2007) have been criticized for attempting to ideologically indoctrinate students. Regardless of their ideological motivation, however, such programs often explore issues that have the potential to expose ideological conflict. These programs address *ill-structured problems*, defined by King and Kitchener (2004) as problems having “two features: that they

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cannot be defined with a high degree of completeness, and that they cannot be solved with a high degree of certainty” (p. 5).

The perception of an ideologically liberal bias in academia is likely fostered by the fact that academia is, in fact, left leaning. Peer-reviewed studies have explored the U.S.’s higher education system and estimated approximately three liberal faculty members for every one conservative (Gross & Simmons, 2007; Zipp & Fenwick, 2006). While there has been a clear ideological imbalance in the professoriate, other research has questioned the legitimacy of Horowitz’s (2007) concern that instructors are enforcing ideological conformity or grading in a prejudiced manner. Studies have indicated that conservative students do not receive lower grades from faculty compared to their liberal peers (Kemmelmeir, Danielson, & Basten, 2005), and that while students do self-identify as more politically liberal during their college years, they do so at rates similar to individuals in the same age range who do not attend college (Mariani & Hewitt, 2008).

Though research does not support that faculty ideology has an effect on students’ grades or beliefs, faculty ideology may still affect students’ college experience. Kelly-Woessner and Woessner (2008) have found that students who perceive their instructors as having politically similar views reported putting more effort into a class. Students also reported higher levels of learning from politically similar instructors, and conversely reported less enthusiasm for classes taught by instructors politically dissimilar to themselves. Although Kelly-Woessner and Woessner’s findings are based on student self-reports and unmeasured learning outcomes, they do support the need for further exploration of the student classroom experience as it relates to ideological bias.

Smith, Mayer, and Fritschler (2008) began to explore the student experience with ideological bias in the university classroom through a series of focus groups and interviews with students. Their findings indicated that students did not believe their professors were biased or that their campuses lacked a diversity of political views. In fact, the researchers suggested that many students wanted instructors to be more forthcoming with ideological views. Smith, Mayer, and Fritschler’s sample population, however, lacked diversity. The participants are identified as “high achievers ... the students accepted the notion that they were attending college to learn, to be stimulated by their professors, and to have their own views challenged by their professors and their fellow students” (p. 146). Smith, Mayer, and Fritschler’s findings may hold true with similar high achieving students but their conclusions cannot be broadly applied.

In an effort to find a wider student perspective regarding instructor ideological bias, Linvill and Havice (2011) explored what students perceive as ideological bias from their university instructors and how they experience such bias. Through this research, the Political Bias in the Classroom Survey (PBCS) was developed. Linvill and Havice employed this measure to identify demographic differences between students’ perceptions of ideological bias. Their research suggested that self-identified conservative students perceived more, while African American students perceived less ideological bias from their university instructors. No other demographic variable was found to be significant in the perception of ideological bias. A follow up study employing the PBCS (Linville, 2011) also identified a possible relationship between student identity, as defined by Marcia’s (1966) identity development construct, and the perception of ideological bias in the classroom.

Fisler and Foubert (2006) suggest an additional important factor that may influence students’ perceptions of instructor ideological bias: student cognitive development. Fisler and Foubert argued that students’ cognitive development may play a crucial role in how they

perceive and react to their classroom experience, particularly related to ideology. Fisler and Foubert argued that facilitating cognitive growth is an essential function of higher education, but that such growth is often “accompanied by some degree of disequilibrium, especially if students are stretched too far beyond where their minds are ready to go” (p. 4). They suggest that disequilibrium caused by having beliefs challenged may influence students’ perceptions of education professionals having an ideological bias, stating “students’ level of cognitive development is central to the meaning they ascribe to events around them” (p. 4).

To gauge one form of undergraduate students’ cognitive development, this study employed King and Kitchener’s (1994) Reflective Judgment Model (RJM). The RJM focuses on understanding the *way* people think rather than *what* they think. The RJM was developed to explore the progression in an individual’s assumptions about how and what they can know, an individual’s epistemological assumptions. The model specifically gauges development of reflective thinking in late adolescence and through adulthood. Dewey (1933), the first to define the concept of reflective thinking, stated it “involves (1) a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity” (p. 12). Dewey believed reflective thinking compelled individuals to inquiry through evidence and rationality and that encouraging such thought was a central goal of education.

King and Kitchener (2004) grouped the RJM into three distinct levels which divide the seven stages comprising the RJM. Individuals in stages one through three, termed *pre-reflective thinking*, operate under the assumption that knowledge is certain. Single correct answers exist for all questions and there are no ill-structured problems. An individual in the stages of *pre-reflective thinking* relies heavily on belief, opinion, and the word of authority figures. Stages four and five comprise *quasi-reflective thinking*. These individuals recognize that uncertainty is a part of the knowledge process and that knowledge is constructed. *Quasi-reflective* thinkers begin to use and understand evidence in building knowledge claims, though the link is tenuous. This link is solidified in stages six and seven, *reflective thinking*. *Reflective thinkers* contend that knowledge claims should be evaluated in context. These individuals remain open-minded to re-evaluating claims should new information arise.

The purpose of this study is to test a model which examines the role of reflective thinking in the perception of and reaction to political bias in the college classroom. Given that individuals found to be in the *pre-reflective thinking* stages of the RJM rely heavily on belief and opinion and individuals found to be in the *reflective thinking* stages of the RJM are generally more open-minded to re-evaluating knowledge claims in the face of new information, it seems likely that individuals who are in the higher stage ranges of the RJM will be less likely to view their instructors’ actions as politically biased. It is possible that what is viewed by an individual in a lower stage range of the RJM as bias may be viewed by an individual in a higher stage range as the instructor purposefully challenging the student with new concepts that can and should be evaluated on their own merit. In addition, it also seems likely that the degree to which students perceive political bias in the classroom predicts how strongly those individuals react to it, with higher degrees of perception resulting in a greater degree of reaction. Thus:

H1: Students’ reflective thinking development will negatively predict students’ perceptions of an ideological bias among university faculty.

H2: Students’ perceptions of an ideological bias among university faculty will positively predict students’ reactions to ideological bias.

I. Method.

A. Participants.

Survey data was collected for the current study through convenience sampling in the fall of 2010. One hundred eighty-seven undergraduate student participants were recruited from 14 sections of Introduction to Public Speaking at the study institution. The participants volunteered to take part in the study for extra credit from a total sample population of 242 students. Although Introduction to Public Speaking is housed in the Department of Communication Studies, the classes were general education courses at the study institution, a mid-sized, land grant institution in the Southeastern United States. Therefore, participants represented various academic disciplines. Administration of the surveys took place on the participants' own time in a laboratory setting.

The sample consisted of 52.4% female and 47.6% male participants. The sample was comprised of 26.2% freshmen, 30.5% sophomores, 23% juniors, and 20.3% seniors while the mean age was 19.7. 87.7% for participants self-identified white, 6.7% African-American, 0.5% American Indian/Alaskan native, 2.7% Asian or Pacific Islander, 2.1% Hispanic, and no participants self-identified as other. Participants' ideology was self-identified on a seven-point Likert-type scale, with one being "very liberal" and seven being "very conservative." The mean reported ideology was 4.3 with a standard deviation of 1.4.

B. Procedures and Instrumentation.

To gauge undergraduate *reflective thinking* this study employed the Reasoning About Current Issues Test (RCI, King & Kitchener, 2004). The RCI is the only instrument currently available to evaluate at what stage of the RJM a student is in their reflective thinking. Most previous research utilizing the RJM has employed the Reflective Judgment Interview (RJI, King & Kitchener, 1994). Training on the implementation of the RJI, a semi-structured interview designed to obtain data regarding participants' epistemological assumptions, is no longer being offered (Reflective Judgment, 2011). Unlike the RJI, the RCI is an objectively scored measure amenable to large-scale administration. The RCI is an online measure of reflective judgment administered at reflectivejudgment.org (Reflective Judgment Model, 2010). The RCI takes approximately 30 to 45 minutes to complete and is comprised of descriptions of three ill-structured and controversial problems. The measure is proprietary and not available to the public, but examples provided at reflectivejudgment.org of the type of problems employed in the RCI include global warming and federal government debt. Participants are asked to read ten statements regarding each ill-structured problem. The statements reflect different levels of the RJM. The participant is asked to rate how closely each statement relates to his or her own thinking on a four-point scale. The participant may also rate a statement as "meaningless." Purposefully meaningless statements containing complex vocabulary are included to control for the possibility of participants rating statements high based on their apparent sophistication rather than actual connection to their own way of thinking. Finally, participants are asked to choose the three statements that most closely reflect their own thinking and rank them in order starting with the statement that is most like their own thinking. These rankings are used to calculate the participants RCI score. This RCI score reflects the level of RJM reasoning most often employed

by the participant. Scores range from two to seven and correspond to levels two through seven of the RJM.

Wood, Kitchener, and Jensen (2002) reported internal consistency for the RCI with alpha scores in the low to mid 0.70's for different samples. Reliability testing performed on the current study indicated an alpha of 0.473. Although some may express concern regarding the low estimates of internal reliability obtained for this measure, reflection on the nature of the reflective thinking construct assessed here mitigates against this concern. Little, Lindenberger, and Nesselroade (1999) argue that low internal reliability does not necessarily indicate that a measure lacks validity, as indicator specificity does not mean that the scale is assessing reliably the true centroid of the construct under investigation. Conversely, they note that some constructs are assessed best via a limited number of heterogeneous indicators, despite the low reliability concomitant with such indicators. As the construct of interest here (i.e., reflective thinking) necessarily stimulates only a limited number of diverse and somewhat heterogeneous manifest indicators, it stands to reason that this construct's indicators would exhibit lower than normative reliability, yet still provide true information about the construct (Ledbetter, 2009).

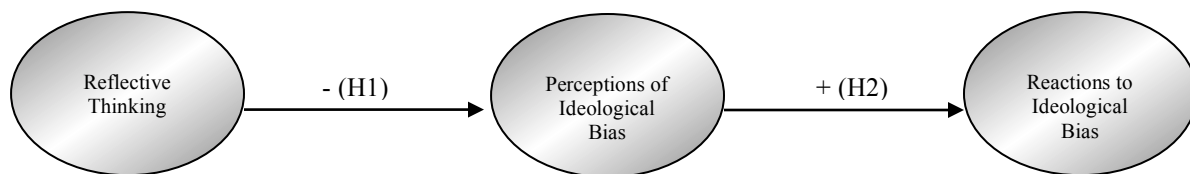
To gauge *students' perceptions of ideological bias*, this study employed the PBCS (Linville & Havice, 2011). The PBCS (as modified by Linville, 2011) is a 12-question self-report survey eliciting Likert-style responses. Rather than asking about particular instructors, the instrument draws on participants' general attitudes regarding faculty. Responses range from one, "strongly disagree," to six, "strongly agree." The PBCS explores student experiences with instructor political bias in the college classroom along two dimensions: the degree to which the student perceives instructor political bias and the degree to which the student reacts to this bias. The six-item *perceptions* scale focuses on what the students experience in the classroom and is based on observations of their instructors. This scale addresses elements found to be inherent to students' perception of instructor political bias such as the perception of instructors limiting class content and discussion to conform to their own beliefs as well as instructors dismissing views and ideas expressed by students which disagree with their own views. A typical *perceptions* scale question reads: "In my experience, professors present multiple political views when discussing political issues." The six-item *reactions* scale focuses on how students were found to respond to the perception of instructor political bias, focusing on the students' perceived need to conform to the beliefs of their instructor, whether in class discussion or through responses on tests and assignments. A typical reactions scale question reads: "When a professor expresses political views that differ from my own, it is difficult for me to contribute to class." Linville (2011) obtained a Cronbach's alpha coefficient of 0.77 for the *perceptions* scale and 0.78 for the *reactions* scale. For the current study, reliability testing performed on the PBCS showed the *perceptions* scale had a Cronbach's alpha of 0.69, while the *reactions* scale had a Cronbach's alpha of 0.76.

C. Data Analysis.

As shown in Figure 1, the hypothesized model contained three latent constructs: (a) reflective thinking, (b) perceptions of ideological bias, (c) reactions to ideological bias. The constructs were identified by creating three *parcels*, "aggregate-level [indicators] comprised of the sum (or average) of two or more items, responses, or behaviors," (Little, Cunningham, Shahar, & Widaman, 2002, p. 152) per latent construct. Given the unidimensional nature of these constructs, items were assigned to parcels by thirds (e.g., for the six-item perceptions of

ideological bias measure, the first parcel contained items 1 and 4, the second parcel contained items 2 and 5, and the third parcel contained items 3 and 6). The parceling technique, which

Figure 1. Hypothesized Structural Model Predicting Students' Perceptions and Reactions to Ideological Bias.



reduces the number of manifest indicators for each latent construct, has several advantages over using individual items as indicators, including greater reliability, more precise identification of the latent construct, and fewer parameter estimates (Kline, 2005; Little, Cunningham, Shahar, & Widaman, 2002).

The hypothesized model was estimated using structural equation modeling (SEM) with the LISREL 8.80 for Windows software package. SEM is a flexible data analytic technique that purifies manifest variables of error variance, thus generating truer tests of association between latent constructs of interest. Following generally accepted procedures for SEM, data analysis included testing the measurement model via confirmatory factor analysis prior to testing the hypothesized associations in a structural equation model (Kline, 2005). There was no missing data in the sample.

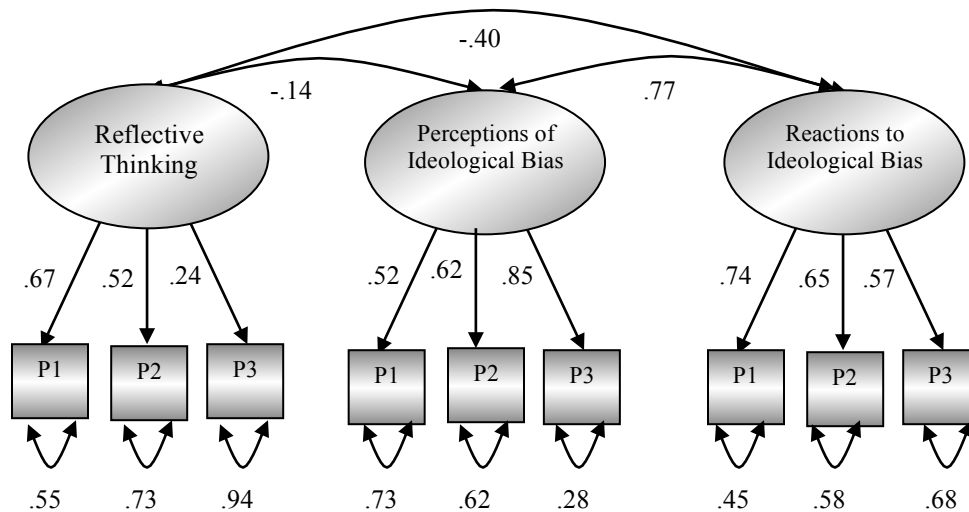
As compared to manifest variable statistical techniques (e.g., ordinary least squares hierarchical regression) that only allow piecemeal investigation of complex models, SEM permits the researcher to test overall global model fit in a single procedure. For both the confirmatory and structural models, model fit was assessed via four common fit indices: (a) model chi-square, (b) the root mean square error of approximation (RMSEA), (c) the non-normed fit index (NNFI), and (d) the comparative fit index (CFI) (Kline, 2005). Model chi-square is a basic statistic that assesses model fit, with good fit indicated by nonsignificant chi-square values. One weakness of the chi-square statistic is that it relies strongly on sample size, such that moderately large samples almost always produce statistically significant chi-square values even when model misfit is negligible. The additional three fit indices corrected for this shortcoming. The RMSEA statistic assesses amount of model misfit per degree of freedom, with RMSEA values below 0.08 indicating acceptable fit and values below 0.05 suggesting close fit (MacCallum, Browne, & Sugawara, 1996). The NNFI and CFI statistics indicate the degree to which the observed data fits the specified model better than a null model (i.e., with no specified relationships between latent constructs); for these fit indices, values above 0.95 indicate close model fit (Kline, 2005).

II. Results.

Descriptive statistics, including means, standard deviations, and Pearson product-moment correlations for all variables included in the study are reported in Table 1. All underlying assumptions of SEM were assessed; the data met these assumptions. Consistent with standard two-step procedures for SEM (Kline, 2005), confirmatory factor analysis first evaluated the fit between the manifest indicators and their respective latent constructs. The measurement model

demonstrated close model fit, $\chi^2(22) = 29.97, p > 0.05$, RMSEA = 0.042_[90% CI: .000-.079], NNFI = 0.97, CFI = 0.98, and examination of the modification indices did not suggest any necessary alterations to the model. Each of the indicators loaded on their respective latent constructs, and thus, the final measurement model, which includes loadings for the indicators and the corresponding residuals, is provided in Figure 2.

Figure 2. Final Measurement Model of Reflective Thinking and Ideological Bias.



Note. P1, P2, P3 = parcel 1, parcel 2, parcel 3. All factor loadings and latent covariance estimates are standardized and significant at $p < 0.01$.

After establishing close fit for the measurement model, we tested the hypothesized regression paths in a structural equation model (see Figure 1). The structural model demonstrated close fit, $\chi^2(23) = 38.56, p < 0.05$, RMSEA = 0.054_[90% CI = .000-.087], NNFI = 0.95, CFI = 0.97. The model revealed significant main effects between reflective thinking and perceptions of ideological bias. That is, as expected, reflective thinking (Unstandardized $B = -0.25$ _[95% CI = -0.48:-0.01], Standardized $\beta = -0.24$ _[95% CI = -0.51:-0.03], $p < 0.05$) negatively predicted perceptions of

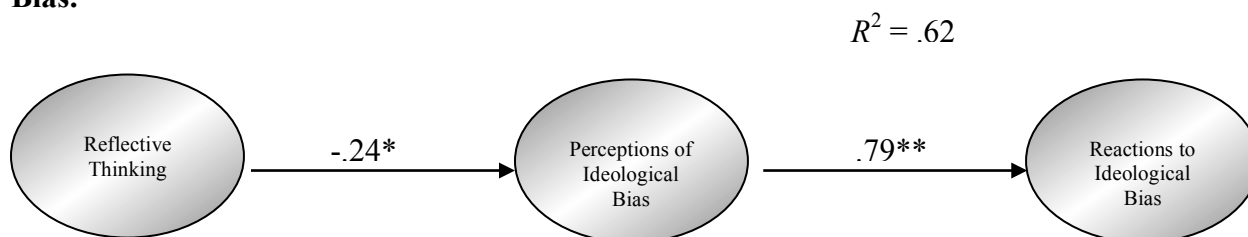
Table 1. Descriptive Statistics and Bivariate Correlations Among Latent Constructs (N = 187).

Variables	<i>M</i>	<i>SD</i>	1	2	3
1. Reflective Thinking	4.61	1.24	--		
2. Perceptions of Ideological Bias	2.86	0.88	-0.19**	--	
3. Reactions to Ideological Bias	2.98	1.11	-0.25**	0.54**	--

Note. ** Correlations significant at $p < 0.01$.

ideological bias, supporting the first hypothesis. In other words, low critical thinking scores lead to increases in perceptions of ideological bias among faculty. The model also revealed significant main effects between perceptions of ideological bias and reactions to ideological bias. As predicted, students' perceptions of ideological bias (Unstandardized $B = 0.77$ [95% CI = 0.64:0.90], Standardized $\beta = 0.79$ [95% CI = 0.67:0.91], $p < 0.01$) positively predicted their reactions to ideological bias, supporting the second hypothesis. Students who perceived a higher degree of ideological bias among faculty tended to also react to those perceptions of bias. In addition to direct effects on students' reactions to ideological bias, the model also leaves the possibility that reflective thinking indirectly predicts reactions to ideological bias via perceptions of ideological bias. A Sobel test failed to reveal the presence of an indirect effect for reflective thinking ($z = -0.31$, $p > 0.05$). Together, the direct effects explained 62% of the variance in students' reactions to ideological bias. See Figure 3 for the final structural model.

Figure 3. Structural Model Predicting Students' Perceptions and Reactions to Ideological Bias.



Note. All parameter estimates are standardized. $^{**}p < 0.01$ $^*p < 0.05$

III. Discussion.

The primary goal of the present study was to test a model of students' reflective thinking, perceived ideological bias among university faculty, and reactions to ideological bias in the college classroom. The results suggest that lower degrees of reflective thinking on the part of students heighten their perceptions of ideological bias among university faculty. These perceptions then lead students to adversely react to the presence of such ideological bias in the classroom. This finding supports Fisler and Foubert's (2006) argument that students' perceptions of their instructors' biases and how students react to those biases may be partially dependent on these students themselves.

This study's findings have important implications for education professionals, supporting King and Baxter Magolda's (1996) integrated perspective on learning which views cognitive and affective dimensions of development as related components. King (2000) argues that educators who feel their only responsibility is to sharpen their students' intellect, and that the responsibility to foster alternate forms of development lies in others' hands, are doing their students a disservice, as poorly developed skills in one area can inhibit the development of another. King and Baxter Magolda (1996) point out, such a "disjointed approach has not yielded the results educators, legislators, students and parents hope will prepare young adults for effective citizenship in today's complex culture" (p. 172). According to King (2000), educators who want to help students understand their own beliefs and make effective knowledge claims must give up the "I pitch you catch" (p. 24) approach to education.

Freire (2002) refers to King's "pitch/catch" style of education as *banking* education. In *banking* education, "the teacher issues communiqués and makes deposits which the students patiently receive, memorize and repeat" (Freire, p. 72). To educators practicing *banking* education, knowledge becomes a gift bestowed on those they consider to know nothing. Such an approach to teaching does not foster cognitive development. In terms of the RJM, *banking* education may arrest development in the *pre-reflective* stages where an individual relies heavily on the opinions of authority figures (King & Kitchener, 1994). According to Freire (2002), *banking* education limits a student's creativity and the process of free inquiry. An alternative teaching method Freire (2002) recommends is the concept of *problem-posing* education. *Problem-posing* education does not draw sharp distinctions between student and teacher. *Problem-posing* education encourages a process in which students are no longer docile listeners, but rather "critical co-investigators in dialogue with the teacher" (Freire, p. 81). Freire explains the role of the *problem-posing* educator is to create, together with the student, an environment where true knowledge can be found. *Problem-posing* education is "education as the practice of freedom—as opposed to education as the practice of domination" (Freire, p. 81). Baxter Magolda (2000) also advocates for partnering with students in the process of meaning making, stressing this approach as being essential to holistic learning. Baxter Magolda asserts that it is by joining students as partners that educators can understand their individual process of meaning making and gain the opportunity to "map the pathways to self-authorship from particular students' starting points on the journey" (p. 98).

Although this study suggests that the perception of some ideological bias may be in the eye of the beholder, there are certainly cases where such bias is genuine and instructors break ethical standards. According to the Bureau of Labor Statistics (Occupational Outlook Handbook, 2010), in 2008 the U.S. had 1.7 million individuals employed as post-secondary educators. With this number of professional educators there will certainly be cases where individuals over-step their bounds and treat students inappropriately for ideological reasons. Contrary to the view that genuine ideological bias may be a serious problem in academia, Smith, Mayer, and Fritschler (2008) argue that ideology and serious discussion of political issues is, in fact, largely absent from the modern university classroom. They believe that colleges and universities, in contrast to their nineteenth century counterparts, have abandoned civic education and the teaching of democratic citizenship to the detriment of society. Smith, Mayer, and Fritschler contend that this change is due, in part, because faculties are averse to possible ideological conflict in the classroom. Refocusing education to help foster cognitive development may help address ideological bias in the classroom, both real and merely perceived, and facilitate educators in helping students reflect on issues of civic importance. One way to accomplish this may be to change instructors' views of teaching from what King (2000) describes as the pitch/catch model of teaching toward education that is a partnership between the student and instructor with a goal toward constructing knowledge together, as both Freire (2002) and Baxter Magolda (2000) suggest.

The findings of the present study also highlight a need for alternative methods of assessing reflective thinking. The RCI was found to have a relatively low reliability. Importantly, the large sample size (Thorndike, 2005; Streiner, 2003) and application of structural equation modeling remedied this shortcoming (Kline, 2005; Little, Lindenberger, & Nesselrode, 1999). Unlike manifest variable statistical tests (e.g., ordinary least squares hierarchical regression), SEM purifies manifest variables of error variance and ultimately generates truer tests of association between latent constructs of interest. Indeed, Little, Lindenberger, and Nesselrode

aptly state that low reliability for a particular measure does not necessarily indicate that the measure lacks validity. One would expect low reliability to reduce variance explained in the dependent variable and thus generate Type-II error (i.e., failing to reject a false null hypothesis) (Kline, 2005; Ledbetter, 2009), yet the reflective thinking construct identified here did explain a significant portion of variance in students' perceptions of ideological bias. Future studies using latent variable techniques (e.g., structural equation modeling) would mitigate further against these concerns; however, additional validity testing of the RCI or the development of alternative measures to assess reflective thinking is indeed warranted. Until more development is done on the RCI or an alternate instrument is validated, training and certification should be offered on the Reflective Judgment Interview (King & Kitchener, 1994), the semi-structured interview employed in theory development and validation studies of the RJM. Additionally, future research would benefit from an RCI that is publicly available to facilitate research on its development. If the RCI cannot be shown to consistently deliver higher reliability estimates, it will not likely be useful to studies that employ small sample sizes and manifest variable statistical analysis.

Many students come to college with the belief that knowledge is certain and that there are definite answers to all questions which may be identified and memorized. Aiding students in learning to critically examine information and understand that knowledge claims are not just something possessed by authority figures but are context dependent and should be evidence based has been an acknowledged goal of education for decades (Dewey, 1933). The current study has illustrated that this goal is not only beneficial for the students in their epistemological development, but possibly for the faculty and the institution as well. Teaching in a manner that addresses cognitive growth, as Fisler and Foubert (2006) suggest, may help improve the classroom experience. In the long term, to do so may also improve the public perception that academia has an inappropriate liberal bias (A special report, 2004). In a time of constricting public support for higher education, addressing this perception may be more important than ever.

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Benefits of service-learning for freshmen college students and elementary school children

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Abstract: Freshman honors students in a service-learning course tutored low-income English Language Learning kindergartners, first-, and second-graders in reading. We conducted two separate data collections, one assessing college students' attitudes and motives (Study 1) and one exploring the benefits for elementary school children (Study 2). We measured changes in college students' motivations for volunteering and social attitudes, and we measured changes in children's reading performance and achievement goals. Comparisons with non-service-learning college students revealed that the service-learning students volunteered more hours, showed larger gains in esteem and protective motives (volunteering made them feel better about themselves and helped them cope with personal problems), and showed a marginally significant increase in motivation to volunteer in order to promote professional growth. We found a positive correlation between hours tutored and increases in children's reading scores, and the children showed increases in adaptive achievement goals. Although service-learning benefits for children were non-significant due to small sample size, findings suggest that benefits of the service-learning project were reciprocal.

Keywords: service-learning, tutoring, volunteer motives, achievement goals

We evaluated a service-learning course in which freshman honors students tutored at-risk elementary school children in reading. We assessed the effects of this experience for the college students providing service by examining changes in their social attitudes and motivations for volunteering (Study 1). We assessed benefits for the children receiving service by examining changes in their achievement motivation and progress in reading (Study 2).

Service-learning is a “course-based, credit-bearing educational experience in which students (a) participate in an organized service activity that meets identified community needs and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility” (Bringle & Hatcher, 1995, p. 112). Service-learning experiences can provide a variety of benefits to college students that persist even beyond the college years. These experiences enhance academic learning (Conway, Amel, & Gerwien, 2009; Markus, Howard, & King, 1993; Novak, Markey, & Allen, 2007) and are associated with positive cognitive and social changes, including advances in moral reasoning, prosocial reasoning, and decision-making (Batchelder & Root, 1994; Conrad & Hedin, 1981). Service-learning students report greater interest in interacting with culturally different and diverse people (Simons & Cleary, 2006) and increased commitment to future community service (Astin & Sax, 1998; Giles & Eyler, 1994). In fact, involvement in volunteer activities during the senior year of college predicted involvement in community service

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nine years after graduation (Astin, Sax, & Avalos, 1999). Students are more likely to continue volunteering after graduation when they believe that service-learning experiences during college facilitated their personal development (Tomkovick, Lester, Flunker, & Wells, 2008). In the context of developmental transitions, service-learning experiences have both short- and long-term influences on conceptions of self, self-esteem, and identity formation (Conrad & Hedin, 1991; Jones & Abes, 2004; Yates & Youniss, 1996). Students engaged in service-learning are more likely to explore occupational identity issues (Batchelder & Root, 1994) and to aspire to service-related occupations (Reed, Jernstedt, Hawley, Reber, & DuBois, 2005).

Although service-learning can influence many outcome variables (Conway et al., 2009), we focused on changes in college students' social attitudes and which functional motives were highlighted by their service experience. A large national sample of college students who engaged in community service expressed stronger commitment to promoting racial understanding and reported increased knowledge of and ability to get along with people of different races and cultures (Astin & Sax, 1998). Several researchers have found that students report increased interest and understanding of diversity issues (Astin & Sax, 1998; Astin et al., 1999; Simons & Cleary, 2006), but studies that directly measure the effects of service-learning on racial attitudes are rare. Myers-Lipton (1996) found that service-learning students showed greater decreases in racist attitudes compared to students who participated in community service without the full service-learning experience and those sampled from a general student population. Thus, one goal of our study was to examine the effects of service-learning on racist attitudes.

A second goal of our study was to assess changes in college students' motivation for volunteering. Although motivational variables bear complex relationships to one another and to volunteer activities (Finkelstien, 2009), motivation is a key component in determining whether or not volunteer activity is sustained and what benefits volunteers derive from community service. People who volunteer may appear to share similar reasons for volunteering (e.g., to help others or give back to the community), when in fact some may have quite different underlying motivations (e.g., career advancement, building self-esteem, or socializing with friends). More specifically, the same volunteer activity may serve different personal functions for different individuals, and these functions may play an important role in sustaining the activity over time. Clary, Snyder, Ridge, Copeland, Stukas, Haugen et al. (1998) developed the Volunteer Functions Inventory (VFI) to assess six factors that motivate people to volunteer: values (motivated by altruistic concern for others), understanding (motivated by opportunities for learning), social (motivated by expectations of friends), career (motivated to explore vocational choices), protective (motivated by desire to cope with personal problems such as loneliness), and esteem (motivated by a sense of personal growth). Clary et al. found that individuals expressed greater satisfaction with their work and stronger commitment to future volunteering when there was a good fit between individuals' motivation for volunteering and the actual benefits derived from volunteer work.

Ferrari, Dobis, Kardaras, Michna, Wagner, Sierawski et al. (1999) used the VFI to assess pretest-posttest changes in motivation during varied service-learning experiences. Before service began, students rated values and understanding as the most important motives for volunteering with social and protective motives rated the lowest. Ferrari et al. found that teacher-education students who volunteered at a day-care center for low-income children showed an increase in social motives for volunteering after eight weeks of service. However, they found no changes in volunteer motives for sophomore honors students engaged in a wide range of service activities. Although these results suggest the possibility of interesting changes in students' motivations for

volunteering, the findings were inconsistent and the service-learning students were not compared to any control groups. Thus, further research is needed to better understand changes in motivation for volunteering, particularly during the transition to college life, a time when students often show a decrease in their volunteer activities (Bureau of Labor Statistics, 2010; Wilson, 2000).

Study 1 focused on benefits of service-learning for the college students. Using a pretest-posttest design, we compared service-learning students to a similar group of freshman undergraduates not involved in service-learning. Both groups completed surveys at the beginning and end of their first semester assessing frequency of volunteer service, motivation for volunteering, and racism. Study 2 examined benefits for the service recipients, with emphasis on assessing the relationship between amount of tutoring received and reading achievement. We obtained the elementary school children's reading achievement scores at the beginning and middle of the school year (comparable time to the college students' first semester). We also assessed changes in the children's achievement motivation.

I. Study 1: College Students' Attitudes and Motives.

The service-learning course was a humanities seminar for freshmen honors students, most of who were interested in the medical profession. These students tended to pursue a science curriculum having bypassed many of the university's humanities and social science requirements with advanced placement credit. The instructor's primary goal was to increase students' cultural competence through literature, class discussion, field trips and community service. The service-learning experience was designed to sensitize students to issues facing Hispanic immigrants living in a rural, low-income area. This goal is consistent with research demonstrating links between service-learning and increased interest in diversity experiences (Simons & Cleary, 2006), and between volunteerism and increased socializing with different races and ethnic groups (Astin et al., 1999).

The service-learning students tutored children at a local elementary school for approximately 2 hours per week. The instructor asked the school to choose kindergartners, first, and second graders who needed assistance with reading. We were interested in whether changes in the college students' attitudes and motivations matched the instructor's aims for the course. Based on the instructor's goals, we hypothesized that the service-learning students, in contrast to the comparison group, would shift their motives for volunteering toward values (concern for others) and understanding (desire to gain new perspectives) as measured by the VFI, and would show decreased levels of racism over the semester.

A. Method.

Participants. Participants included 18 freshmen honors students enrolled in the service-learning seminar and a comparable group of 25 introductory psychology students. The first-semester grade point averages (GPA) for the two groups were 3.81 ($SD = 0.28$) and 3.82 ($SD = 0.13$), respectively. The service-learning students completed the surveys in their class. To obtain a comparison sample, we recruited introductory psychology students who were fulfilling a course requirement. A pool of 150 students attended a session in which they completed the survey. The final sample was selected from this pool on the basis of GPA to form a sample that was comparable to the service-learning students. Comparison students were chosen from those

students with GPA > 3.5 who completed both measures. Twelve of the service-learning students were female, 4 male, and 2 did not report their sex. We eliminated data for additional participants, 1 student who was absent for the pretest and 3 international exchange students who indicated that the survey questions were not meaningful in the context of their culture. These students were Scandinavian and expressed the belief that community service was not a common practice by young people in their country. All service-learning students were European-American. Eighteen of the comparison group students were female and 7 were male, and 72% were European-American. The median age for both groups was 18.

Measures and Procedure. The students were tested at the beginning and again at the end of the semester with the same measures. The demographics section included questions about community service activity ("In the past 6 months, how often have you participated in volunteer activities or community service?" measured on a 5-point Likert scale with 1 = none, 2 = a few times per year, 3 = monthly, 4 = weekly, 5 = daily). We also asked students to rate how confident they were that they would participate in future community service activity (on a scale ranging from 1 to 10 with 10 = more certain).

The Color-blind Racial Attitudes Scale (CoBRAS), developed by Neville, Lilly, Duran, Lee, and Browne (2000), measures cognitive aspects of racial attitudes. This measure has 20 items rated on a 6-point Likert scale, and the items are summed to yield a maximum score of 120. Higher scores indicate more negative racial attitudes. Neville et al. found that reliability for the total racism scores was acceptable with alphas ranging from .68-.91. For concurrent validity, Neville et al. reported that the CoBRAS correlated with the Quick Discrimination Index and the Modern Racism Scale. Oh, Choi, Neville, Anderson and Landrum-Brown (2010) found that CoBRAS scores predicted acceptance of Affirmative Action in a diverse sample of college students. Tynes and Markoe (2010) found that CoBRAS scores predicted college students' discomfort with racist themes on social network sites. Finally, Neville et al. found significant decreases in CoBRAS scores as a result of multicultural training.

We selected the CoBRAS because it included items measuring attitudes toward the Hispanic community, such as "Immigrants should try to fit in the culture and values of the U.S," and "English should be the only official language of the U.S." Secondly, we chose it because Neville et al. (2000) showed that CoBRAS scores are modifiable through multicultural experiences. Cronbach's alpha for our sample was 0.78.

The Volunteer Functions Inventory (VFI), developed by Clary et al. (1998), measures students' motivations for volunteering. Sample items for the six subscales are: values (I am concerned about those less fortunate than myself.); understanding (Volunteering allows me to gain a new perspective on things.); esteem (Volunteering makes me feel better about myself.); protective (Volunteering helps me work through my own personal problems.); career (I can make new contacts that might help my business or career.); and social (People I am close to want me to volunteer.). Each subscale has five items which were averaged. Participants rated strength of agreement on a 7-point Likert scale with higher scores indicating stronger endorsement of those motives. Internal consistency was high for all of the subscales (Cronbach alphas were 0.83 for values, 0.88 for understanding, 0.83 for esteem, 0.81 for protective, 0.83 for career, and 0.84 for social).

B. Results.

We compared changes in the responses of students who were required to participate in service-learning activities to those of the comparison students in a series of 2 (class: service-learning vs. introductory psychology) x 2 (time: pretest vs. posttest) mixed analyses of variance for each of the measures. The means and standard deviations for each measure are summarized in Table 1.

Table 1. Pretest and posttest means and standard deviations for both groups of students.

Measures	Service-learning		Introductory Psychology	
	Pretest	Posttest	Pretest	Posttest
Volunteer Frequency ¹	3.00 (0.84)	3.83 (0.51)	2.00 (1.04)	2.16 (1.21)
Predict Future Service	8.94 (1.86)	9.22 (1.66)	7.96 (2.76)	7.83 (2.51)
CoBRAS – Total Racism	72.50 (11.06)	63.00 (13.03)	72.30 (12.26)	69.68 (10.26)
VFI				
Values	5.97 (1.09)	6.20 (0.81)	5.88 (1.15)	5.57 (1.10)
Understanding	5.21 (1.09)	5.88 (0.82)	5.38 (1.35)	5.34 (1.14)
Esteem	3.91 (1.35)	4.64 (1.01)	4.72 (1.38)	4.74 (0.86)
Protective	2.50 (1.06)	3.70 (0.95)	3.58 (1.60)	3.27 (1.00)
Career	4.20 (1.46)	5.40 (0.95)	4.70 (1.40)	5.02 (1.17)
Social	3.04 (1.40)	3.84 (1.41)	3.16 (1.47)	3.39 (1.03)

¹The rating scale for Volunteer Frequency was 1 = none; 2 = a few times per year; 3 = monthly; 4 = weekly; 5 = daily.

Community Service Activity. For community service activity, there was a significant class x time interaction, $F(1, 41) = 4.07, p = 0.05$. There was little change in volunteer frequency for the introductory psychology students, who reported that they volunteered a few times a year. As expected, the service-learning students increased from volunteering monthly to approximately weekly.

Color-blind Racial Attitudes Scale (CoBRAS). On the total racism scale of the CoBRAS, lower scores indicate less racist attitudes. Findings for this scale showed a main effect of time, $F(1, 41) = 10.73, p = 0.002$, and the interaction approached significance, $F(1, 41) = 3.43, p = 0.07$. As seen in Table 1, racism scores for both groups declined at posttest. Decreased racism was one of the service-learning instructor's goals, and the service-learning students showed a tendency toward greater change in this direction. Their scores dropped by 9.5 points compared to the introductory psychology students whose scores decreased by only 2.6 points.

VFI—Values and Understanding Subscales. As seen in Table 1, both groups of students rated the values and understanding motives highest on both the pre- and the posttest. There were no significant effects for either of these subscales. Although we had predicted that these motives, which were consonant with the instructors' goals, would be most affected by the service-learning course, the scores were quite high for both groups at the outset, consistent with the findings of Ferrari et al. (1999). Ceiling effects may have masked any possible changes over time in these measures.

VFI—Esteem and Protective Subscales. These two motives showed similar patterns of results. For the esteem subscale, the main effect of time was significant, $F(1, 41) = 4.45, p = 0.041$. There was also a significant class x time interaction, $F(1, 41) = 4.08, p = 0.05$. As seen

in Table 1, there was little change for the introductory psychology students, $t(24) < 1$, but a significant increase for the service-learning students, $t(17) = 2.95$, $p = 0.009$. On the protective subscale, both groups of students scored low on the pretest, which is consistent with Ferrari et al.'s (1999) findings. The main effect of time was significant, $F(1, 39) = 4.59$, $p = 0.038$, as was the class \times time interaction, $F(1, 39) = 13.31$, $p = 0.001$. Similar to the results for the esteem subscale, the introductory psychology students' scores on the protective subscale did not change significantly, $t(24) = 1.19$, $p = 0.12$, but the service-learning group showed a significant increase from pretest to posttest, $t(15) = 3.78$, $p = 0.002$ (see Table 1). Service-learning increased students' motives for volunteering in order to protect their self-esteem and help them deal with personal problems, a finding that we did not anticipate.

VFI—Career Subscale. For the career subscale, the main effect of time was significant, $F(1, 41) = 9.39$, $p = 0.004$. As seen in Table 1, both groups scored higher at posttest than pretest. The service-learning students' scores increased more than those of the comparison students, however the class \times time interaction only approached significance, $F(1, 41) = 3.15$, $p = 0.08$.

VFI—Social Subscale. Both groups of students rated social motives fairly low at pretest, which is also consistent with Ferrari et al. (1999). There was a main effect of time, $F(1, 41) = 4.75$, $p = 0.035$, but neither the main effect of class nor the interaction were significant. As seen in Table 1, both groups scored higher at posttest than pretest.

VFI Subscales as Predictors of Future Plans to Volunteer. We also looked at correlations between the students' ratings of how confident they were that they would participate in future community service and the six VFI subscales. The strongest predictors of students' confidence for future community service were the values (pretest $r = 0.50$, $p < 0.001$; posttest $r = 0.60$, $p < 0.001$) and understanding (pretest $r = 0.61$, $p < 0.001$; posttest $r = 0.53$, $p < 0.001$) VFI subscales. Although students' scores were quite high from the start on these two subscales so that the scores did not show any increases over time or any differences between our groups, there was enough variability to show significant correlations with plans for future volunteering. The careers subscale was also significantly related to future service plans (pretest $r = 0.30$, $p = 0.05$; posttest $r = 0.38$, $p = 0.012$). Students who volunteered to fulfill career goals indicated high confidence that they would engage in future community service. Other correlations between VFI subscales and plans for future community service were much smaller and mostly not significant (esteem pretest $r = 0.34$, $p = 0.027$; esteem posttest $r = 0.18$, $p = 0.241$; protective pretest $r = 0.20$, $p = 0.20$; protective posttest $r = 0.24$, $p = 0.12$; social pretest $r = 0.27$, $p = 0.09$; social posttest $r = 0.20$, $p = 0.186$).

C. Discussion.

Compared to introductory psychology students, service-learning students increased their community service (as required for their course), and also showed changes in their attitudes and motives for engaging in community service. Previous research reported that service-learning was associated with increased commitment to promoting racial understanding and increased interest in interacting with culturally diverse groups (Astin & Sax, 1998; Astin et al., 1999; Simons & Cleary, 2006). In the present study, all students showed significant declines in racism and the difference between the groups was only marginally significant. This finding may reflect a change in racial attitudes that was related to the general college experience, not specific to service-learning. Perhaps motives for volunteering are a more appropriate measure of how service-

learning influences students as well as a predictor of whether volunteer activities will be sustained.

Conway et al.'s (2009) meta-analysis showed small effects of service-learning on students' personal outcomes and stronger effects on academic and social outcomes. Our findings, in contrast, showed the most reliable effects for personal outcomes (volunteer motivations). It may be worth noting that the main criterion for including studies in the Conway et al. meta-analysis was that they had identical pretest-posttest measures for service-learning students, and this limited the sample to only seven studies for volunteer motivations. Also, the included studies were not required to have a control group for comparison, making it difficult to assess whether pre-post changes were actually due to service-learning or due to maturation. In our study, for example, even the non-service-learning students showed improved social outcomes (lower racism scores) although the change was somewhat greater for service-learning students.

We found that service-learning students became more likely to value service as a way to gain new perspectives, increase their self-esteem, and cope with personal problems. They also gained a somewhat stronger motivation to engage in service in order to clarify career goals. Similar to Ferrari et al. (1999), service-learning students showed increases over time in social motives for community service. The design of this study allowed us to compare service-learning students to comparable students who did not participate in service-learning. The use of paper and pencil measures to assess motivations and social attitudes enabled us to do a quantitative analysis of the effect of service-learning.

One limitation of this assessment was that students might have reported answers that they believed their instructor found socially desirable on the posttest. Although the investigators were not involved in the instruction of the course, some of the assessments were conducted in the classroom and students may well have inferred that the research was an investigation of the course effectiveness. Considering that the students showed gains in areas where we had not predicted growth reduces the likelihood that this was a significant problem. For example, the instructor expressed a hope that service-learning would increase students' understanding of problems facing the community and their desire to help others. However, these goals, measured by the values and understanding subscales of the VFI, were already endorsed by both service- and non-service-learning students to a high degree. Service-learning students, on the other hand, came to see service-learning as a way to foster their personal growth and development, an effect not expected by the instructor or the researchers.

II. Study 2: Benefits for the Elementary School Children.

Study 1 supported earlier research findings of benefits for college students engaged in service-learning courses. There is general consensus that more research is needed on the benefits of service-learning for community recipients (Butin, 2003). Study 2 describes the effects of service-learning tutoring on elementary school children performing below grade level in reading.

Volunteer tutors may provide schools with a cost-effective means of assisting children who have fallen behind their age mates in reading and who are at risk for school failure. A good example is Fitzgerald's (2001) study of at-risk first and second graders who were tutored by college students participating in the America Reads program, part of the National and Community Service Act of 1993. The college students worked on the children's reading skills during two highly structured 40-minute sessions per week for 25 weeks. During six months of tutoring, this at-risk group of children showed gains on the Bader Reading and Language

Inventory comparable to more than a grade level. This was in contrast to a within-program comparison group of children who received 12 or fewer weeks of tutoring. Their reading and language scores increased by only one-third of a grade level.

In a meta-analysis, Elbaum, Vaughn, Hughes, and Moody (2000) compared outcomes for several one-to-one tutoring programs in reading. The overall findings indicate that interventions conducted with trained college students and community volunteers are effective in improving children's reading comprehension and phonemic awareness. We were interested in whether tutoring by untrained college students improved the children's reading scores and also whether the college students developed relationships with the children that impacted the children's achievement motivation, specifically their response to challenge (persistence versus helplessness). Few studies have examined links between number of tutoring sessions and children's reading achievement (Wasik, 1998), but there is some evidence to suggest that the number of tutoring hours is related to advances in reading achievement particularly for children who start at the lowest levels (Dyson, Miller, & Gagne, 2008). To our knowledge, no studies have examined relationships between tutoring in reading and children's achievement motivation goals.

One aspect of achievement motivation on which young children differ is their response to criticism and challenge (Cain & Dweck, 1995; Heyman, Dweck, & Cain, 1992; Smiley & Dweck, 1994; Ziegert, Kistner, Castro, & Robertson, 2001), and these differences can have important academic consequences. Dweck and colleagues (Cain & Dweck, 1995; Smiley & Dweck, 1994) developed a task to categorize young children into those who seek challenge (mastery oriented) versus those who avoid challenge (performance oriented). Children are given success and failure trials in the form of solvable and unsolvable jigsaw puzzles, and then are asked to choose which of the two puzzles they would prefer to continue working on. Performance-oriented children, who choose the easier solvable puzzles, generally prefer non-challenging tasks and tend to respond negatively to challenging situations. They downgrade their performance after criticism and show characteristics of helplessness including negative self-judgments, negative affect, and low persistence. In contrast, mastery-oriented children, who choose the more difficult unsolvable puzzles, generally prefer challenging tasks and tend to respond positively to challenge. They are less affected by criticism, and they show persistence and increased effort to understand and master the subject matter. These findings have been replicated by Zeigert et al. (2001) with kindergarten and first graders.

The two patterns of academic motivation described by Dweck and colleagues have different consequences for academic performance when material is challenging. For example, during the transition to 8th grade when mathematics classes become more difficult, performance-oriented students' grades start to decline while mastery-oriented students maintain their previous grades (Blackwell, Trzesniewski, & Dweck, 2007). Although connections to academic performance have not been studied in younger age groups, we hypothesized that children who are struggling with reading might show similar patterns of divergence. Also, we speculated that having a college student tutor to encourage them to keep trying might help the children shift to a more adaptive mastery orientation.

The service-learning students, who received no special training, tutored their assigned children about once a week. However, the total number of hours of tutoring varied among the students. We predicted that the number of hours of tutoring would correlate with reading achievement scores and that tutoring would increase children's adaptive responses to challenge.

A. Method.

Teachers at a rural, low-income elementary school (98% of children qualify for reduced or free lunch) chose the children they thought were most in need of extra assistance, and each child was paired with a tutor. Twenty-eight children were matched to tutors, and we obtained parental permission to test 18 of the children: 5 kindergartners (3 M, 2 F), 5 first graders (4 M, 1 F), and 8 second graders (3 M, 5 F). Most children (78%) were Hispanic English Language Learners, and 22% were African American. One second-grade student moved away and was not available for posttest measures.

We obtained children's Texas Primary Reading Inventory scores (TPRI) from the school at the beginning and middle of the year. The TPRI (Foorman, Fletcher, Francis, Carlson, Chen, Mouzaki, et al., n.d.) is an early reading assessment for children in kindergarten through third grade. This screening test is a 3-5 minute assessment that is individually administered by the teacher and is designed to identify children who are at risk for reading problems. It has acceptable reliability (alphas = 0.81 to 0.91) and moderately strong correlations with the Woodcock-Johnson, Peabody Picture Vocabulary, and Rapid Naming of Letters and Objects Tests. Nelson (2009) reported test-retest alphas of 0.84 and 0.88 for kindergarten mid-year screening tests. Nelson assessed concurrent validity by correlating TPRI screening scores with Dynamic Indicators of Basic Early Literacy Skills (DIBELS), Test of Phonology Awareness-Second Edition: Plus (TOPA-2+) and the Woodcock Johnson. These correlations ranged from +0.40 to +0.76 and all were significant.

To assess achievement motivation, we adapted methods from Smiley and Dweck (1994). Each child completed an easy puzzle (8 pieces) with ample time to finish, followed by a difficult puzzle (24 pieces) with inadequate time to finish (4 min). To measure persistence and response to challenge, the children chose between working on a new puzzle like the current difficult one or like the first easy one. We classified children who chose the difficult puzzle as mastery oriented, or persistent in the face of failure, and children who chose the easy puzzle as performance oriented, or helpless. Achievement motivation was assessed at the beginning and middle of the school year.

B. Results.

The college students tutored the children between 20 and 44 total hours for the semester ($M = 28.92$, $SD = 8.34$). The correlation between hours tutored and increase in reading scores was 0.40, but this was not significant due to small sample size ($p = 0.18$). Nonetheless, the r^2 indicated that the amount of tutoring accounted for 16% of the variance in children's reading scores.

Regarding achievement motivation, mastery-oriented persistent children ($n = 7$) showed a significantly greater increase in reading level by the middle of the year than performance-oriented helpless children ($n = 11$), $t(15) = 2.41$, $p = 0.03$. The mastery-oriented persistent group increased an average of 2.00 levels ($SD = 0.63$), roughly equivalent to expected progress. Average increase for the performance-oriented helpless group was only 1.00 level ($SD = 0.89$). It was encouraging to find that most of the helpless group who chose the easy puzzle at the beginning of the school year switched their preference to the difficult puzzle by the end of the year (8 of 10), and only a few of the children who initially chose the difficult puzzle changed their preference (2 of 7). We cannot determine whether this change was due to maturation or to

the tutoring. We had hoped to compare the children's progress in reading and achievement goals to a comparison group who did not receive tutoring, but an appropriate comparison group was not available.

C. Discussion.

Overall, these children showed patterns of achievement motivation similar to middle-SES children in previous studies (Cain & Dweck, 1995; Smiley & Dweck, 1994), and preference for challenge predicted improvement in the children's reading scores. Few studies have reported a clear connection between achievement goals and academic performance (Blackwell et al., 2007) and none with children this young. We demonstrated a relation between adaptive achievement goals and academic achievement in young children from an understudied population. When considering tutoring as an intervention strategy, children's attitudes about academic achievement may also play an important role. Understanding children's achievement motivation, particularly how they respond to academic challenges, should aid in planning more effective educational interventions.

A most encouraging finding was that the children who originally preferred an easy task switched their preference to a difficult task by the middle of the school year. This could be an important finding if it were directly linked to tutoring. The lack of a comparison group of children who did not receive tutoring makes it difficult to determine whether changes in the children's achievement motivation were due to interacting with the tutors or to maturation. Ziegart et al. (2001) found that although achievement motivation goals reflect somewhat stable individual differences from kindergarten through fifth grade, they are influenced by a variety of academic experiences. Thus, tutoring may have increased the children's adaptive achievement goals. Further research with appropriate controls and comparison groups is needed before making stronger conclusions. Future research could also provide more information about the kind of tutoring relationship that works best for promoting persistence on challenging tasks. This might include training tutors to give certain kinds of messages at key times (e.g., praise effort rather than ability), choice of activities during tutoring (e.g., challenging tasks over easy ones), and talking to children about the meaning of failure (e.g., feedback on what you know and what you need to do rather than assessment showing lack of ability) (see Dweck, 2002).

III. General Discussion.

For first-year undergraduate students, understanding the self is an important developmental task. At a time of life when community service declines (Bureau of Labor Statistics, 2010; Wilson, 2000), service-learning appears to be a valuable way to help students adjust to college, adapt to social expectations, define career goals, and develop their identity within the context of the larger community.

Benefits for the children were less clear. Past studies have shown positive effects for children tutored by college students trained to use a structured reading curriculum (e.g., Allor & McCathren, 2004; Fitzgerald, 2001). We also found benefits even when the college students had no special training or curriculum to follow and simply read with the children.

This study was an attempt to assess benefits for both the providers and the recipients of service-learning. Few studies report data from both sides of the service-learning equation and

there are some daunting challenges to this type of research. Despite these challenges, our findings show benefits of service-learning experience for both students and the community.

Acknowledgements

We thank Dr. Michael Bassman for inspiring this project, Mr. Glenn Joyner and his staff at Belvoir Elementary School for making this research possible, and the Belvoir children and ECU students for participating. We also thank Dr. Holly Mathews, Dr. Susan McCammon, Angelita Ragland, Virginia Gonzalez, Sheila Wilcox, Maggie Gocke, Toy Sherrill, and Julie Webb for assistance with data collection and analysis. Portions of this research were funded by the UNC Undergraduate Research Expansion Initiative.

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All kidding aside: Humor increases learning at knowledge and comprehension levels

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Abstract: It has been argued that humor is beneficial in the classroom because it increases social bonding between instructor and student, salience of information, and ultimately recall and retention. The current study sought to add to the literature by empirically testing some assumptions about humor as a pedagogical tool. Specifically, we predicted that using humor in a classroom setting would enhance learning on the first three levels of Bloom's taxonomy (i.e. knowledge, comprehension, and application). Results indicated that using humor to teach material significantly increased students' overall performance on exams, particularly on knowledge and comprehension level quiz items, but not application level items. Moreover, learning a construct through the use of humor was most effective for comprehension level quiz items. This study provides some of the first ecologically valid evidence that humor may maximize learning outcomes in college classrooms.

Keywords: humor; Bloom's taxonomy; classroom assessment, teaching strategies

I. Introduction.

Boredom may be the largest pedagogical obstacle to teaching (Smith, 2007), and many believe it is up to teachers to spark students' interest in classes. One way to ignite students' enthusiasm is by using humor. In the classroom, humor can create a cheerful learning climate, enhance social bonding through increased student-instructor interaction, add variety to lectures, decrease test anxiety, and provide enjoyment and laughter, (Bryant, Comisky, Crane, & Zillmann, 1980; Gorham & Christophel, 1990; Kaplan & Pascoe, 1977; Neumann, Hood, & Neumann, 2009; Schmitz, 2002).

In addition to the social benefits, humor is cognitively and pedagogically important. For instance, instructional humor has been touted as an excellent way for students to learn vocabulary, increase critical thinking, practice semantics, and remember more information (Bell, 2009; Dormann, & Biddle, 2006; Forsyth, 2003; Hill, 1988; Tatum, 1999; Ziv, 1988). Because humor often plays with meaning, it helps individuals change their current mental perspective by visualizing problems in an alternate way, as well as engaging their critical thinking (Dormann & Biddle, 2006; Wanzer, Frymier, & Irwin, 2009). For instance, it has been demonstrated that message relevant word puns increase vocabulary because students must first recognize an incongruity in the message and then resolve or interpret it (Tatum, 1999; Wanzer, Frymier, & Irwin, 2009). For example, "Does the name Pavlov ring a bell?" is a play on words that is related to a famous psychologist, but requires students to remember who Pavlov is and remember his work with conditioning in order to understand the humorous twist. Thus, recall, retention, and comprehension skills are practiced while decoding the pun.

It is generally believed that humor is beneficial and is often advised as a best practice by effective teachers. However, aside from anecdotal, little evidence exists of its benefits (e.g.

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Ruggieri, 1999; Tatum, 1999). Most of the very little empirical work that has been conducted addresses students' and teachers' preferences, satisfaction, and perceptions of effectiveness and learning (Gorham & Christophel, 1990; Ziv, 1988). A very small number of studies have examined the effect of humor on relevant cognitive outcomes or in the actual classroom and most of the research on humor in higher education takes place in laboratory settings (Gorham & Christophel, 1990; Kaplan & Pascoe, 1977; Ziv, 1988). While there are notable exceptions, the majority of empirical research on how humor affects cognitive outcomes examines memory after hearing a speech or lecture (see Ziv, 1988 for review). For example, Garner (2006) found that students who listened to pre-recorded statistics lectures containing humor remembered significantly more material than the students who heard the exact same lecture, from the same professor, without humor. While this is a great addition to the literature, it lacks ecological validity, in which the study methods actually represent the real-life environment. Listening to a pre-recorded lecture lacks the social interaction available in an actual classroom. Moreover, asking a student to pay attention for one hour, in a lab setting, is not the same as asking them to pay attention for three hours a week throughout an entire semester in a classroom setting.

In addition, most of the research which has examined cognitive outcomes assesses recall and recognition levels of learning, which equates to the lowest level of Bloom's taxonomy of cognitive processing, the knowledge level (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). At the knowledge level of learning, the skill that is required for mastery is basic memorization, not an in-depth grasp or understanding of the material (Bloom, et al., 1956; Granello, 2001; Lord & Baviskar, 2007). To date, no known studies have assessed humor's effectiveness on Bloom's slightly higher levels of learning. The second of Bloom's levels, comprehension, denotes whether students have a basic understanding of the material (Granello, 2001; Lord & Baviskar, 2007). Comprehension assessments instruct students to translate, classify, or paraphrase information indicating an understanding of the intricacies of the material (Bloom, et al., 1956; Lord & Baviskar, 2007; Reid & McLoughlin, 2002). Bloom's third level of learning, application, indicates whether students can connect, practice, or demonstrate learned information in a new situation or setting (Granello, 2001; Lord & Baviskar, 2007).

Bloom's taxonomy is organized in a hierarchical fashion, with higher levels of thought not mastered until one has achieved lower levels (Bloom, et al., 1956). However, this does not mean that understanding of a construct will always be strongest at the lower levels of Bloom's taxonomy (e.g., knowledge). It is possible for one to have merely sufficient understanding of a construct at the knowledge level, but superior understanding of that same construct at higher levels of Bloom's taxonomy (e.g., comprehension, application). For instance, a student may not recall the name of a phenomenon, indicating poor success at the knowledge level, but may still be able to comprehend and apply that construct. As the higher levels of Bloom's taxonomy indicate more complex thought, it would be meaningful to evaluate humor's effects on learning beyond the knowledge level.

II. The Current Study.

The current study adds to the literature by exploring whether or not humor is beneficial in a classroom setting and enhances test scores on three levels of Bloom's taxonomy (i.e. knowledge, comprehension, and application). It was expected that humor would not only increase learning at the knowledge level—as has been previously demonstrated (e.g., Garner, 2006)—but also at the comprehension and application levels. Since, arguably, humor pushes students to connect

classroom material to new situations (Dormann & Biddle, 2006; Wanzer, et al., 2009) and these skills demonstrate comprehension and application, the following predictions were made:

Hypothesis 1. Students' quiz scores for constructs taught using humor would be significantly higher on all three levels of Bloom's taxonomy than students' scores for constructs taught without humor.

Furthermore, since classroom humor often requires translating, classifying, or paraphrasing course material, the same steps involved in comprehension, it may be that humor is especially likely to increase learning at the comprehension level.

Hypothesis 2. Constructs taught using humor would be most effective for the comprehension level of learning, as opposed to knowledge and application.

III. Method.

As part of a larger study, various constructs in a social psychology course were taught using humor. Student's learning was subsequently evaluated through six quizzes, which assessed learning on three of Bloom's cognitive levels: knowledge, comprehension, and application.

A. Participants.

The student body ($N = 51$) composition consisted of 18 males and 33 females (Mean age = 19.35, $SD = 0.76$). Two students were dropped from analyses due to incomplete records. The majority of students were Caucasian (58%), Hispanic (8%), and Asian (8%), African-American (2%), Bi-Racial (4%) and other (4%). The remaining 16% of students' ethnicity information was not completed.

B. Materials and Procedure.

The current study was a repeated measures design investigating learning through humor in the classroom. Over the duration of the semester, all students were exposed to various constructs that were taught either with humor or without humor, but in ways that were complementary to the personality of the instructor. That is, the instructor was free to use humor or to not use humor naturally to teach a construct, and constructs were not pre-assigned to a humor condition. For example, when students were presented with the various phases of relationship dissolution, a trailer for the comedy movie "The Break-up" was used to illustrate the phases. However, when students were taught the concept of self-esteem, no humor was used.

Prior to the beginning of the semester, a teaching assistant (TA), blind to the hypotheses, was trained to identify and code humorous attempts made by the instructor. The TA was instructed to code all of the instructor's attempts to be humorous, whether the attempt was successful or not. All attempts at humor were included in the analyses, even if the attempt was unsuccessful. Moreover, the TA was told that humorous attempts could be presented in puns, jokes, riddles, personal anecdotes, and multi-media (e.g. videos, songs, and comics). However, the type of humor presentation, and level of complexity within the humorous attempt itself, was not specifically coded. Across the semesters, approximately 40% of the constructs were taught with humor.

Two additional researchers, also blind to the hypotheses, created six quizzes to be administered approximately every three weeks. Each quiz assessed learning of four separate

constructs (e.g., fundamental attribution error, belief perseverance). A total of 24 concepts over the semester were each measured on knowledge, comprehension, and application levels of Bloom's taxonomy. Moreover, each quiz consisted of true/false, multiple choice, and short answer questions. Question types and level of Blooms taxonomy were independent of one another; for instance, short answer questions were used for all three levels indiscriminately.

Finally, two additional researchers, also blind to the hypotheses, graded the quizzes. Answers on each item were either marked as completely correct or completely incorrect. Blank or missing answers were marked as incorrect. No partial credit was awarded. The number of correct answers was combined for all quizzes and was then transformed into a total percentage correct for analysis.

IV. Results.

To test our hypothesis that students' scores for constructs taught using humor would be higher on all three levels of Bloom's taxonomy than students' scores for constructs taught without humor was supported. A 2 (Humor) X 3 (Bloom's level) repeated measures ANOVA was conducted. Results indicated a significant interaction ($F_{(2, 98)} = 7.02, p = 0.0014, \eta^2_p = 0.13$) of humor and Bloom's levels. Additionally, there was a significant main effect of humor ($F_{(1, 49)} = 18.10, p < 0.0001, \eta^2_p = 0.27$) and a significant main effect of Bloom's ($F_{(2,98)} = 7.23, p = 0.0018, \eta^2_p = 0.13$). See Table 1 for a summary of the means and standard deviations.

Table 1. Scores on constructs taught with humor or without humor.

	Humor		No Humor		<i>t</i> (49)	<i>p</i>
	M	SD	M	SD		
Knowledge	0.71	0.22	0.60	0.16	3.71	0.001***
Comprehension	0.80	0.20	0.67	0.12	4.05	0.000***
Application	0.66	0.24	0.69	0.16	-0.88	0.384
Total	0.72	0.16	0.66	0.11	3.17	0.003**

Note. Means are mean percentages, * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

To investigate our second hypothesis that using humor would be most effective for the comprehension level of learning, pairwise t-tests for humor on each of the Bloom's levels was conducted. Results indicated that scores on Bloom's comprehension level were significantly higher than both knowledge ($t(49) = -2.36, p = 0.025$) and application ($t(49) = 4.16, p = 0.001$). However, knowledge and application levels were not significantly different from one another ($t(49) = 1.15, p = 0.25$).

V. Discussion.

Overall, students' scores for constructs taught with humor were higher than the scores of constructs taught without humor. Moreover, the results suggest that using humor is especially beneficial if the test items are on the knowledge and comprehension level of Bloom's taxonomy, but not for application level items. Further analyses indicated that humor was most effective for learning on comprehension level. This is not to suggest that students who performed better on comprehension level items lacked knowledge of the constructs being tested, but that their knowledge was sufficient to allow them to excel at higher levels of Bloom's taxonomy. These

findings support prior research findings that recall and recognition are enhanced through humor, but also provide new evidence that humor increases one's ability to understand the information.

Interestingly, our findings suggest that humor does not increase learning at the application level. The students performed equally well on the application questions, regardless of whether the construct was taught using humor. This is surprising as one would expect that humor would enhance students' ability to apply information because humor often involves using constructs in different situations. However, humor is often employed by showing a construct being misused or applied in a situation that is bizarre or inappropriate. While this allows individuals to be able to discern that the situation is inappropriate, it may not help them to practice the appropriate applications. Thus, learning on an application level may not be truly enhanced by this type of humor. Since type of humor was not coded in this study, thus we cannot test for these effects. One possibility is that riddles could lead to increased recall or knowledge, and humorous videos could lead to increased comprehension, while puns could be effective at increasing application skills. Future studies may want to code the types of humorous attempts in order to assess the cognitive impact of each attempt.

These findings are beneficial for the teaching and humor literature because they add empirical evidence in favor of humor as effective educational pedagogy. Although past research has provided some empirical evidence of the benefits of humor, only a few notable exceptions (e.g. Ziv, 1988) have tested the effectiveness of humor within the classroom context, using relevant cognitive outcomes. Thus, because the current study was conducted in a classroom setting, it has higher ecological validity than many past studies investigating the effectiveness of humor on learning that were conducted in the lab. Importantly, this study used a within subjects design, which allows the authors to rule out limitations resulting from comparing individual differences among instructors or course content.

Despite this benefit, limitations do exist in the current study. One limitation is that constructs were not randomly assigned to be taught using humor. As some constructs do not lend their selves to humor (e.g. aversive racism), the use of humor was left to the instructor's discretion, and used in natural, unscripted ways. This is a limitation because it denies the instructor the ability to control for the level of complexity of each humorous attempt. That is, some humorous attempts were 'plays on words' (e.g., Does Pavlov ring a bell?) while others were personal anecdotes containing sarcasm (a personal story involving eating an entire box of Oreos, while dieting, to demonstrate cognitive dissonance theory). Presumably, these humorous attempts are helping students exercise different levels of Bloom's taxonomy (knowledge and comprehension vs. application, respectively). It could be greatly beneficial if future studies could find a way to pre-assign humor to constructs, as well as control for complexity of the humorous attempt.

An additional limitation to the current study is that it is unknown whether the instructor's humor was directed more at knowledge, comprehension, or application levels of Bloom's taxonomy. In other words, was most of the humor that the instructor used at the knowledge level, the comprehension level, or the application level? Because the humor use was used in natural and unscripted ways, the cognitive level of the humor was not controlled for. Additionally, this information was not coded by the research assistant in the classroom. Future research should investigate different types of humor to determine if humor directed at different cognitive levels actually helps to enhance learning at those levels.

Finally, there was a lack of control over extraneous variables since this study was conducted in a classroom environment. As with any study containing ecological validity, there is

an increased chance that the independent variable may be confounded with other variables (e.g., student attention, class attendance). However, it is unlikely that our findings were caused by an extraneous variable, as our results corroborate existing laboratory research showing a robust relationship between humor and learning outcomes (Garner, 2006).

Past literature suggests that humorous teachers are perceived as more effective (Fortson & Brown, 1998; Downs, Javidi, & Nussbaum, 1988; Norton & Nussbaum, 1980.) But, some instructors are uncomfortable using humor in the classroom and it may take an experienced instructor to purposefully incorporate humor into one's verbal repertoire (Fortson & Brown, 1998). However, one does not have to be an experienced comedian to effectively incorporate humor into one's teaching strategies. For example, there are many movie clips, television shows (e.g. episodes of *The Office* to show self-monitoring, or the lack thereof), commercials (e.g. parodies of Snuggie ads to show exaggerated influence techniques) or even songs (e.g. "White and Nerdy" by Weird Al Yankovic to illustrate stereotypes) that are humorous and can be used. Thus, the instructor does not have to rely on his or her own comedic value, but can borrow from other sources instead.

In conclusion, the present study demonstrates that the use of humor is cognitively beneficial in the classroom. The findings indicate that overall performance was enhanced when using humor in the classroom, with a particular advantage for concepts tested at the comprehension level of assessment. Thus, it is possible to enhance classroom learning with the added benefits of minimizing boredom. And, all kidding aside, that is a win-win for instructors.

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Book Review

Experiential Education: Making the Most of Learning Outside the Classroom

Ange Cooksey¹

Citation: Qualters, Donna M., (Ed). (2010). *Experiential Education: Making the Most of Learning Outside the Classroom*. New Directions for Teaching and Learning, Number 124, Catherine M. Wehlburg, Editor-in-Chief. Winter 2010. San Francisco, CA: Jossey-Bass. ISBN: 978-0-470-94505-6.

Publisher Description: As the cost of education increases, endowments decline, and the job market tightens, institutions of higher education are faced with many challenges. How do we remain relevant in a world many still view us as the “ivory tower”? If we bring in the outside world, how do we convince our own faculty of its value in the classroom? How do we help students combine that exposure with the deep reflection that will give them the knowledge and skills necessary for their future?

Experiential Education: Making the Most of Learning Outside the Classroom is intended to aid administrators, faculty and staff in the design, construction, assessment, and funding of experiential education. From descriptions of individual courses to the layout of entire programs, these writers address the realities of experiential learning – the need to reflect upon its lessons and engage colleagues in understanding its power.

Whether you are a beginner, a regular practitioner, or a field expert in experiential education, this book is a good read for you. From the definitions and descriptions in the preliminary sections to the discussions and analyses at the end, the chapters here provide an informative, and sometimes provocative, look at the state of experiential education in the academy today.

The first chapter presents simple definitions and brief discussions of the most predominant forms of experiential education and although some might seem unnecessary or tedious to the seasoned practitioner, the concluding discussion is worth working through the preliminary sections. The author raises compelling questions about the role and relevance of experiential education in students’ scholastic portfolios, while posing similar questions about their relationship to the vision and mission of colleges and universities today. However, the chapter concludes as many articles of this nature do: the overall success, value, and relevance of experiential education hinge on the amount of planning, preparation, and supervision that occur in support of thoughtful reflection by our students. The latter is, in the end, most impactful.

Chapter two presents three ways to operationalize the positive pedagogical attributes of experiential education: direct service-learning, project-based service-learning, and community-based research. Each is described and discussed in reasonable depth, with specific details included for implementation of programs and projects. Chapters three and four continue by taking on niche curricula for which experiential education is particularly well suited – study

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abroad and the performing arts. Chapter three is of special interest because it exalts out the most challenging aspects of study abroad in general (risk management, the under representation of certain groups, faculty roles and responsibilities), then explores the additional considerations of experiential education in particular. Chapter four is most noteworthy for its discussion of discipline-specific adaptation of the experiential education pedagogy, and its excellent illustration through the *Laramie Project*. This multi-faceted, immersive educational experience is a wonderful example of everything that is right with experiential education and all that can be achieved through its application.

Chapter five's topic is work-based learning, but its real focus is the epistemological infrastructure of higher learning. This chapter is especially interesting because much of its content and analyses are applicable to experiential learning in general. The implications of its findings are compelling when assessing the real value of immersive experiences by considering the learning styles and dispositions of our students.

Chapter six shifts focus to the ethical predicaments students find themselves in as they engage in experiential education, the provocative thesis being that students easily become ethically disenfranchised while working on site. This chapter explores the reasons for this, and how it may be avoided through the adoption of best practices.

Chapter seven offers insight into the challenge of assessing experiential education, and does so in simple terms and common sense explanations. The author writes knowledgeably of the 'assessment loop' and the unique ways it expresses itself in immersive learning. In a kind of Zen-like conclusion, the author of this chapter, and the editor of this book, writes that "In assessment, there are no conclusions, just ongoing questions that the data raise about learning and the process of learning." The last sentence of this 'non-conclusion,' however, is what becomes important about this chapter:

With a clear consideration of design that goes beyond perceptions and into documenting learning, by developing new tools to capture praxis and by using a multi-pronged approach that engages faculty in identifying and designing methods to answer their burning questions, experiential learning can move from the periphery of learning to demonstrating that learning beyond the classroom is a central component of education in higher education (p.61).

Funding experiential education in tight economic times is discussed in Chapter eight, with Merrimack College in Boston used as a working example. From planning to implementation to evaluation, each step of the model followed is showcased in this concise, well organized discussion. Although what works at one school will not automatically work at others, the components and protocols described in this chapter present good guides for creating one's own model. Chapter nine presents three more examples of the adoption of and adaptation to experiential education – this time models for the institutionalization of experiential education. Organized in three parts, this chapter reviews the various approaches taken by different institutions to integrating meaningful immersive experiences into their existing course delivery systems. Perhaps the most interesting experience is that related by the faculty and staff at Purdue Calumet who not only appealed to the Kolb model in building their program, but literally employed the model as an organizational guide for their own planning process.

The final two chapters of the book round out the instructional assistance afforded by the book by offering suggestions for building strong curriculum and good courses. Chapter ten takes on the creation of successful programs through thoughtful and concerted planning, while Chapter

eleven addresses perhaps the most important aspect of experiential education – reflection. In each chapter, concepts and conclusions are well supported by field research, making the suggestions more like directives that will result in best practices. Chapter eleven is again authored by the editor of the book and serves as an assimilative and concluding piece for the entire collection of chapters. But it is also an excellent review of the critical components of reflection – ones that the authors employs herself as she thoughtfully moves through her own experience of bringing the publication together.

Experiential Education: Making the Most of Learning Outside the Classroom meets the expectations for works included in the New Directions for Teaching and Learning series: It ‘informs readers about current and future directions’ in postsecondary education, ‘illuminates the context that shapes these new directions,’ ‘illustrates these new directions through examples from real settings, and ‘proposes ways in which these new directions can be incorporated into still other setting.’ Even though the majority of institutions discussed were from the Boston area, the chapter content was nonetheless interesting, informative and enlightening.

Book Review

Creating a sense of presence in online teaching: How to “be there” for distance learners

Marcia D. Dixon¹

Citation: Lehman, R.M. & Conceicao, S.C.O. (2010). *Creating a sense of presence in online teaching: How to “be there” for distance learners*. San Francisco, CA: Jossey-Bass. ISBN: 978-0-470-56490-5

Publisher’s Description: How can faculty create a strong e-presence for their online classes? This volume highlights the need for creating a presence in the online environment. The authors explore the emotional, psychological,² and social aspects from both the instructor and student perspective. It provides an instructional design framework and shows how a strong presence contributes to effective teaching and learning. Filled with illustrative examples and based on research and experience, the book contains methods, case scenarios, and activities for creating, maintaining, and evaluating presence throughout the cycle of an online course. (<http://www.josseybass.com/WileyCDA/WileyTitle/productCd-0470873116.html>)

While the book does fit the publisher’s description, providing an instructional framework and examples with activities and scenarios, it is not clear how useful that information really is to an online instructor. The first problem is one of semantics. The authors define engagement as “only one aspect of social presence” (p. 4) yet follow that with the statement that current research focuses on “creating engagement, a rich environment for learner interaction, and a sense of community which together result in an enhanced social presence.” (pp. 4-5). So, while the claim seems to be that presence is larger than and encompasses engagement, the same things we use to create engagement (a rich environment, sense of community) also create social presence. That suggests that the two are overlapping terms rather than one encompassing the other. The authors’ first argument about the difference between engagement and social presence is less than convincing.

The authors then go on to analyze social presence from three perspectives: social, psychological, and emotional. The social aspect makes sense to many of us versed in the online learning research. Social presence is when others in our virtual learning environment seem “real” to us. The psychological state is when the “technology becomes transparent to users” (p. 8). In other words, we stop focusing on the technology and focus on the learning, the other learners, the instructor, etc. The emotional aspect is “the ability to genuinely show feelings” (p. 9). The authors direct the emotional aspect of presence

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more toward making decisions rather than any emotions shared between participants or about the content.

While these three aspects make some sense, they are not developed any further. The next pages introduce the three elements “essential for online education experience: cognitive, social, and teaching presence.” (p. 11) which are more intuitively satisfying than the previous three aspects being about thinking (cognitive presence), personal and emotional connections (social presence) and the voice of the facilitator (teaching presence).

At this point, the book has posited two sets of aspects/elements to consider when designing online courses. In chapter two, they add four types of experiences: subjective, what occurs in our own minds, objective “sense that you are psychologically and physically in another location” (p. 15), social, sense of being with others and environmental experience, “ability to easily access and modify, provide input about and interact with the online environment” (p. 17).

Then the authors add four modes of presence: realism, close match with the real world; immersion, being immersed in the virtual world, i.e., Second Life; involvement, engagement with others; and suspension of disbelief, creating a reality in our own minds. Then (still Chapter 2) they add the three dimensions of the learner: “the interior world, the interface with the real world (perception/conception process), and the concrete world they share with others” (p. 20).

Finally, on page 22, they offer their “The Being There for the Online Learner Model.” Imagine a series of concentric circles moving from the center outward: at the center is the learner’s inner world (thought, emotion, behavior); next the four types of experience: objective, environmental, social, and subjective; then, four modes of presence: immersion, realism, involvement, and suspension of disbelief; and, finally, in the outer circle: outer world and online environment. The model does not seem to clarify social presence in any way that adds to our ability to understand and/or create it in the online learning environment. Because there are so many factors to consider, it is difficult to see how the model might be used to inform a design that creates social presence or student engagement.

In Chapter three, the authors attempt to apply the model to a framework for designing online courses. Essentially, we are instructed to use the model to inform our understanding of presence, which the authors contend is determined by content type and focus, learning experience format, interactive strategies, instructor role, type of technology that enables presence, and support needed. These are useful areas of design to consider when creating an online course which encourages social presence and engaged students. The three example courses they give offer some valid ideas for creating presence. However, the ideas seem to boil down to communication in various forms (video, feedback on assignments, email, discussion forums) between the instructor and the learners and between the learners themselves. It is not clear how a fairly complicated model four circles of four typologies adds to our understanding that communication within an online course is essential to creating social presence. Nor is it clear how this differs in any substantial way from most of the engagement literature that takes social presence into account.

Chapter four offers activities for measuring and creating presence before, during, and at the end of the course. While they reproduce the model in this chapter, there is no real integration of it with the activities. For example, how does the “Welcome Letter” (admittedly a good idea to send a brief welcome to students explaining some initial things about the class) fit into the model? Is it about involvement mode and the social

experience? How is the model actually used to help make choices about design? And, where did the social, psychological, and emotional presences go? The authors state that it is “important to keep in mind the Being There for the Online Learner model when incorporating the activities described” (p. 45) but give no guidance on how to do that.

In Chapter 5 the authors present three case studies. In the case studies, they do analyze the activities according to parts of the model. This is better but seems incomplete. For instance, for Case 1: Getting to Know You and Your Course, the authors describe three activities and then analyze how presence was established through these three activities. They state that presence was created primarily “through social experiences ... to a lesser degrees through environmental experiences ... through involvement in the course LMS [Learner Management System]” (p. 97). They indicate that the course designer used two attributes from one ring and one from another. Is that the guideline? Pick some from the second and third rings? Is more better? In Case 2 (use of Second Life) presence was created through social and environmental experiences and immersion and involvement modes. If what we should really be doing is being sure we are tapping into at least one mode and one experience within the model, that could be presented in a much clearer and more useful fashion.

In short, the book contains some information that is useful but difficult to dig out because of too many typologies: three perspectives, three elements, four types of experiences, four modes, and six determinants of presence. Some of these are present in the model (Being There for the Online Learner) some in the Framework for Designing Online Courses with a Sense of Presence (which is the model plus the determinants of presence), some just seem to go missing. There is not enough synthesis of the information to make it consistent, cohesive, and maximally useful in actually designing a course, evaluating an online course, or choosing online activities.

Mission

Founded in 2001, the Journal of the Scholarship of Teaching and Learning (JoSoTL) is a forum for the dissemination of the Scholarship of Teaching and Learning in higher education for the community of teacher-scholars. Our peer reviewed Journal promotes SoTL investigations that are theory-based and supported by evidence. JoSoTL's objective is to publish articles that promote effective practices in teaching and learning and add to the knowledge base.

The themes of the Journal reflect the breadth of interest in the pedagogy forum. The themes of articles include:

1. Data-driven studies: formal research projects with appropriate statistical analysis, formal hypotheses and their testing, etc. These studies are either with a quantitative or qualitative emphasis and authors should indicate the appropriate domain. Acceptable articles establish a research rigor that leads to significant new understanding in pedagogy.
2. Reflective essays: integrative evaluations of other work, essays that challenge current practice and encourage experimentation, novel conclusions or perspectives derived from prior work
3. Reviews: Literature reviews illuminating new relationships and understanding, meta-analysis, analytical and integrated reviews, etc.
4. Case studies: These studies illustrate SOTL and its applications, usually generalizable to a wide and multidisciplinary audience.
5. Comments and communications: Primarily, these are comments based on previously published JoSoTL articles, but can also include book reviews, critiques and evaluations of other published results in new contexts or dimensions

Submissions

Authors are encouraged to submit work in one of the following categories:

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- **Reflective Essays on SoTL**
- **Reviews of current themes in SoTL research including meta-analysis**
- **Case studies illustrating SoTL and its applications**
- **Comments and Communications on previous Journal articles, or book or software reviews**

In your e-mail with your submission, please indicate which of the above categories most applies to your submission. Despite their differences, all of these types of submissions should include the author's expression of the implications their work has for the teaching-learning process. This reflective critique is central to our mission in furthering understanding of SoTL. Authors are encouraged to review the [Guidelines for Reviewers](#) in order to understand how their submissions will be evaluated. **Authors are strongly encouraged to study the Reviewer's Rubric that reviewers shall apply in evaluating their submitted work.**

Authors should submit their article to josotl@iupui.edu. Submissions must be prepared in an electronic format using Microsoft Word on either PC or Macintosh platforms. Submissions should be uncompressed files attached to an e-mail, not in the body of an e-mail text. All submissions must be prepared following the guidelines below. While there is no formal page limit, authors should adhere to recent article lengths, typically 20 pages or less. Authors are expected to include proper referencing for their sources, especially URLs for web sites that might contain material of interest to our readership.

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Style Sheet for the *Journal of the Scholarship of Teaching and Learning*

John Dewey¹ and Marie Curie²

Abstract: This paper provides the style sheet for the Journal of the Scholarship of Teaching and Learning. Manuscripts submitted for publication should adhere to these guidelines.

Keywords: radiation, metacognition, identity theory, constructivism, educational philosophy.

I. General Guidelines for the Manuscript.

The final manuscript should be prepared in 12-point, Times New Roman, and single-spaced. Submissions should be double-spaced. All margins should be 1 inch. The text should be fully left- and right-justified. The title (in 16 point bold) and author's name (in 12 pt. bold) should be at the top of the first page. The author's name should be followed by a footnote reference that provides the author's institutional affiliation and address. The abstract should be indented 0.5" left and right from the margins, and should be in italics.

Except the first paragraph in a section subsequent paragraphs should have a 0.5" first line indent. Use only one space after the period of a sentence (word processors automatically adjust for the additional character spacing between sentences). The keywords should be formatted identically to the abstract with one line space between the abstract and the keywords. Authors should use keywords that are helpful in the description of their articles. Common words found in the journal name or their title article are not helpful.

Pages should be unnumbered since they will be entered by the Journal editorial staff. We will also insert a header on the first page of the article, as above.

References should be incorporated in the text as authors name and date of publication (Coffin, 1993), with a reference section at the end of the manuscript (see below for the desired format for the references). Titles of articles should be included in the references in sentence case. Unless instructed otherwise in this Style Sheet, please use APA style formatting. Footnotes should incorporate material that is relevant, but not in the main text.

A. Plagiarism.

It is essential that authors refrain from plagiarism. Plagiarism is a violation of ethics and, in serious cases, will lead to a manuscript being rejected by this journal. No future manuscripts will be accepted from authors who have submitted a plagiarized manuscript.

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B. Unique work.

This journal does not accept previously published work. We also do not accept work that is being considered for publication by another journal. If your manuscript is accepted, you will be required to sign a form stating that your manuscript has not been previously published.

II. Section and Sub-Section Headings.

A. Major Sections.

Major section headings should be flush-left, bold-faced, and Roman numeral numbered. Major section headings should have one-line space before and after. The first paragraph(s) of the article do not require a major heading.

B. Sub-Sections.

Sub-section headings should also be flush-left, in italics, and alphabetically numbered. Sub-section headings should have a one-line space before and after. Sub-sub-sections should appear at the beginning of a paragraph (i.e., with an 0.5" indent, followed immediately by the text of the sub-sub-section), with the heading also in italics.

III. Tables and Figures.

Tables and figures should be inserted in the text where the author believes they best fit. They may be moved around a little to better correspond to the space requirements of the Journal. If necessary, tables and figures may occupy an entire page to ensure readability and may be in either portrait or landscape orientation. Insofar as possible, tables should fit onto a single page. All tables and figures should be germane to the paper. Tables should be labeled as follows with the title at the beginning (in bold), with data entries single-spaced, and numbered. Column labels should be half-line spacing above data.

Table 1. The title of the table.

Unit	Length, inches
Point	1/12
Pica	1/6

Figures should have their captions follow the image. Captions should be single-spaced, with title in bold. Additional text should not be in bold. The Editorial staff may adjust layout to allow optimal use of space.

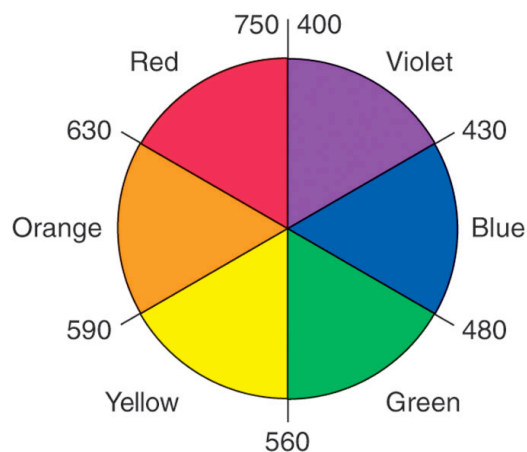


Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

Acknowledgements

Acknowledgements should identify grants or other financial support for this research by agency (source) and number (if appropriate). You may also acknowledge colleagues that have played a significant role in this research.

Appendix

Please insert any appendices after the acknowledgments. They should be labeled as follows:

Appendix 1. The Title of the Appendix.

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ISSN: 1527-9316