The Journal of Effective Teaching

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CALL FOR PAPERS

The Journal of Effective Teaching is accepting submissions for review for the Fall 2015 issue.
Manuscripts will be due May 31, 2014. The expected publication date will be September 30th.
Articles will be accepted in any of the Content Areas supported by the journal.
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The Journal of Effective Teaching is an electronic journal devoted to the exchange of ideas and information about undergraduate and graduate teaching. Articles are solicited for publications which address excellence in teaching at colleges and universities. We invite contributors to share their insights in pedagogy, innovations in teaching and learning, and classroom experiences in the form of a scholarly communication which will be reviewed by experts in teaching scholarship. Articles should appeal to a broad campus readership. Articles which draw upon specific-discipline based research or teaching practices should elaborate on how the teaching practice, research or findings relates across the disciplines. We are particularly interested in topics addressed in the particular Content Areas described at this site, including empirical research on pedagogy, innovations in teaching and learning, and classroom experiences.

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Manuscripts for publication should:

- Follow APA guidelines (5th Edition).
- Include an abstract and 3-5 keywords.
- Typeset in English using MS Word format and 12 pt Times New Roman
- Articles/essays on effective teaching should be 2000-5000.
- Research articles should be 3000-8000 words.
- Tables and figures should be placed appropriately in the text.

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Letter from the Editor-in-Chief: 2013-2014 Index

Russell L. Herman
The University of North Carolina Wilmington, Wilmington, NC

This issue marks the nineteenth issue of *The Journal of Effective Teaching* since it was reformatted in late 2006. We have had over 500 submissions, which have resulted in 120 published articles comprising 1726 pages. The overall acceptance rate at this date is about 25%. We have had many wonderful articles on pedagogy, innovations in teaching and learning, and classroom experiences with suggested best practices. We thank all of our authors and reviewers for their contributions to the success of the journal.

The contents of the 2007-2012 issues were listed at the end of Volume 12 (3). The contents for the years 2013-2014 are provided below, giving an overview of the variety of papers we have published recently. As many of our readers know, these papers are accessible at [http://www.uncw.edu/cte/et/](http://www.uncw.edu/cte/et/). In the past year we also started an RSS feed at [http://www.uncw.edu/cte/et/ARTICLES/JETrss.xml](http://www.uncw.edu/cte/et/ARTICLES/JETrss.xml). The feed can be searched in some browsers for various keywords or authors of JET. This is handy for future authors who might find recent articles covering some aspect of their research.

We also hope that our readers have enjoyed many of these papers and will consider making contributions in the future.

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The Relationship Among Transformational Teaching
and Student Motivation and Learning

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Abstract

Transformational leadership is a well-documented and validated leadership perspective studied in management and organizational contexts that has recently been applied to the instructional context. The current study predicted a positive relationship between teacher transformational leadership and learning, and motivation. A population of 273 college students was surveyed and these hypotheses were supported. Transformational leadership significantly predicted student state motivation, learning indicators and affective learning. The study ends with an analysis of the transformational leadership model in the instructional context, and directions for future research extending the application of the transformational leadership model in the classroom.

Keywords: Transformational leadership, student learning, motivation.

Instructional communication and leadership are two areas of interest for communication scholars. Instructional communication research examines the effects of different predictor variables (immediacy, clarity) on student outcomes such as satisfaction, learner empowerment, learning, motivation, and student affinity for the instructor. Leadership communication research typically investigates the communication behaviors or practices that yield positive outcomes in an organizational or group context. This study seeks to substitute the teacher – student relationship for the leader – follower relationship in an attempt to test the relationship between transformational leadership and student motivation and learning. Additional research in this area is needed in order to increase the usefulness of the transformational teaching construct as it has not been heavily researched, especially amongst older students (Beauchamp, Barling, & Morton, 2011).

Richmond and McCroskey (1992) asserted the classroom as an organization aiming for learning and sharing interdependent relationships, positioning the teacher as the leader. As instructional leadership scholars have demonstrated, a teacher functions as a leader in the classroom (Chory & McCroskey, 1999; Harvey, Royal, & Stout, 2003; Luechauer &

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Shulman, 1996; Pounder, 2008a; Pounder, 2008b). They are responsible for more than teaching as they act as experts, increase interest in the subject, and serve as role models for their students (Bogler, Caspi, & Roccas, 2013). Research, (Bolkan & Goodboy, 2011; Chory & McCroskey, 1999, Kearney & McCroskey, 1980; Robinson, Lloyd, & Rowe, 2008; Sallinen-Kuparinen, 1992) has examined the relationship between teacher management or leadership style and student outcomes, validating the study of organizational theories within the instructional context. Facilitating learning, managing conflict, disseminating information, allocating resources, empowering learners, motivating students, and aiming for high marks in student satisfaction are all analogous to basic principles of leadership contextualized in organizational settings (Chory & McCroskey, 1999). The current study will extend the research and offer insight on the effects of a specific leadership theory - transformational leadership - on student outcomes.

Pounder (2003) hypothesized transformational leadership as an applicable theory for the instructional context. His research and subsequent studies found positive outcomes associated with teacher transformational leadership including, the development of student capability to use ideas and information, development of student ability to think critically and assess ideas, and development of student ability to critically examine a situation and generate novel approaches to solving the problem (Bolkan & Goodboy, 2011; Bolkan & Goodboy, 2010; Pounder, 2008a; Pounder, 2008b; Pounder, 2003). Transformational leadership has enjoyed many applications in the instructional context in recent years. These applications include critical pedagogies of transformational teaching and learning (Mitra, 2013), transformational assessment practices (Pounder, 2008a) and transformational leadership at the administrative level in educational organizations (Forward, Czech, & Allen, 2007). All of these are viable applications of this robust theory; however, this paper will strictly focus on transformational leadership as an instructional leadership style and subsequent impacts on student outcomes.

Transformational leadership has its roots in the theory of transactional leadership. Bass and Avolio (1990) distinguish transactional leaders from transformational leaders. In this model transactional leaders are those leaders who influence followers by “setting goals, clarifying desired outcomes, providing feedback, and exchanging rewards for accomplishments” (Eden, Avolio, & Shamir, 2002, p. 735). Transformational leaders, on the other hand, are leaders who wield influence additionally by “broadening and elevating followers’ goals and providing them with confidence to perform beyond the expectations specified in the implicit or explicit exchange agreement” (Eden et al., 2002, p. 735).

Additionally, the transformational leadership model incorporates a charismatic element facilitating the influence exerted by leaders (Avolio, Waldman, & Yammarino, 1991). Transformational leadership is often studied by analyzing the impact transformational leadership has on workplace outcomes. Outcomes such as, empowerment, innovation, creativity, team performance, motivation, morality, and performance are all positively correlated with transformational leadership in the workplace (Eden, et al., 2002; Jung, Chow, & Wu, 2003). However, an emerging area of research is concerned with applying transformational leadership to an instructional context (Bolkan & Goodboy, 2010; Harvey et al., 2003; Luechauer & Shulman, 1996; Pounder 2003).
Harvey et al. (2003) substituted the leader/teacher and subordinate/student relationships successfully in a study of student outcomes. They found a positive relationship between teacher’s transformational leadership and student satisfaction with the instructor, student report of instructor performance, and student respect for the instructor. Research has suggested that transformational leaders attempt to develop subordinates’ ability to think critically and independently, be creative, and obtain a variety of perspectives on a problem before arriving at a solution (Bogler, Caspi, & Roccas, 2013; Pounder, 2003). Pounder (2003) posited that these goals are similar to those desired in the instructional context. If teachers can strengthen motivation and affect for the class and instructor as transformational leadership would indicate then transformational teaching practices are well suited to positively impact student learning (Rodriguez, Plax & Kearney, 1996).

The purpose of this study is to examine transformational leadership in the instructional context, seeking to explore a potential positive relationship between teacher transformational leadership and student outcomes. It will focus on three student outcomes: 1) student motivation, 2) affective learning and 3) learning indicators among college students. First, we will examine the transformational leadership model followed by an analysis of the outcome variables (student motivation, student learning and learner empowerment).

Transformational Leadership

Transformational leadership research examines outcomes of effective transformational leadership (cohesion, performance, employee satisfaction, innovation, organizational commitment, and follower development) in a variety of contexts (military, corporate, emergency response, and a few in the educational sector) (Bolkan & Goodboy, 2010; Dionne, Yammarino, Atwater, & Spangler, 2004; Eden et al., 2002; Pillai & Williams, 2004; Pounder, 2003).

Transformational leaders exert influence similar to transactional leaders – “setting goals, clarifying desired outcomes, providing feedback, and exchanging rewards for accomplishments” (Eden et al., 2002, p. 735). This type of social influence is used to motivate, empower, foster creativity and critical thinking, and improve engagement (Eden, et al., 2002). Transformational leaders go beyond task influence and attempt to build follower confidence, commitment and elevate follower goals so they can perform beyond expectations (Bass, 1985; Castro, Perinan, & Bueno, 2008; Pounder, 2006). Transformational leadership encompasses an element of charisma, a distinction from the transactional leadership model (Bass & Avolio, 1990).

Transformational leadership is composed of the four I’s: individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence (Avolio et al., 1991). To fully understand transformational leadership we must carefully analyze each of the 4 I’s.

First, individualized consideration is concerned with treating members of a team or group as individuals, not just as members of a team or group. Through individualized consider-
ation the individual is not seen as merely a means to achieving a goal, but an instrumental part of that goal (Bolkan & Goodboy, 2011). The leader spends time getting to know the follower personally including his or her personal goals, strengths, and developmental needs in an effort to meet the needs of that particular individual (Dionne et al., 2004; Walumbwa, Peng, Lawler, & Kan, 2004). The individualized consideration component is often equated to a mentor mentee relationship. As Avolio et al. (1991) suggested, a mentor learns the strengths and weaknesses of his or her student and helps boost confidence and abilities.

Another metaphor useful in explaining individualized consideration is a personal advocate. The leader makes sure followers have access to the resources necessary for them to achieve their goals. This can take the form of negotiation, removing potential problems, or facilitating conflict resolution.

Second, intellectual stimulation focuses on promoting careful problem solving, novel ways of thinking, intelligence building, and questioning previously held assumptions (Bass, 1985; Bolkan & Goodboy, 2011; Dionne et al., 2004; Kark, Shamir, & Chen, 2003; Pounder, 2003). Transformational leaders work extensively to help followers adopt new ways of thinking about “old” problems, change the way they think about all types of problems, and search for creative problem-solving techniques (Avolio et al., 1991; Bass, 1985; Bolkan & Goodboy, 2009). Intellectual stimulation helps to maintain a motivated, excited, positive, and enthusiastic team of followers who are constantly challenging the “status-quo” (Pounder, 2008b). An intellectually stimulated team has the potential for higher levels of performance (Dionne et al., 2004).

Intellectual stimulation is not always one-way; bottom-up influence is common with open teams and subsequently leads to transformational learning opportunities for students in decentralized courses (Mitra, 2013). For example, if a student proposes an activity to help the class grasp an issue, a transformational teacher would willingly embrace the idea as it helps benefit the class. Students appreciate openness and some even enjoy being challenged to reach their potential (Bolkan & Goodboy, 2010). When challenged they are more likely to have an intrinsic motivation for learning (Bolkan, Goodboy, & Griffin, 2011).

Third, inspirational motivation involves formulating, articulating, and sharing a vision or goal for the team through shared symbols or emotional arguments and an overall sense of optimism and enthusiasm (Kark et al., 2003; Pounder, 2003). The inspirational leader is able, through honed communication skills, personal charisma, role-modeling, and personal accomplishments, to inspire others to act in accordance with the shared vision (Bolkan & Goodboy, 2009; Pounder, 2006). The leader fosters a sense of worth, confidence, and opportunity (Avolio et al., 1991). They communicate their expectations which exceed the minimal standards in hopes of energizing the individuals they are leading (Morton, Keith, & Beauchamp, 2010). Follower development is an important aspect of inspirational motivation. Research has suggested that the effectiveness of inspirational motivation is contingent on its interplay with individualized consideration and intellectual stimulation (Dionne et al., 2004; Pounder, 2003). Inspirational motivation occurs when
individualized consideration, intellectual stimulation, and the behavioral aspects of inspirational motivation occur simultaneously increasing the feelings of opportunity and value (Avolio et al., 1991).

Fourth, idealized influence is the charismatic element of transformational leadership. The transformational leader is able to develop extensive personal rapport and influence among followers by treating them with respect, trusting them, showing confidence in them, and viewing them as individuals (Avolio et al., 1991). Idealized influence consists of leader behaviors that instill pride in followers. These behaviors often foster a sense of associational pride between leaders and followers. Pride stems from the leader’s optimism, and allows the working environment to operate positively (Dionne et al., 2004). Increased respect, admiration, and an increased desire to emulate the leader will result if the leader effectively actualizes idealized influence (Bolkan & Goodboy, 2011; Bolkan & Goodboy, 2009; Pounder, 2008a; Pounder 2006). Often, idealized influence is seen as an appropriate precursor to the other three “I’s” as it facilitates a shared vision. Idealized influence can be seen as “setting the table” for transformational leadership to be effective.

To summarize, the four I’s of transformational leadership, individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence, together make up a transformational leader. The 4 I’s offer a prescription and a description; that is, they paint the image of a transformational leader, but also prescribe the necessary behavioral components.

Transformational leadership behaviors exhibited by teachers should have positive relationships with student satisfaction and learning. Research in the organizational context has demonstrated that transformational leaders empower followers and increase their motivation (Bolkan & Goodboy, 2010; Pillai & Williams, 2004; Pounder, 2003). One way that they do this is through transforming the work environment and teachers have this same ability with their classrooms (Bolkan, Goodboy, & Griffin, 2011). Additionally, Pillai and Williams (2004) found transformational leadership positively associated with follower performance. Using transformational leadership in the educational setting could increase student learning and better prepare them to enter the work force (Beauchamp et al., 2011). Instructors can use the four dimensions of transformational leadership to improve their relationship with their students and to promote learning and personal growth (Slavich & Zimbardo, 2012).

**Student Motivation**

Student motivation has been the subject of instructional communication studies as an outcome variable (Frymier & Shulman, 1995; Jaasma & Koper, 1999; Richmond, 1990). Motivation is also identified as an important mediating variable between instructor behaviors and student learning (Jaasma & Koper, 1999). Many instructional variables impact student motivation including teacher immediacy and teacher style (Frymier, 1993).

Student motivation exists as a state or a trait (Frymier & Shulman, 1995). State motivation is dependent on situation, time, and other variables. It is the motivation a student
feels for a specific course, task, or subject area at a specific time (Frymier & Shulman, 1995). Trait motivation, however, is a more longstanding attribute that refers to a student’s motivation in regard to a specific task (Frymier & Shulman, 1995). The distinction between the two is especially important as it positions the teacher to impact student’s state motivation through behavior. Students have shared some of the ways that teachers can have an impact and they are to increase inspirational motivation, enthusiasm and their activity level within the classroom (Morton et al., 2010).

Richmond (1990) suggested classroom interactions as the “primary means by which motivation can be increased.” Her research hypothesized a mutually causal relationship between motivation and learning. That is to say, students who are motivated learn more, and as students learn more they become more motivated (Richmond, 1990). Though Richmond (1990) did not find outright support for this hypothesis, it was found that motivation and learning are likely to reciprocally increase. These conclusions give the teacher an immense opportunity to positively influence student outcomes; therefore a teaching style most able to capitalize on this opportunity is of great importance. Bolkan, Goodboy and Griffin (2011) found that if teachers are able to influence the intrinsic motivation of the students then they are more likely to increase their knowledge through deep learning rather than simply taking a rote learning approach. This type of influence can occur when teachers are intellectually stimulating which occurs through interactions where they challenge the students (Bolkan, Goodboy, & Griffin, 2011).

Richmond (1990) differentiated between compliance and motivation imploring instructors to motivate students. Compliance is doing something because someone else wants us to do it; whereas, motivation, is doing something because we desire to do it. Effective teaching is concerned with increasing motivation, not on compliance gaining (Richmond, 1990). Richmond’s vision of motivation is indicative of transformational leadership in the classroom. Seeking compliance is a transactional approach, but motivating students is transformational. Pounder (2003) illustrated the motivating impact of a transformational teacher. The intellectual stimulation and individualized consideration elements of transformational leadership are components to student motivation (Pounder, 2003). Morton et al. (2010) found students reporting these factors. Students mentioned the importance of intellectual stimulation and the absence of such stimulation greatly decreased interest in the subject, others mentioned increasing their efforts when the teacher paid attention to them as individuals (Morton et al., 2010). Students reported that they worked harder in physical education classes to the level that their teachers were inspirationally motivating. A direct increase in self-motivation was found when students recognized that their teachers were using transformational techniques (Morton et al., 2010; Pounder, 2009). These techniques led the students to say they had increased motivation, enjoyment and that they were more satisfied with their teacher. As a result the following hypothesis is offered:

H1: Teacher transformational leadership will have a significant positive relationship with student state motivation.
Student Learning

Student learning is a multidimensional construct. According to Bloom (1956), student learning can have many faces: cognitive, affective, and/or behavioral. In Bloom’s (1956) taxonomy an explanation for each of these aspects is offered. Affective learning is described as the cultivation of a positive or negative attitude toward learning in a particular context, cognitive learning is described as understanding and retaining information. (Bloom, 1956). Research extending Bloom’s taxonomy has asserted these three dimensions are interrelated components of learning (Kelley & Gorham, 1988).

Cognitive learning can be defined as the reception, retention, transference, and application of knowledge (Messman & Jones-Corley, 2001). Rodriguez et al. (1996) hypothesized cognitive learning as an input-output process. Their study hypothesized cognitive learning as a process of inputs (motivation, affective learning, and immediacy) that together helped yield cognitive learning; however, measuring cognitive learning has proven difficult. The learning indicators measure is designed to analyze behaviors that indicate a student is learning such as study time, discussing material with friends and thinking about content (Frymier & Houser, 1999).

In addition to cognitive learning, student attitudes are an important consideration for instructional communication scholars. Affective learning is the sphere of learning concerned with the beliefs and attitudes a student holds about a specific task or subject area (Rodriguez et al., 1996). Sideling and McCroskey (1997) define affective learning as “the development of positive attitudes toward a subject matter being studied,” (p. 2).

Affective learning is a unique construct particularly significant to the instructional communication literature because student affect offers the teacher a great opportunity to influence student learning. Sorensen (1989) suggested that teacher communication skills, such as delivery, immediacy, clarity and organization, have an immense possibility of increasing student affective learning. The importance of affective learning becomes increasingly evident when it is seen as mediator to cognitive learning (Rodriguez et al., 1996). Student affect often contributes to cognitive learning because student interest, motivation, and involvement heighten as affective learning increases (Rodriguez et al., 1996). As a result, the teacher has an opportunity to impact cognitive learning through affective learning.

Transformational leadership is focused on articulating and adopting a shared vision. A shared vision implies both the leader and the followers ascribe to it with enthusiasm and optimism (Pounder, 2006; Walumbwa et al., 2004). This is similar to the goal of affective learning (Kark et al., 2003). As a result transformational teachers are well positioned to encourage student learning. A transformational teacher has a variety of goals they seek to accomplish with their students some of which are to improve knowledge, learning abilities and student thoughts about learning (Slavich & Zimbardo, 2012). Ideally students will increase their desire to learn and their ability to take in new information while having positive attitudes, values, and beliefs about learning (Coppola, 2013). When students recognize the transformational leadership style they are more engaged in the class-
room and with their instructor (Bogler, Caspi, & Roccas, 2013; Pounder, 2009). Increasing knowledge in how transformational leadership influences student behaviors is important because of the potential for learning to create a quality education (Bolkan, Goodboy, & Griffin, 2011).

H2: Teacher transformational leadership will have a significant positive relationship with student learning.

Method

Participants

Students at a large undergraduate university in the south were recruited through email to participate in the study. The email contained a link to a secure online anonymous survey and was distributed in the tenth week of the semester. If they chose to participate they clicked on the link and were given the direction to think about the teacher of their first class of the week when they answered all of the questions. This was done so that a variety of teachers and courses would be included in the sample. The survey took between fifteen and twenty minutes to complete. The research was approved by the institutional review board (IRB) and the only requirement for participation was that each student was at least eighteen years old.

The population contained a total of 302 surveys with 273 (90.4%) participants fully completing the survey. The sample after data was cleaned consisted of 90 males (33%) and 183 females (67%). The average age of the participants was just under 19 years old (M=18.75, SD=1.11). The gender of the teacher was collected and 169 had male professors (69.2%) while 84 had female professors (30.8%).

Measures

Transformational Leadership: Teacher transformational leadership was operationalized in this study using a modified condensed Multi-factor Leadership Questionnaire version 6s (MLQ) developed by Bass (1990). This original scale is a self-report leadership diagnosis tool that consists of 21 items measuring the leaders’ leadership style. It consists of four subscales measuring the elements (individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence) of transformational leadership, as well as, transactional leadership and laissez – faire leadership. The original scale was modified from self-report to other – report so that students evaluated their teachers’ leadership style. The original scale uses “I” as the subject and then follows with a stem indicating a leadership behavior. In the modified version, the “I” is changed to “My teacher” in order to allow for a descriptive other report scale. Because laissez-faire leadership did not apply to any of the planned analyses it was dropped to shorten the overall measure. This modification resulted in an 18 item measure.

The MLQ has been utilized extensively in academic research and organizational training and development and is considered a valid measure (Jung et al., 2003). Previous alpha
reliabilities from academic research have been around .90 (Eden et al., 2002; Harvey et al., 2003). Alpha reliability for this study was .93 with $M = 63.10$, $SD = 12.01$. The sub-scale reliability for idealized influence was .88 with $M = 11.33$ $SD = 2.66$; the alpha reliability for inspirational motivation was .72 with $M = 10.70$, $SD = 2.34$; the alpha reliability for individualized consideration was .76 with $M = 9.48$ and $SD = 2.60$; and the alpha reliability for intellectual stimulation was .81 with $M = 10.92$, and $SD = 2.40$.

**Student Learning:** Student learning was operationalized both affectively and cognitively. Respondents were asked to report on their attitudes regarding the course, the instructor, and the content using the revised affective learning scale developed by Mottet and Richmond (1998). The measure employed in this study is based on earlier affective learning scales (Andersen, 1979; Gorham, 1988), but an expanded version of the scale was introduced and validated by Mottet and Richmond (1998). The original version of the revised scale put forth by Mottet and Richmond (1998) had eight sub-constructs. The scale in the current study consists of five sub-constructs of the original eight sub-constructs each made up of four items. The additional three sub-constructs were omitted based on previous research deeming the three additional constructs redundant (Weber, Martin, & Patterson, 2001).

The five sub-constructs each consist of four items that represent student attitudes about the course, four items about student appreciation about course content, four items about “real life” application of content, four items regarding student attitudes about the instructor, and four items evaluating the likelihood of taking another course with the same teacher. Each sub-construct is measured with four bi-polar adjectives (good/bad, worthless/valuable, fair/unfair, positive/negative or likely/unlikely, impossible/possible, probable/improbable, would/would not) (Mottet & Richmond, 1988).

Previous alpha reliabilities for affective learning scales have been above .90 (Frymier & Houser, 2000; Weber et al., 2001). Reliability for the affective learning scale in this study was .96 with $M = 89.42$ and $SD = 19.39$.

A second measure of student learning, the revised learning indicators scale as developed by Frymier and Houser (1999), investigated student behaviors that indicate learning. By using the learning indicators measure students not only reported on their attitudes, but they reported on behaviors indicative of student learning.

This learning indicators measure consists of seven items addressing learning activities anchored by 0 (never) to 4 (very often) (Fymier & Houser, 1999). The learning activities include: I like to talk about what I’m doing in this class with friends and family; I explain course content to other students; I think about course content outside the class; I see connections between the course content and my career goals; I review the course content; I compare the information from this class with other things that I have learned; and I feel I have learned a lot in this class. Frymier and Houser (1999) reported an alpha reliability of .85 in their initial application of the scale. Reliability for the learning indicator scale in this study was .86 with $M = 26.10$ and $SD = 5.22$. 
Student Motivation: Student state motivation was operationalized in this study by the score on Richmond’s (1990) motivation scale using five 7-step bipolar adjectives (motivated/unmotivated, excited/bored, interested/uninterested, involved/uninvolved, dreading it/looking forward to it) to evaluate students’ motivation in regards to the course and instructor. Previous alpha reliabilities have been above .80 (Frymier & Houser, 2000; Frymier, Shulman, & Houser, 1996; Richmond, 1990). The reliability for the motivation scale in this study was .96 with \( M = 21.80 \) and \( SD = 8.13 \).

Results

Hypothesis one predicted a positive relationship between transformational teaching and student state motivation and was tested using Pearson’s correlation. Transformational teaching was significantly related to student state motivation, \( r = .53, n = 255, p < .01 \).

A multiple regression was performed to determine the amount of variance each of the 4 I’s had explained in student state motivation. The predictor variables in this regression were inspirational motivation, individualized consideration, idealized influence, and intellectual stimulation with student state motivation as the criterion variable. Transformational teaching explained a significant amount of variance in student state motivation, \( R^2 = .282, F(1, 254) = 99.22, p < .01 \). An analysis of beta weights provided more precise information about variance in student state motivation. Individualized consideration (\( \beta = .23, p < .01 \)) and inspirational motivation (\( \beta = .21, p < .05 \)) were the only two elements of transformational teaching to explain significant variance in student state motivation.

Hypothesis two predicted a positive relationship between transformational teaching and student learning. To test this hypothesis student learning was operationalized affectively and by behavioral indicators of student learning. Transformational teaching was significantly related to student affective learning \( r = .69 \), \( n = 254, p < .01 \).

A multiple regression was used to determine the amount of variance explained by each of the 4 I’s. Transformational teaching significantly predicted student affective learning, \( \beta = .69, t(252) = 6.03, p < .01 \). Transformational teaching also explained a significant amount of variance in affective learning, \( R^2 = .48, F(1, 254) = 233.27, p < .01 \). All of the 4 I’s showed significant correlations with student affective learning with idealized influence \( r = .64, p < .01 \), inspirational motivation \( r = .62, p < .01 \), individualized consideration \( r = .60, p < .01 \), and intellectual stimulation \( r = .63, p < .01 \).

Transformational leadership was significantly related to student indicators of learning \( r = .50, n = 248, p < .05 \). In order to determine the variance explained by each of the 4 I’s a multiple regression was performed. Transformational teaching significantly predicted student learning indicators \( \beta = .69, t(246) = 9.81, p < .01 \). Transformational teaching also explained a significant amount of variance in student indicators of learning, \( R^2 = .25, F(1, 254) = 80.56, p < .01 \). Multiple regression was used to determine the variance explained by each of the 4 I’s had in student learning indicators. Intellectual stimulation (\( \beta = .24, p < .05 \)) and individualized consideration (\( \beta = .21, p < .05 \)) were the only two
elements of transformational teaching to explain significant variance in student indicators of learning.

**Discussion**

Instructional communication scholars investigate novel ways to transmit information, engage students, empower learners, increase motivation, and improve learning. A transformational approach to teacher leadership can provide the necessary tools to achieve these broad goals. Transformational teaching continues to develop, especially in regards to use in higher education, and with the information gathered in the current study it appears to be an appropriate and effective model for classroom instruction. Further research will need to be conducted in order to bolster the model.

This study sought to examine the relationship between teacher transformational leadership and student outcomes, particularly, student motivation and student learning. The hypotheses of this study suggested a positive relationship between teacher transformational leadership and these outcome variables. Both of the hypotheses were supported significantly.

Transformational leadership played an important role in the motivation of the students in the classroom. This is an important finding because motivation has been found to be related to student learning. Teachers have a direct impact on student motivation and therefore learning (Jaasma & Koper, 1999; Richmond, 1990). Pounder (2003) found that that individualized consideration was an aspect of transformational leadership and the current study confirmed this finding. Students want their teacher to help them develop as a person, let them know how they are doing in class and to help those who seem to have been rejected. Taking the time to interact with students on an individual basis could be accomplished in a variety of ways both inside and outside of the classroom. Some options are meeting with students after both poor and good results on an assignment to let them know that the teacher is aware of how they are doing, another opportunity is to take time both before and after class to interact with the students. The importance of individualized attention in the study highlights the centrality of professors in helping their students to be motivated to excel and participate in the course. This presents an opportunity to focus more specifically in future research on how to create the feeling of individualized attention among the students.

Hypothesis two predicted a positive relationship between transformational teaching and student learning. Affective learning and teacher transformational leadership are positively correlated. Affective learning is focused on how a student “feels” about the material and instructor in their course (Sorensen, 1989). Transformational teachers focus, not only on outcomes, but on how to achieve them. This process creates a meaningful and positive environment in the classroom (Pounder, 2003). Transformational teachers are concerned with the affective dimensions as well as performance. Research has explored the role that affect plays in foregrounding other forms of learning (Frymier, 1993). In fact, student attitudes toward the course, instructor and content are mediating variables for student cognitive learning and performance (Rodriguez et al., 1996). Inspirational moti-
vation and idealized influence are the two I’s of transformational teaching most concerned with affective dimensions of leadership and accounted for the most variance, in the study, in affective learning (Avolio et al., 1991; Dionne et al., 2004).

When students are engaged, teachers are immediate, and learners are empowered the likelihood of students to engage in learning indicators is increased (Frymier, Shulman & Houser, 1996). As a result, transformational teachers are well positioned to positively influence learning indicator behavior. Intellectual stimulation and individualized consideration positively impact student learning indicators (Noland, 2005). This result was confirmed in the current study. Transformational teachers that focus on student needs and promote novel approaches to coursework see an increase in student learning indicators, which predict student retention (Avolio et al., 1991; Frymier et al., 1996).

**Limitations**

This study has a few limitations. A central limitation in the study is the use of the transformational leadership construct. There is the potential that it is measuring how much the students like the course or the instructor rather than if the teacher is using transformational leadership principles. This is especially true given the high correlations between affect and transformational teaching. Another potential issue is the clarity of the measures and this potential lack of clarity could alter how participants respond to the questions. Though the reliabilities are all acceptable, further scale development should be done to improve the clarity and validity of these scales. The sample was not racially diverse which inhibits the generalizability of the results to a larger population and it contained a high percentage of females (67%). The sample consisted of mostly first year students who have not had a variety of professors or classes. This lack of collegiate coursework could inhibit their ability to judge their instructors.

Another limitation is the variety of coursework tested in the sample. Though disciplinary and class diversity was secured in the method, the fact that students were freshmen meant their classes were mostly lower level courses. Pedagogy, and thus transformational teaching, in upper division courses should be further analyzed. Another issue was the low reliability in the transformational subscales. The inspirational motivation and individualized consideration scales had the lowest reliability. These scales need to be investigated further to better understand why they are not achieving the desired results. The discourse of “my teacher” throughout creates a power distance that seems counter to the very tenets of transformational leadership. Future research and scale development should avoid this binary and masculine form of measurement. Another limitation is that the relationship between student and teacher was still in an early stage and having spent only one semester with the professor may not be enough time to create a transformational learning environment.

**Future Research**

One of the most pressing issues regarding this research is working to create a transformational leadership scale that works well with undergraduate students and their professors.
To get a better understanding of the transformational leadership scale it needs to be tested with another college population and these results should be compared with the results of the current study. This will provide more information about which questions are working and which need to be altered for this population. The reliability issues of the subscale may require additional scale creation and validation (Bolkan & Goodboy, 2010).

Building on the research examining how teachers manage the classroom this study, and others, focused on how teacher leadership impacts the classroom, particularly student outcomes. Of particular importance here are the significant correlations evident between transformational leadership and student outcomes; however, an underlying trend may emerge. This underlying trend would involve the relationship between transformational leadership and the traditional instructional predictor variables such as teacher clarity and immediacy. Future studies should examine the relationships between teacher transformational leadership, immediacy, and clarity. Additionally, future studies should attempt to analyze to what extent transformational leadership accounts for variance in student outcomes in comparison to other instructional predictors. For example, does transformational leadership account for a relatively small amount of variance in comparison to clarity, immediacy, and other predictors?

Can we study leadership communication theory in the context of instructional communication? It is clear given the correlations between transformational teaching and the outcome variables that transformational teachers are well positioned to influence student outcomes. Similar to Bolkan and Goodboy (2010, 2011), Harvey et al. (2003), and Pounder (2003) this study implemented the transformational leadership model to make that leap. We must be careful when transitioning from one field to another. However, we have evidence that transformational leadership practices in the classroom positively impact student attitudes, motivation and therefore learning and student indicators of learning. As the literature on transformational teaching practices pervades, new measurement and instructional practices will emerge founded on strong evidence to positive student outcomes.

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Pounder, J. S. (2003). Employing transformational leadership to enhance the quality of
YouTube in the Classroom: Helpful Tips and Student Perceptions

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Abstract

The rise in popularity of YouTube has made the use of short video clips during college classroom instruction a common learning tool. However, questions still remain on how to best implement this learning tool as well as students’ perceptions of its use. Blended Learning Theory and Information Processing Theory provide insights into successful integration of technology into the classroom. Literature on multimedia and discussions is also reviewed to shed light on their potential value as teaching techniques. As an example of successful integration, a method of presenting YouTube clips is described in a psychology course. Immediately after the videos, the class participated in structured discussions. Students’ perceptions of the YouTube videos were positive; however, students perceived certain videos as more helpful than others. In addition, class quiz scores are reflected on as indices of learning.

Keywords: YouTube, blended learning theory, multimedia, discussions, psychology.

The use of multimedia in the classroom is not a new phenomenon. However, the type of media used and how it is used is changing with technological innovations. Educators have employed various forms of multimedia in the classroom for decades, dating back as early as the 1920’s (Snelson & Perkins, 2009). In the 1950’s, teachers used technology such as 16mm projectors; the 1980’s and 1990’s gave birth to VHS and DVD’s to provide visual aids and increase student engagement (Berk, 2008, 2009; Kaplan & Haenlein, 2010). The 21\textsuperscript{st} century has been marked by revolutionary growth in use of technology, including cell phones, tablets, and laptop computers (Greenhow, Robelia, & Hughes, 2009; Jones & Healing, 2010; Jones, Ramanau, Cross, & Healing, 2010). Media content is now accessed via the Internet and through Web 2.0 technologies where users interact and collaborate to create content (Harris & Rea, 2010). Such social media sites allow people to share and generate information with the rest of the world. The website “YouTube” is one source of social media that has grown in popularity over the past five

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years, including its use in the classroom as an educational tool (Fleck et al., 2013; Shere & Shea, 2011).

YouTube was launched in 2005 as a place where individuals could record and share their own videos without cost (Terantino, 2011; YouTube, 2013). The website is now owned by Google and is viewed daily by millions of individuals across the world. Although much of the content on YouTube is for entertainment purposes, there exists an enormity of educational content. For example, YouTube EDU was created in 2009 as an educational hub for lectures, courses, and examples and is used by professionals and non-professionals in a variety of fields. Evidence suggests that YouTube as an educational tool has extended to the medical field (Clifton & Mann, 2011; King, Greidanus, Carbonaro, Drummond, & Patterson, 2009), within the field of language learning (Terantino, 2011), in educator training (Hudock & Warden, 2001; Sun, 2014), and to promote cross-cultural understanding (Bloom & Johnston, 2010). With such broad applicability, YouTube is a source of media that is an integral part of the education system.

The ease of using YouTube has contributed to its popularity. Reports suggest that there are over 10 to 20 hours of video footage posted to YouTube every minute (Kaplan & Haenlein, 2010; Snelson & Perkins, 2009). This continuous and massive contribution to the website provides an endless source of information that has the potential to be used for educational purposes. Kaplan and Haenlein (2010) report that 51% of YouTube users connect with the website on a weekly basis and 52% of individuals who are 18-34 years-old post videos to YouTube frequently. This age range includes traditional college-aged students who have been identified as “digital natives” or the “net generation” and describes people reared in a world saturated with technology (Davis, Deil-Amen, Aguilar, & Canche, 2012; Roodt & Peier, 2013). Terentino (2011) reports that 93% of teenagers are considered digital natives, and that 73% of those teens are active users of YouTube. However, YouTube has also been used to bridge the gap between digital natives and non-traditional students (Cooper, Walker, Marks, & McNair, 2001).

While the use of YouTube in higher education is not new, its prevalence as an educational tool begets attention in regards to best practices and student outcomes. Although much research has approached the topic, it has been done anecdotally and often lacks educational theoretical foundations. The current study provides a literature review that focuses on the usefulness of YouTube media as a form of lecture support and conversation starter in the classroom. The general benefits of media in the classroom and the benefits of classroom discussions are considered and supported by Blended Learning Theory as well as Information Processing Theory. These theoretical foundations clearly demonstrate the intentional integration of YouTube creating positive student outcomes working to advance the current literature. In the developmental educational psychology course under investigation, YouTube videos, coupled with discussion questions, were implemented and assessed. The combination of videos and discussion is a unique and new paradigm to be studied. Student preference data provides helpful tips for use of YouTube in educational settings. In addition, class quiz scores are reflected on as indices of learning.
Multimedia in the Classroom

Faculty continue to increase their use of multimedia in the classroom due to the many potential learning benefits it provides (Berk, 2008, 2009; Hudock & Warden, 2001; Lee & Lehto, 2013; Wingard, 2004). Berk (2009) presented several examples of ways that media helps students to interact with the course material. For example, using a video may help to draw attention to a specific concept and work to maintain students’ attention on that concept throughout the duration of the video. Other benefits to using media in the classroom include the ease in availability of diverse materials, vividness of procedural instruction, and relevance to the target population (Hudock & Warden, 2001; Lee & Lehto, 2013). Other researchers suggest that video content specifically from Web 2.0 technology increases student engagement (Roodt & Peier, 2013; Shere & Shea, 2011). However, faculty should be critical of the videos selected in order to ensure their relevance and learning potential (Al-Jarf, 2012; Cooper et al., 2011; Fat, Doja, Barrowman, & Sell, 2011).

Blended Learning Theory. With the popularity of Web 2.0 technologies, instructors need to be deliberate and intentional in their use of multimedia in the classroom. Garrison and Kanuka (2004) define blended learning as, “thoughtful integration of classroom face-to-face learning experiences with online learning experiences” (p.96). The use of YouTube in the classroom ought to fall under this definition; however, it is of special importance to note the intention behind the blending of technology with face-to-face instruction. The two should complement one another in a well-balanced combination that is uniform and harmonious mixture (Hussey, Fleck, & Richmond, 2013; Osguthorpe & Graham, 2003). Adding videos to a course in a haphazard way will not have the positive effects on learning that a truly Blended Learning Theory class will have.

Attention and memory. There are numerous ways in which faculty can present information. In choosing such methods and materials, it is important for faculty to consider the ways in which students learn in order for their teaching to have the greatest impact. Mayer (2010) described the process of learning and creating memories according to the Information Processing Theory. To create a memory, individuals are exposed to information via sensory input that is either visual (icon) or audio (echo). These initial pieces of information are only held in the sensory memory for a brief moment, unless the individual focuses attention to the stimulus and the object of interest is moved into the working memory. The working memory has a limited capacity, holding only pieces of information at a given time. If the individual maintains attention, the theory dictates that working memory will encode the information for storage in long-term memory. The long-term memory is an unlimited storage space in which one must recall or recognize information to bring it back into working memory for conscious awareness (Deffenbacher & Brown, 1973; Mayer, 2010; Ravizza & Hazeltine, 2013).

The key component to information processing, as it relates to multimedia, is the working memory. Using media pictures and videos engages the student longer in the material to increase the attention spent on the information (Hudock & Warden, 2001; Mayer, 2010). As a result, the information has a greater chance of reaching the long-term memory cen-
ter and the individual has a greater span of memory cues to increase retrieval ability. Paivio’s dual coding hypothesis suggests that when simultaneous verbal and pictorial representations are encoded in memory (the icon and echo), redundant retrieval routes are provided to the same information, thus heightening the chances of retrieval (Paivio, 1970; Paivio & Clark, 1986). Mayer (2010) posited that the use of multimedia tools in the medical field influenced an increase of attention paid to target information, subsequently increasing retention. This provided a helpful tool for medical students who were required to retain large amounts of information. In this way, multimedia can further increase a student’s memory for information presented in the video.

Skill development and application. As learners expand their knowledge, they are able to have a broader base from which to draw from when making decisions and applying new concepts. Multimedia provides an opportunity to expand the understanding in a topic area by providing greater diversity in context (Hudock & Warden, 2001). Educators provide evidence that media tools help students transfer material from the educational setting to the real world (McLoughlin & Luca, 2002; Terantino, 2011). For example, students in a family-counseling course were exposed to fictitious videos portraying counseling techniques in a variety of contexts. These exposures increased the students’ understanding of counseling skills and enabled them to transfer the skills into a variety of real settings (Hudock & Warden, 2001). Others have employed YouTube to provide procedural instruction for various tasks in technology, such as fixing a printer (Lee & Lehto, 2013). The use of YouTube is also popular in health fields such as nursing to further explain topics related to childbirth, mental health, pediatrics and leadership (Clifton & Mann, 2011; Mayer, 2010). Its use is especially helpful for topics that students might not have a chance to encounter in everyday occurrences like complicated birth (Cooper et al., 2011). Such videos are used as a learning tool for transmitting content knowledge as well as to increase class discussions and debates. YouTube videos are also useful in speeding time up (e.g. watching an organism grow) or slowing time down (e.g. examining the trajectory of a bullet); learning about remote locations or unsafe events (e.g., forest fires); as well as bringing expert lecturers to the classroom (Snelson & Perkins, 2009). Cooper and colleagues (2011) further note that the use of YouTube videos have the potential to increase skill building for a variety of learners, including Millennial students, who expect technology in the classroom. Although the Baby Boomer generation might not experience technology in the same way, they can still benefit from multiple modes of instructional delivery (Cooper et al., 2011).

Diversity and learning needs. Textbooks and teaching materials can lack the diversity that is present in the student population and/or the society in which our students will interact. This places the onus on faculty to include diverse perspectives in the classroom (Hussey, Fleck, & Warner, 2010). YouTube can help in this endeavor. For example, YouTube can be helpful in engaging students in language learning. Terantino (2011) postulates that videos available on YouTube often provide a cultural context relevant to the language being taught. Additionally, the videos provide alternative perspectives and explanations that support a variety of learning needs. Terantino (2011) does not limit the use of YouTube as an aid for any single language; rather the use of the videos is encouraged to support learning of any language. In a related topic, students who speak English
as a second language can benefit from YouTube clips as supplemental material in the classroom (Al-Jarf, 2012). This includes videos in which the content is covered in their native language and/or supplemental videos in English. Also, in areas where certain types of diversity might be lacking, videos can be used to introduce different social groups, perspectives, allow students to participate in cross-cultural exchanges, and so on (Bloom & Johnston, 2010; Glimps & Ford, 2008).

Availability of material. Educators have access to a plethora of material using YouTube as an instructional tool with Internet access and adequate search criteria. For example, the Blinkx video search website estimates almost 7 million hours of online videos exist (http://www.blinkx.com). Fat, Doja, Barrowman, and Sell (2011) found over 6,000 available videos that met their criteria for instructional videos. However, not all of these videos are effective instructional tools. They piloted 100 YouTube videos and found roughly half to be rated as poor examples. Educators can search these videos or narrow their search to education hubs (e.g. www.youtube.com/edu) or channels (e.g. Khan Academy: http://www.youtube.com/user/khanacademy). Snelson and Perkins (2009) also listed a sample of YouTube channels containing educational content in areas such as art, politics, math, science, history, education, and foreign language. In addition, Snelson’s (2011) review of the literature shows that faculty from numerous disciplines, including agriculture, business and marketing, media studies, and forensics employed YouTube in the classroom.

In each case described, the researcher reinforced the importance of engagement in the material and visual cues that were provided through the use of media in the classroom and in many other educational contexts. Additionally, the information available on Internet sites such as YouTube provides a diverse base for students to learn from, is culturally relevant, and is easily accessed. Thus, media as a support tool provides greater opportunities for learning as students remain engaged and have a greater diversity in explanations.

Peer Discussions and Multimedia in the Classroom

Similar to multimedia in the classroom, peer learning has a history of being an integral part of the learning environment (Topping, 2005). Developmental, cognitive, and educational theories have recognized the importance of interaction amongst peers within a classroom setting. For example, Piaget (1928) noted that individual reasoning is promoted by social interactions; and Vygotsky (1978, 1986) considered learning to be a socially mediated process best facilitated by verbal conversational exchange to create and enhance meaning. Classroom discussions transform student engagement from being passive to active within the learning environment (Goldenberg, 1993; Sandora, Beck, & Mckown, 1999; Dole & Sinatra, 1998). This in turn increases such things as students’ attention, engagement, and content knowledge (Prince, 2004). In the present study, YouTube videos were intentionally paired with a discussion question and discussed in small groups. The literature suggests that these types of discussions can increase learning (Boud, Cohen, & Sampson, 1999; Smith et al., 2009; Topping, 2005; Murphy, Wilkinson, Soter, Hennessy, & Alexander, 2009).
**Increased comprehension.** A recent meta-analysis examined the role of classroom discussion on content comprehension (Murphy et al., 2009). A total of 39 empirical studies were reviewed that related to discussion practices in the classroom and the effect on overall comprehension. Results indicated that regardless of the discussion technique, classroom discussions were effective in increasing comprehension of text-related material. When teachers became facilitators of conversation, discussions converted from being teacher-led to student-driven. This collaborative reasoning amongst peers was shown to be the most effective at increasing comprehension (Murphy et al., 2009). Group discussion offers students the opportunity to share content knowledge as teachers and learners, thereby increasing collaboration, critical thinking, and metacognitive skills (Boud, et al., 1999; Topping, 2005). Even when no one in the group knows “the answer”, group discussions have shown to be effective in aiding students to come to correct conclusions (Smith et al., 2009). In addition, peer discussions combined with lecturing help stronger students stay engaged in the material, resulting in greater learning gains (Smith, Wood, Krauter, & Knight, 2011).

**Increased discussions.** Classroom discussions are generally common practice in nearly all disciplines, including science, history, literature, and economics. Discussions require students to engage in active conversations, providing gains in theoretical skills and conceptual knowledge (Gross, 1990; McCloskey, 1998; Nelson, Megills, & McCloskey, 1987; Simons, 1989). Research demonstrates that students value peer discussions, as it promotes reflection and critical thinking and allows individuals to engage in perspective taking, with the result being a more active learning environment (Prince, 2004; Roehling, Vander Kooi, Dykema, Quisenberry, & Vandlen, 2010). Classroom discussion in small groups of peers gives students the opportunity to build relationships, hear other people’s perspectives, and voice their own opinions (Henning, 2005; Prince, 2004). Furthermore, by allowing students to talk to each other, it “primes the pump” for a more positive atmosphere for whole class discussions and increases the quality of conversations (Hyman & Whitford, 1990). Whole class discussions allow teachers to engage students by reframing, broadening, and synthesizing student responses, in addition to asking higher-level questions (Henning, 2005).

**Discussions of multimedia.** McLoughlin and Luca (2002) emphasize a combination of methodologies including project-based learning, collaborative learning, and extensive exposure to media combined to enhance the learning experience. However, it depends on what is shown and to whom (Snelson & Perkins, 2009). Although showing videos better connects to digital natives and bridges the gaps with non-traditional students, faculty should ensure the relevancy and learning potential of videos (Al-Jarf, 2012; Cooper et al., 2011; Fat et al., 2011). In addition, active learning techniques should be employed with multimedia use, versus simply showing a video. Researchers note the importance of student discussions after watching videos to further develop students’ understanding of the material covered (Al-Jarf, 2012).

The research reviewed suggests that when used in the right way, Web 2.0 technologies (such as YouTube) have the potential to be a valuable asset in the classroom (Davis et al., 2012; Fleck et al., 2013). Blended Learning Theory recommends the need for technology
use to be deliberate and integrated into the course harmoniously (Osguthorpe & Graham, 2003). In the current classroom based study, class meetings began with the presentation of a short YouTube video. Immediately after the video, the class participated in a structured discussion answering a question that pertained to the course content and the video. It is the combination of the media and discussion that is unique to this study and combined, has not been the topic of investigation in previous research, especially based on theoretical frameworks. Student’s opinions were assessed at both the start and end of the semester. It was hypothesized that college students would view the YouTube paradigm positively as a learning tool in the classroom. In addition, it was expected that the use of YouTube and discussions would contribute to an increase in students’ understanding of course content.

**Method**

**Participants**

Eighty-five psychology students (19 males and 66 females) from a large, urban, commuter university participated in this study. On average, the students were 23.91 years of age ($SD = 5.57$); with an age range of 17-46 years. The majority of participants were Caucasian (70.6%), followed by African American (9.6%), Hispanic (9.4%), Multi-racial (4.7%), Asian/Pacific Islander (2.4%), Latino (2.4%), and (1.7%) chose “not to say”. All participants were enrolled in various sections of a Developmental Education Psychology course that was taught using a hybrid format (50% online and 50% face-to-face). The semester ran for 16 weeks total, each class met one time per week for one-hour and 15 minutes. All sections were taught in the same way by the same professor. A total of 18 students reported they had taken a hybrid course in the past, while 67 students had not. Developmental Educational Psychology is an introductory level course most often taken by students entering the Human Development Major. The content bridges developmental psychology with educational applications. For participating in this study, students received 10 class points (out of 1,000 total). They were offered a brief reflective writing assignment as an alternative way to earn the points that was completed during the survey time if they opted not to participate.

**Materials**

**Classroom materials.** Each class period began with a short YouTube video relevant to the chapter read in the textbook that week. The videos ranged in length from 58 seconds to 6-minutes 46 seconds in time with most being between 2 and 3 minutes ($M=2.78$, $SD=1.78$). Table 1 presents a complete list of YouTube videos used during class including their title (for searching purposes), the related chapter of the text (McDevitt & Ormrod, 2012), and a list of the relevant concept and keywords associated with the video. In addition, the table includes the discussion question that was posed to the students after viewing the video. The teaching assistant selected several videos that were then viewed and considered for each topic by the instructor. The instructor chose the video that was the most appropriate, educational, and best demonstrated or related to the particular topic. After a video was selected, the instructor and teaching assistant wrote the related discussion question.
Table 1. YouTube Video Information.

<table>
<thead>
<tr>
<th>YouTube Video</th>
<th>Textbook Chapter</th>
<th>Video Duration</th>
<th>Discussion Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alison Gopnik, What do babies think?</td>
<td>Ch 1: Making a Difference in the Lives of Children and Adolescents</td>
<td>18:30*</td>
<td>Why might it be important/useful for adults to think like children?</td>
</tr>
<tr>
<td>Correlation vs. Causality:</td>
<td>Ch 2: Using Research to Understand Children and Adolescents</td>
<td>1:29</td>
<td>What factors do we need to consider when interpreting data from our research?</td>
</tr>
<tr>
<td>Freakonomics Movie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Secrets of Einstein’s Brain</td>
<td>Ch 5: Physical Development</td>
<td>6:46</td>
<td>What differences might you expect between Einstein’s brain and your own? What are glial cells and how to they contribute to learning?</td>
</tr>
<tr>
<td>Piaget: Conservation</td>
<td>Ch 6: Cognitive Development: Piaget and Vygotsky</td>
<td>3:11</td>
<td>What stage of development are these girls in? How do you know?</td>
</tr>
<tr>
<td>Vygotsky: Roxanne – Private Speech</td>
<td>Ch 6: Cognitive Development: Piaget and Vygotsky</td>
<td>1:36</td>
<td>Discuss how this child’s behavior is relevant to Vygotsky’s theory. Be specific in your answer by choosing at least one aspect of Vygotsky’s theory and apply it to Roxanne.</td>
</tr>
<tr>
<td>Selective Attention Test</td>
<td>Ch 7: Cognitive Development: Cognitive Processes</td>
<td>1:22</td>
<td>From an information processing perspective why is attention crucial for learning?</td>
</tr>
<tr>
<td>Star Wars according to a three year</td>
<td>Ch 8: Intelligence</td>
<td>1:30</td>
<td>How does this child demonstrate intelligence based on Sternberg’s theory? Be specific in your answer. Think back over the teachers you have had who used reinforcement. Jot down at least one example you remember. Discuss if it is positive or negative reinforcement.</td>
</tr>
<tr>
<td>old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement – The Big Bang</td>
<td>Ch 9: Behaviorist Views of Learning</td>
<td>4:54</td>
<td>How can we encourage social perspective taking in our classrooms?</td>
</tr>
<tr>
<td>Theory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking Twin Babies – Babbling Babies</td>
<td>Ch 9: Language Development</td>
<td>2:09</td>
<td>Identify the different components of language that exist in this conversation.</td>
</tr>
<tr>
<td>Kid Gives Speech After</td>
<td>Ch 13: Development of Motivation and Self-Regulation</td>
<td>0:58</td>
<td>Is this an example of intrinsic or extrinsic motivation? Why? What is one way you can promote intrinsic motivation?</td>
</tr>
<tr>
<td>Learning to Ride a Bike</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Simple Map of Typical</td>
<td>Ch 12: Development of Self and Social Understanding</td>
<td>4:47</td>
<td>How can we encourage social perspective taking in our classrooms?</td>
</tr>
<tr>
<td>‘Theory of Mind’ Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bloom’s Taxonomy According to ‘Pirates</td>
<td>Ch 13: Instructional Strategies</td>
<td>3:29</td>
<td>Now that you have seen Bloom’s taxonomy applied to a movie, how might we utilize it in our classrooms? In other words, why is this an important theory when developing a lesson plan?</td>
</tr>
<tr>
<td>of the Caribbean’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Behaviorist Views of Learning and Instructional Strategies were chapters assigned from Ormrod (2008), Educational Psychology: Developing Learners 6th edition.

*This video was viewed from 14.51 minutes until the end for a total viewing time of 3.71 minutes.
Study materials. At the beginning of the semester, students completed a survey requesting demographic data. Additionally, questions were asked concerning their prior experience with YouTube when used in the classroom, including “Have you ever used YouTube for academic purposes?” and “Do you find multimedia (such as YouTube videos) to be helpful for academic purposes?”. Students were then provided with a list of 10 adjectives and were asked, “When your teachers use YouTube during class time, you find it to be: (circle all adjectives that apply)”. The adjectives were derived from a previous research study conducted by Fleck and colleagues (2013) in which college students described their opinions when various social media applications, including YouTube, were integrated into the classroom. This question was intended to gain an understanding of students’ feelings based on prior exposure to YouTube in the classroom or their expectations of what the experience might be like. At the end of the semester, the same series of questions were asked of the students as well as three questions that requested them to indicate their most favorite, least favorite, and most helpful YouTube video clip. Students were also asked two yes/no questions regarding whether they enjoyed the YouTube videos that were presented, and if the videos had been helpful for academic purposes.

To reflect on learning, questions were selected from normally occurring weekly quizzes. One question was identified for each chapter that corresponded with the YouTube video topic for each week. The quizzes were taken online, prior to coming to class, thus providing a pre-YouTube assessment of the students’ understanding. The same questions were given on the mid-term and final exam providing a post-YouTube assessment. In accordance to Bloom’s revised taxonomy, each question was considered a low-level knowledge or understanding based question. Many checked for understanding or requested near-transfer application (application of concepts heavily related or already discussed in the text) (Barnett & Ceci, 2002; Krathwohl, 2002).

Procedure

On the first day of the semester, students completed the pre-semester survey. During the rest of the semester, prior to coming to class, students completed the assigned textbook reading and took a weekly quiz online. At the beginning of each in-class meeting (once a week), students watched the YouTube video clip selected for that chapter. Following the video, students discussed the posed question with peer groups of approximately three students (A list of all the discussion questions can be found in Table 1). After the small group discussion, the class discussed the question together at large. Class then proceeded with lecture, hands-on activities, or other group projects. On the last day of the semester, students completed the post-semester survey, concluding the study.

Results

To understand students’ experience with YouTube, questions from the pre and post-semester surveys were analyzed. At the start of the semester, 85 students responded to the survey questions. Fifty-four (63.5%) indicated that they had prior experience with YouTube for academic purposes whereas 31 (36.5%) did not. When asked if they find multimedia, such as YouTube, to be helpful for academic purposes, the majority (80%)
reported that they did. Post-semester surveys indicated a similar high frequency and positive pattern. When asked if the videos were helpful for academic purposes, 68 of the students said they were (80.7%), whereas 7 indicated they were not (8.2%). In addition, at the end of the semester nearly all of the students (97.3%) reported that they enjoyed the YouTube experience overall in the classroom.

Data from the survey question that prompted students with 10 adjectives to describe their experiences with YouTube can be seen in Table 2. The frequencies presented indicate an increase in favorable responses to positive adjectives (e.g., fun and engaging) from pre to post-semester. Likewise, there is a decrease in responses to negative adjectives (e.g., annoying and waste of time). Wilcoxon signed-rank tests were utilized to statically examine pre-semester and post-semester responses. Answers were coded as 1 indicating no and 2 indicating yes, thus higher values represent more agreement to the question or adjective. One adjective was significantly different. Students reported YouTube to be more beneficial for learning ($z = -3.41, p = .001$) after the semester ($M = 1.69, SD = .46$) as compared to before ($M = 1.47, SD = .50$).

Table 2. Adjectives used to Describe YouTube.

<table>
<thead>
<tr>
<th>Adjective</th>
<th>Pre-semester (n=85)</th>
<th>Post –semester (n=75)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fun</td>
<td>49</td>
<td>57.6</td>
</tr>
<tr>
<td>Helpful</td>
<td>49</td>
<td>57.6</td>
</tr>
<tr>
<td>Beneficial for learning*</td>
<td>40</td>
<td>47.1</td>
</tr>
<tr>
<td>Engaging</td>
<td>42</td>
<td>49.4</td>
</tr>
<tr>
<td>Entertaining</td>
<td>47</td>
<td>55.3</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annoying</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Distracting</td>
<td>49</td>
<td>57.6</td>
</tr>
<tr>
<td>Waste of time</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>A time to nap</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Irrelevant to course material</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Overall was YouTube:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoyable (yes responses)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Helpful for academics (yes responses)</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. Mean differences statistically significant. * $p = .001$

To reflect on learning, a paired samples t-test was run comparing the total score correct for pre-YouTube questions and post-YouTube questions. The questions were on the topics related to the videos. Pre-quiz questions were taken as homework prior to coming to class. The same questions were then given as post-quiz items and were taken on the midterm or final exam. The test revealed a significant difference, $t(45) = -6.13, p<.001$, with students performing better on quiz questions after coming to class (see Figure 1).
Finally, responses pertaining to students most favored and least favored videos were totaled. Percentages revealed that the “Babbling Babies” language development chapter was the most favorite (21% of students indicated so). Students found the “Big Bang” video to be the most helpful for understanding course content (15.3%). Although the “Pirates of the Caribbean” video was found to be helpful, students did not prefer it. It was found to have the highest percentage votes for least favorite (47.3%). See Table 3 for results, presented in rank order for videos chosen for each question.

Table 3. Student Perceptions of YouTube Videos in Descending Order.

<table>
<thead>
<tr>
<th>Most Favored Video Rank Ordered</th>
<th>Most Helpful Video Rank Ordered</th>
<th>Least Favored Video Rank Ordered</th>
</tr>
</thead>
</table>

**Discussion**

Participants in this classroom-based study reported overall positive perceptions of using YouTube in the classroom for educational purposes. Many of the students in the pre-semester survey indicated that they had high expectations for the use of YouTube; the response of the post-semester survey indicated that these expectations were mostly met. Students associated their experience with adjectives such as fun, entertaining, beneficial for learning, and engaging. The comments associated with students’ favorite videos (i.e., Babbling Babies and The Big Bang Theory) indicated that the students found the material to be funny and familiar. Indeed, these specific videos were not only class favorites, but they were able to demonstrate theoretical concepts by engaging students with familiar pop culture. Connection to student culture has been recognized to be important in modern day classrooms (Fleck & Hussey, 2009). Students are accustomed to easily accessible
information and entertainment (Roehling et al., 2010). Some of the least favorite videos were “Pirates of the Caribbean” to explain Bloom’s Taxonomy, and “Freakonomics” to explain that correlation does not equal causation. The comments associated with these videos indicated that they were too complicated to follow or did not clearly connect with the course material for effective learning purposes. Such opinions indicate that entertainment value of the video is regarded as important, along side of its clear connection with the course material. These findings are similar to those of Fat and colleagues (2011), who found that only 50% of students found their carefully selected videos to be relevant to the course information.

YouTube provides a stimulating and differentiated approach to learning new material. Berk (2009) discussed the potential that media has to provide a greater entertainment value in the classroom. Entertainment, though not a goal of education, has been shown to increase student attention (Berk, 2009; Terantino, 2011). Media can help to draw attention and maintain interest in a topic for much longer than a traditional lecture, which might be missing visual stimulation (Berk, 2009). The students in the current study indicated on the post-semester survey that their overall experience with YouTube was fun, entertaining, and engaging. Thus, having an engaging stimulus in the classroom, such as YouTube, might increase students’ interest and motivation to be successful in the class. According to Mayer (2010), this method of engagement should keep the information in working memory for a much longer period of time to help increase memory cues.

Related to feelings, students’ expectations of YouTube were examined. Although sometimes viewed as a place simply for entertainment purposes, it appears that educational content is also accepted. The analyses suggest that students initially had high/positive expectations; after exposure to the course content, the majority of students reported that they were satisfied with the YouTube experience as a whole. George and Dellasega (2011) found similar results when assessing pre-post expectations of using YouTube in the classroom. Their students reported feeling unsure about the effectiveness of using YouTube for learning; however, after exposure they were happy with the support that the media tools provided. Particularly, the media videos expanded on available information to aid understanding. Our results suggest that students believe there is a useful educational component to the videos. Additionally, the majority of students reported that they found the videos to be beneficial for learning. Other researchers have found that YouTube is effective for increasing skills both in a lab setting and in the general public (Lee & Lehto, 2013; Fat et al., 2011) as well as long-term retention of material (Manasco, 2010). Thus, YouTube is being continually validated as an effective tool for teaching in a formal setting or in the home for common skills and tasks.

The increase demonstrated in quiz scores is reflective of overall learning in the course. The YouTube videos and discussion questions contributed to the rise in understanding and memory for course material. Following the information processing approach, learning and memory is enhanced when the student is provided multiple mediums for data input, thus creating more meaningful connections. Multimedia tools such as YouTube provide visual imagery to extend the attention spent on a stimulus that creates stronger cues for retrieving stored information (Mayer, 2010). Although these results indicate overall
learning in the course, readers should note that because there was not a control condition, or isolation of YouTube as a variable, a causal effect of YouTube and learning cannot be determined. Material was also read, lectured on, and worked on in various other formats. It would be expected that students would increase their knowledge having been exposed to the material in multiple modalities. Future research could include a control classroom to better compare the learning outcomes associated with the use of YouTube (Snelson, 2011). Similar to a control group study, lab-based research would be beneficial by controlling for extraneous variables that often muddy the results of classroom-based studies. The naturalistic approach used here is a strength; however, in the lab variables such as participants’ gender, incentives (i.e., the ten participation points), the level of the assessment questions used to measure knowledge, the specific length of the videos, and the students’ exposure to content through multiple modalities, could all be controlled.

An important component of this study was the additional use of classroom discussion after viewing the YouTube video. The structured discussions provided the students with opportunities to further engage with the material, share ideas, and clarify uncertainties. Collaborative reasoning amongst peers has shown to be effective at increasing comprehension (Boud et al., 1999; Murphy et al., 2009; Topping, 2005). Again, this process is consistent with the research by Mayer (2010) that keeping students engaged longer increases the time that information exists in working memory. Researchers Chen, Lambert, and Guidry (2010) also posit that technological applications increase the time spent on tasks, increase opportunities for collaboration, and foster executive functioning skills. These skills are suggested to have additional growths when the coursework is partnered with face-to-face interaction rather than the use of technology alone. Such interactions were also beneficial for generating interest (Chen, et al., 2010; Mayer, 2010). As discussed by Lee and Lehto (2013), an increase in self-efficacy in a given task also predicts higher interest and satisfaction with the information. Thus, those who find YouTube and class discussions to be useful components in their learning experience and feel competent in using the technology, are more likely to continue engaging in the activities to strengthen their understanding of the material.

Internet based platforms, like YouTube, offer a unique opportunity to enrich classroom learning environments. YouTube videos create a novel way of conveying educational content through real-life situations and observations, as well as connecting students with external experts. Using social media platforms associated with popular culture can also become a tool in which students can actively pursue learning on their own accord (George & Dellasega, 2011). Teachers, in all areas of education and within all fields of study, can enrich their classroom environment by properly utilizing YouTube as a tool to engage their students, particularly when it is connected to meaningful in-class peer discussions. The content of YouTube videos ranges from personal home movies, to television show clips, to formal lectures given by experts in a variety of fields. Videos are also posted in a variety of languages and diverse contexts. Given the sheer volume of videos that are accessible, incorporating YouTube videos accompanied by discussion questions can be replicated in any classroom; transcending nearly all academic disciplines.
Teaching Tips and Conclusions

Tips for successful integration of YouTube into the classroom include recognizing or measuring students’ familiarity with it and being very explicit in its intended use. Research suggests that the more familiar students are with online learning tools, the more willing they are to use them in the class (Fleck et al., 2013). Polling students at the beginning of the class will aid faculty in gauging students’ experience with YouTube and how much training of the use of the learning tool is needed. Also, because students primarily use YouTube for entertainment purposes, faculty should clearly explain the intended use and purpose of YouTube being used in the classroom (Dunlap & Lowenthal, 2009). In addition, gender differences and preferences might need to be considered. The majority of students in the current study were female. A predominately male-based class might yield different results in regard to video preferences.

In the past, traditional lectures have been the central method for content delivery in college classrooms. However, with advancements in technology, this type of teaching pedagogy alone might no longer be sufficient, especially for promoting thought, scientific inquiry, and critical thinking (Bligh, 2000). Faculty might consider adding a video per assigned reading, much like the examples provided in this paper. Other suggestions or tips include using YouTube in the classroom to increase diversity content (Glimps & Ford, 2008), demonstrate complex material (Manasco, 2010), show real life examples of events students would otherwise not be able to see (Cooper et al., 2011), analyze and produce performances (Desmet, 2009), and help meet diverse students’ learning needs (Al-Jarf, 2012). Considering that the majority of students are digital natives and tech-savvy, the use of social media in the classroom appears to be the way education in general, and the individual classroom in particular, will be transformed (Ashraf, 2009; Fleck et al., 2013).

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The Effect of Project-Based Activities on Intermediate EFL Students' Reading Comprehension Ability

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Payam Noor University of Rasht, Guilan, Iran

Abstract

The present study investigates the relationship between the use of Project-based activities and intermediate EFL students' reading comprehension. The study addresses the questions of whether students' reading comprehension differs after implementing Project-based activities, and whether different projects lead to different degrees of reading comprehension. One hundred twenty intermediate female students from Kish English Institute of Rasht participated in this study. Using a standard test, participants were randomly assigned to two experimental groups, receiving English language instruction in a Project-based context, and one control group receiving instruction in a CLT approach. The first experimental group was asked to make four magazines during a period of four months, while, the second experimental group was supposed to make four wall newspapers during the same period. To compare the performances of the groups, two multiple-choice reading comprehension tests were administered to measure the effectiveness of project-based activities both at the beginning and at the end of the study. The numerical data obtained from the samples was analyzed using the one way ANOVA. The result indicated that at $\alpha = .05$, there is a significant positive relationship between the use of Project-based activities and reading comprehension ability. The study also indicated that there is no significant difference between the reading comprehension ability of the two experimental groups. These findings provide evidence to support further implementation of PBL activities in English learning classes irrespective of the nature of the PBL activity.

Keywords: Project-based learning, reading comprehension.

Reading ability has been shown to have a critical impact on students' learning and performance (Leppanen, Aunola, & Nurmi, 2005), and supportive strategies for its development are essential.

As a teacher, I have always seen my students being challenged by reading tasks, and having difficulty in understanding them. In Iran English is considered as a foreign language, and is not used in formal or informal settings outside the classrooms; therefore, Iranian

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students face challenging learning contexts in which few opportunities are provided for learners to practice English communicatively. I hypothesize that doing projects will provide students with the opportunity of being exposed to a foreign language, and practicing their language while they are not in the learning environment of the class.

Project-based learning approach to education may positively affect students’ ability in understanding a written text, as students actively explore, select, collect, analyze, and comprehend information sources (Kuhlthau, 1997). In project-based learning, students will read through a vast area of reading materials, for the sources ranging over books, magazines, newspapers, articles to surfing the net. In addition, the use of computers and technology in learning activities has been shown to have a positive correlation with higher reading comprehension ability. (Chu, Tse, Loh, & Chow, 2011)

For many years in Iran English classes have been designed with old and dogmatic strategies. The time has come for old methods and strategies to be replaced with new and innovative ones. Part of this study is set up in the hope that it can provide more insights into the constructs that may be associated with the students’ and teachers’ knowledge of Project-based learning and reading comprehension. The second purpose of the study, which differentiates it from other studies being done in this area up to now, is going to see what role the nature of the project plays in improving one’s ability. If the first null hypothesis in this study is rejected then we can claim that teachers and students are taking more benefits from new methods rather than old ones, however the rejection of the second one will lead us to the conclusion that certain types of projects are better conducive to improving reading ability.

**Research Questions and Hypotheses**

The study addresses the following questions:

1. Is there a significant relationship between Project-based learning and intermediate EFL students' reading comprehension ability?

2. Between such group projects as Wall Newspaper and class Magazine which activity is better conducive to reading comprehension ability?

The following null hypotheses are formulated to investigate the questions justifiably:

**Hypothesis 1:** Project work does not lead to better reading comprehension.

**Hypothesis 2:** There is no difference between such group projects as Wall Newspaper and Class Magazine in enhancing reading comprehension.
Theoretical Background

The Team Project

Project-based learning is part of the instructional approach originating from Dewey (1938), who considered practical experience in learning as a crucial factor. In Project-based learning, students work in small groups on academic tasks. The task can be in the form of investigation or research on a particular topic. The topic being studied usually integrates concepts from a number of disciplines or fields of study. Students in the same small group cooperate with one another to reach a collective outcome over a period of time. This is done by asking and refining questions, expressing ideas, making predictions, collecting and analyzing data, reaching to conclusions, and communicating their findings to others. This approach is widely believed to be a powerful teaching strategy to enhance students' motivation and self-directed learning (Blumenfeld et al., 1991).

Projects are one option among many educational options that encourage students to learn in a Project-based learning. Generally, projects require a driving question or problem that directs the activities that lead to a final product (Peterson & Mayer, 1995). Projects also include the improvement of a product, presentation or a performance that can be observed and utilized; they deal with real life problems that arouse interest in students, who interact with the real life through these projects (Curtis, 2002). Eventually, projects enable students to come up with products or works that are believed to be the solutions to the questions or problems given at the beginning of the learning process.

The English Magazine and Wall Newspaper Projects are based on the rationale of Project-Based Learning (PBL). In Project-based learning, projects need extended time period that ranges from a few lessons to a whole year of education process (Moursund, Bielefeldt, & Underwood, 1997). A good project is not an activity of a single move and needs active involvement and attention. Additionally, projects also require working cooperatively to achieve the objectives in defined time period. So, students must work in teams that can be made up of two or more members (Simkins, 1999). Projects also incorporate many disciplines. With Project-based learning, students are able to make interdisciplinary connections between various ideas (Curtis, 2002). One of the most important features that differentiates Project-based learning from traditional educational approaches is that it is student oriented. In Project-based learning, students can define the problems, discuss the views or predictions, collect information, evaluate the collected information, make conclusions, combine views and create a product (Blumenfeld et al, 1991). These tasks involve students' problem solving, decision making, and investigative skills. Eventually, each completed task enables students to build the knowledge that must be acquired. Throughout the tasks, students are encouraged to take charge of their own learning and become autonomous for their decisions (Liu & Hsiao, 2002).

Normally, communicative activities in language classrooms create a feeling of anxiety and stress. To help eliminate these unhealthy feelings, the socio-affective strategy is needed, which is a combination of both social strategies and affective areas. According to Oxford (1990), affective strategies enable learners to control feelings, motivations, and...
attitudes related to language learning. Meanwhile, social strategies facilitate interaction with others, often in a discourse situation.

Thus, team projects are the best classroom devices to practice socio-affective strategies as they provide tasks to be solved, require high team work, activate creative thinking skills and involve the presentation of a product using English language. All movements and achievement of the team will be based on their cooperation and interpersonal skills. This gradually develops confidence in students and prepares them for their higher educational levels. After all, the ultimate goal of language learning strategies is to guide students to become better, autonomous and confident learners (Chamot, 1999).

In completing a team project assignment, cooperation is very important. Cooperative learning strategies have been shown to improve academic performance (Slavin, 1987), increase time on task (Cohen & Benton, 1988), lead to a higher self-esteem (Johnson & Johnson, 1989), motivate students toward learning (Garibaldi, 1979), and lead to more positive social behaviors (Lloyd, Crowley, Kohler, & Strain, 1988).

While learning a language, learning strategies are considered of vital importance in building learners' new knowledge and in expanding their competence. They can be defined as behaviours of a learner that are intended to influence how the learner processes information (Weinstein & Mayer, 1986). Team project activities provide the opportunity for learners to acquire learning strategies while they are involved in doing projects. Clearly, learning strategies are involved in all levels of learning, regardless of the content and context. Therefore, learning strategies are used in learning and teaching math, science, history, languages and other subjects, both in classroom settings as well as in more informal learning environments (Lessard-Clouston, 1997). It is believed that a communicative activity is a process in familiarizing language learners with the common functions of language and building their self-confidence to utter their own sentences. In addition to that, it is believed that throughout the communicative activities, the learners employ several strategies to accomplish their tasks. The common strategies identified are socio-affective strategies. These strategies are widely practiced by learners as they involve in oral communication with other people surrounding them. They normally ask their friends, teachers, parents, and seniors to help them with the tasks. They also like to assimilate with the other groups in order to practice their communicative skills. In other words they like to involve or invite other people to assist them in language learning. Thus, language learning strategies play a role in completing learners' project works. Language learning strategies are the conscious steps or behaviors used by language learners to enhance the acquisition, storage, retention, recall and use of new information (Oxford, 1990).

For many students, the appeal of this learning style comes from the authenticity of the experience. Students take on the role and behavior of those working in a particular discipline. Whether they are making a documentary video about an environmental concern, designing a travel brochure to highlight sites of historical significance in their community, or developing a multimedia presentation, students are engaged in real-world activities that have implications beyond the classroom. For teachers, additional benefits include enhanced professionalism and collaboration among colleagues, and opportunities to build
relationships with students (Thomas, 2000). Furthermore, many teachers are pleased to find a model that accommodates diverse learners by introducing a wider range of learning opportunities into the classroom. Teachers find that students who benefit the most from project-based learning tend to be those for whom traditional instructional methods and approaches are not effective (SRI, 2000).

**Reading Comprehension**

Chastain (1988) defined reading as an active cognitive system operating on printed material for comprehension (Chastain, 1988). Goodman (1988, p. 11) mentioned two views on reading; the first accepting it as "matching sounds to letters", and the second stating it to be a mystery, that "nobody knows how reading works". However, thanks to recent research into the reading process, reading no longer remains a mystery. Contrary to the previous views to reading comprehension, it is now considered as an active and fluent process (Anderson, 1999). Chastain (1988) proposed that in the reading process, the reader's task is to activate background and linguistic knowledge to recreate the writer's intended meaning. To achieve meaning readers are then supposed to go beyond the printed material. In support of this idea, Harmer (2001) has similarly stated that a reader uses a variety of clues to understand what the writer is implying, by which the reader is able to see beyond the literal meaning of the words.

**Reading Models**

According to Wallace (2001), the role of the reader changed in the 1980s and 1990s. She pointed out that in early versions of bottom-up models reading was considered a passive skill, where a reader goes through a mechanical pattern by creating a piece-by-piece mental translation of the information in the text (Anderson, 1999). In this model the interaction between the reader and the text includes little or no interference from the reader's own background knowledge. However, later on it was clarified that the reader played an active role in the process, including extracting meaning from texts in top-down models, whereby the reader is expected to bring her background knowledge to the text. Anderson has indicated that recently, reading has begun to be described as 'interactive' which combines elements of both bottom-up and top-down models as the most comprehensive description of the reading process. Reading is an interaction between reader and text, which can be further segmented into different levels, all of which happen concurrently.

Language students need large amounts of comprehensible input, and reading materials provide the most readily available source. All types of written materials from advertisements to literature can be used to improve students' reading ability. In their first language students have ready access to language used in meaningful contexts, and they incorporate needed patterns from those models into their own changing and evolving linguistic system. What they often lack in the language classroom is the opportunity to develop a sufficient language base from which to generate messages they would like to communicate to someone else (Chastain, 1988).
Method

Participants

Initially the project was launched in four first intermediate English classes. At this level students are able to present clear, detailed descriptions on a wide range of subjects related to their field of interest. They can also interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible. Comprising a total of 120 intermediate students from Kish English Institute Of Rasht, the capital city of Guilan province 80 students were ultimately assigned to two experimental groups, receiving English language instructions in a Project-based context, and 40 students were assigned to the control group, receiving English in a Communicative context. All the participants, ranging from 18 to 24 years old, were to study units 1 to 4 of the institute textbook for intermediate students.

Procedure

After obtaining the Institute manager’s permission, I was given four classes of twenty intermediate students. Students were then divided to two Project-based classes: with one group developing magazines and the other Wall Newspaper. At the same time the control group was taught English using communicative language teaching method.

The subjects seemed to be a little unwilling to participate in the projects at first as, they were not accustomed to this method of language learning. Nonetheless, when the first series of magazines and wall newspapers were published, they took a completely positive attitude. A copy of the magazines was then sent to Kish Administrative Office in Tehran, and much to the students' surprise, they were given a thirty five percent discount on the following two terms' tuition!

The processes of developing such projects were basically the same. It took three sessions for each type of project to be completed. Before getting engaged in the actual project, the students were given absolute freedom to form their own groups and to choose their team members. Each group was composed of four people.

The first session of each phase was devoted to introducing and brain storming on the topics, which were all related to what was covered in their textbooks. Students decided on the aspects of the topic they wanted to work on for the next session. They would then share what they had agreed to work on with the whole class. The classes were then dismissed with the students required to collect relevant data from various sources on the given topics. The next session they would come to class and would share what they had found with their peers. A representative from each group would then be responsible for giving a report of what her group had found to the whole class. The data were then sent to one of the students in class, who was to decide on groups' findings and to come up with a one-page summary of them. She was also responsible for providing different groups with a copy of the summary before the students could meet for the third session. It is well worth mentioning that the responsibility of blending groups’ findings was each time assigned to a different individual.
The third session of the class would require the students to come to class with a designed blueprint of the layout. Groups would then meet again to select a design appropriate enough to be shown to other groups, however, among the five presented designs, only one would ultimately be chosen to appear in the magazine or the wall newspaper. Four issues of magazines and wall newspapers were published in the course of the project. While the experimental groups were engaged in doing their projects the control group was taught the lessons using a communicative language teaching method which is the method currently practiced at the institute.

Data Collection

In order to assess the academic achievement of the students across the two experimental groups, and further to compare the experimental groups' performance with that of control group's the quantitative data collection method was used both at the beginning and end of the term.

Data Analysis

This study utilized the quantitative method of data analysis for the evaluation of the null hypotheses set forth at the beginning of this study. First the students' responses were given numeric values such that, the marks ranged from zero to fifty, which was the highest mark one could achieve. This means that at this preliminary stage, the nominal data were converted to numeral data. In this conversion, the students received one positive mark for each correct answer they gave, and they were not penalized for their wrong answers.

Results

The purpose of this study was to evaluate the effect of the Project-based tasks on the reading comprehension ability of the Iranian intermediate EFL learners which was conducted at Kish Language Institute using two types of tasks namely developing Magazines and Wall Newspaper.

Intermediate EFL learners (N = 120, selected based on an OPT test direction) were assigned randomly into two experimental and one control group. The first experimental group (A) received training on how to develop Magazines, while the second experimental group (B) practiced developing Wall Newspapers and the control group (C) was taught the lessons using CLT approach. Two multiple-choice reading comprehension tests (adopted from NELSON 050A) were used to measure the effectiveness of Project-based activities both at the beginning and at the end of the study. The results of the statistical analyses are presented in the following section:

Pilot Study

Prior to the study, the reading test was piloted on a group of 15 examinees whose characteristics were similar to those of the target group. The purpose behind piloting the test
was to estimate its reliability. The reliability index for the reading comprehension test estimated through Cronbach’s Alpha showed an acceptable index ($r = .81$). The face validity of the reading comprehension test was also examined and confirmed by an expert in the field.

**Table 1: Reliability Statistics of the Reading Test (pilot study).**

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.81</td>
<td>50</td>
</tr>
</tbody>
</table>

**Measure of L2 Proficiency (OPT test for the sampling purpose)**

To select the main sample, the standardized Oxford Placement test (OPT) was administered to 200 EFL students. The participants took the structure, vocabulary and reading comprehension sections of the test with a maximum possible score of 60 points. Based on OPT test direction 120 intermediate students whose score was 31+ in grammar and vocabulary and 8+ in reading section were selected as the main sample for the present study. The results of the OPT test for 200 students are presented in the following table.

**Table 2: Statistics.**

<table>
<thead>
<tr>
<th>Total</th>
<th>N</th>
<th>Valid</th>
<th>Missing</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>32.7300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>.72145</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>34.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>29.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>10.20282</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>104.098</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>-.189</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
<td>.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.256</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td>.342</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>35.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>14.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>49.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>6546.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examining the normality of the distributions**

Before interpreting the results of the analyses, the main assumption of One Way ANOVA namely, normality was examined. Skewness analysis was used to examine the normality
of the distributions. The results of the Skewness analysis, as it is indicated in Table 3, obtained by dividing the statistic of Skewness by the standard error revealed that the assumption of normality was observed in the distribution of the scores.

Table 3: Skewness analysis.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Ex. A Post-test</th>
<th>Ex. B Post-test</th>
<th>Control group Post-test</th>
<th>Ex. A Pre-test</th>
<th>Ex. B Pre-test</th>
<th>Control group Pre-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Valid Missing</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Mean</td>
<td>36.3250</td>
<td>36.9000</td>
<td>32.1500</td>
<td>24.5750</td>
<td>23.9250</td>
<td>24.6250</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>.58220</td>
<td>.44405</td>
<td>.48112</td>
<td>.68677</td>
<td>.72181</td>
<td>.62295</td>
</tr>
<tr>
<td>Median</td>
<td>36.0000</td>
<td>37.0000</td>
<td>32.0000</td>
<td>24.0000</td>
<td>23.0000</td>
<td>25.0000</td>
</tr>
<tr>
<td>Mode</td>
<td>38.00</td>
<td>38.00</td>
<td>32.00</td>
<td>21.00</td>
<td>21.00</td>
<td>25.00</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.68216</td>
<td>2.80841</td>
<td>3.04286</td>
<td>4.34350</td>
<td>4.56513</td>
<td>3.93985</td>
</tr>
<tr>
<td>Skewness</td>
<td>.071</td>
<td>-.017</td>
<td>.252</td>
<td>.372</td>
<td>.512</td>
<td>.162</td>
</tr>
<tr>
<td>Std. Error of</td>
<td>.374</td>
<td>.374</td>
<td>.374</td>
<td>.374</td>
<td>.374</td>
<td>.374</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.027</td>
<td>-.714</td>
<td>-.520</td>
<td>-.721</td>
<td>-.446</td>
<td>-.436</td>
</tr>
<tr>
<td>Std. Error of</td>
<td>.733</td>
<td>.733</td>
<td>.733</td>
<td>.733</td>
<td>.733</td>
<td>.733</td>
</tr>
<tr>
<td>Kurtosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>13.00</td>
<td>11.00</td>
<td>12.00</td>
<td>16.00</td>
<td>17.00</td>
<td>16.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>30.00</td>
<td>31.00</td>
<td>26.00</td>
<td>18.00</td>
<td>17.00</td>
<td>16.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>43.00</td>
<td>42.00</td>
<td>38.00</td>
<td>34.00</td>
<td>34.00</td>
<td>32.00</td>
</tr>
<tr>
<td>Sum</td>
<td>1453.00</td>
<td>1476.00</td>
<td>1286.00</td>
<td>983.00</td>
<td>957.00</td>
<td>985.00</td>
</tr>
</tbody>
</table>

a. Multiple modes exist. The smallest value is shown

**Descriptive Statistics for the Pre-Test Scores of Reading Comprehension**

At the beginning of the study all the participants took part in the pre-test. The purpose was to establish a baseline from which gains on the post-test could be measured. Results of One Way ANOVA showed that there was no significant difference in learners’ performance on the pre-test across the control and experimental groups (\( F = 1.186, p (.309) > 0.05 \)).

The results of the pre-test showed that the means of the experimental (\( Mean (A) = 24.5750, Mean (B) = 23.9250 \)) and control group (\( Mean \ control = 25.3500 \)), did not differ statistically. Tables 4 and 5 show the descriptive statistics and the results of ANOVA for the pretest.

Table 5 shows the results of One-Way ANOVA used to analyze EFL learners' scores in the first administration of the reading test. Based on Table 5, there is no significant difference between the mean scores of the three groups in pre-test of reading comprehension.
Table 4: Descriptive statistics for the Pre -Test Scores of Reading Comprehension test.

<table>
<thead>
<tr>
<th>Pre test</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Experimental A</td>
<td>40</td>
<td>24.575</td>
<td>4.34350</td>
<td>.6867</td>
<td>23.185</td>
</tr>
<tr>
<td>Experimental B</td>
<td>40</td>
<td>23.925</td>
<td>4.56513</td>
<td>.7218</td>
<td>22.465</td>
</tr>
<tr>
<td>Control group</td>
<td>40</td>
<td>25.350</td>
<td>3.43100</td>
<td>.5424</td>
<td>24.252</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>24.616</td>
<td>4.14888</td>
<td>.3787</td>
<td>23.866</td>
</tr>
</tbody>
</table>

Table 5: One Way ANOVA.

<table>
<thead>
<tr>
<th>Pre test</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>40.717</td>
<td>2</td>
<td>20.358</td>
<td>1.186</td>
<td>.309</td>
</tr>
<tr>
<td>Within Groups</td>
<td>2007.650</td>
<td>117</td>
<td>17.159</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2048.367</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$(p \ (.309) > 0.05)$, that is the control and experimental groups were almost at the same level of proficiency in terms of their reading comprehension at the beginning of the study.

Considering the fact that the three groups were equal in terms of their reading comprehension proficiency at the beginning of the study, data from the post-test was used to compare and evaluate the effect of treatment namely Project- based activities on EFL learners' reading comprehension. Another One -Way ANOVA was run for the post-test scores.

**Descriptive Statistics for the Post -Test Scores of Reading Comprehension**

To examine the effect of Project-based activities namely developing Magazines and Wall Newspapers on EFL learners' reading comprehension, another One Way ANOVA was run. Table 6 shows the means and standard deviations, as well as the overall values, for each group on post- test.
A comparison of the means across the three groups showed that the experimental group (B) \((Mean = 36.90)\) performed generally better than the experimental group (A) \((Mean = 36.32)\), as well as the control group (C) \((Mean = 32.15)\).

The relatively high value of \(F = 26.266\) showed that there is, indeed, a significant positive relationship between using Project-based tasks and improving reading comprehension.


Table 7: One-Way ANOVA for the Three Groups on Post-Test.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>537.650</td>
<td>2</td>
<td>268.825</td>
<td>26.266</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1197.475</td>
<td>117</td>
<td>10.235</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1735.125</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**The First Research Question:**

This study was aimed to investigate whether Project-based tasks affect the three groups' reading comprehension proficiency differently. To this end One- Way ANOVA was run to the results of the reading comprehension post- test to compare the two experimental groups' and the control group's performance. This time the results revealed that practicing Project-based tasks affected the reading comprehension of the three groups differently ($p (0.00 < 0.05)$. In fact, learners' performance in experimental groups far outweighed that of control group's in post- test.

In terms of the mean difference of the three groups on reading comprehension test, it can be seen that the positive influence of developing Project-based activities has made the largest difference between the mean scores of the experimental group (B) and the control group (C) (*mean difference* = 4.75000). Therefore, the hypothesis that Project-based tasks have no significant effect on intermediate EFL learners' reading comprehension is rejected, as there is considerable effect of developing Wall Newspapers and Magazines on EFL learners' reading comprehension scores.

To find out the location of the differences among the three groups, a Tukey test was run. The following table makes multiple comparisons among the three groups based on the results of Tukey test.

As it is shown in Table 8, the mean difference between the experimental group (B) and the control group is (*mean difference* = 4.75000) and $p(0.00) < 0.05$ resulting that there is a significant effect of developing Wall Newspaper on EFL learners' reading comprehension. Therefore, the first null hypothesis is rejected.

**The Second Research Question**

The results of One Way ANOVA showed that although there is a meaningful difference between the three groups in terms of their reading score ($p = 0.00$), the significant difference is only between the experimental group (A) and the control group($p = 0.00$) and experimental group (B) and the control group (C) ($p = 0.00$). The findings indicated that the reading scores of the experimental (A) and the experimental (B) are nearly the same ($p = .701$). In other words there is not a significant difference between reading comprehension
scores of the two experimental groups. Table 8 showed that the mean difference between the two experimental groups was .57500 and \( p(.701) \geq (0.05) \).

Finally, there is no significant difference between the two experimental groups in terms of their reading comprehension scores, providing empirical support for the second null hypothesis predicting that there is no difference between the effects of two types of project-based tasks (developing Magazines and Wall Newspapers) on EFL learners' reading comprehension. So the second null hypothesis is supported.

**Discussion**

*Project-based learning and reading comprehension.*

The main purpose of this study was to investigate the possible link between intermediate students’ application of Project-based activities and their improvement in reading comprehension. Administration of a standard reading comprehension test revealed the truth about the nature of these activities. Through data analysis, it was found that there is a significant positive relationship between using project-based activities and students’ reading comprehension.
These findings concur with those of other researchers, such as Grant & Branch (2005), Tuncay and Ekizglua (2010), and Chu et al. (2011), who attest to the fact that there is a significant positive relationship between implying Project-based activities and students learning improvement. It has also been suggested that focusing on Project-based activities increases students’ motivation to read (Owens, Hester, & Teale, 2002). The findings of this study provide further evidence for this finding, as shown by the students' improvements on the test.

It must not be forgotten, however, that vocabulary also plays a crucial role in reading comprehension, and there is increasing evidence showing a positive relationship between vocabulary and reading achievement (Schoonen, Hulstijn, & Bossers, 1998). In this study, students reviewed their findings at least three times: once alone at home, once in class with their partners and finally they recited their findings to the whole class, and those who didn’t have the chance of presenting their findings for a specific session were actively involved in listening to their peers; therefore, what cannot be ignored is the importance of this review and practice, which I feel indirectly made them review at least a certain number of new words.

Although the emphasis of the searches students did was not on memorizing the new words, but to transfer what they had understood from the new materials to the class, encountering new words and structures while reading a new text is an inevitable phenomenon. While this study did not examine vocabulary, it was acknowledged by students dur-
ing the sessions that this is an area that needs to be improved among them.

The PBL approach used in this study was based on the constructivist ideology, and it is suggested that such an approach offers greater possibilities for generalized learning. Surfing the net or going through different sources of information, I believe, could have contributed to the students' improvements in their vocabulary and reading abilities.

**Nature of Project-based Activity and Reading Ability**

Even though a lot of researchers have examined the effect of project-based methods of learning on improving different skills, no studies have studied the effectiveness of a specific type of project rather than another. Testing the second hypothesis, which focuses on the effect of different project-based activities on reading comprehension, as mentioned before, revealed no difference in subjects’ performance. So once again it can be stated that the nature of project-based learning does not play a significant role in improving the reading comprehension ability.

**Suggestions for Future Research**

The study documented the relationship between using project-based activities and students’ rate of reading comprehension among 80 intermediate female students in Rasht Kish English Institute. A replication of this study involving a larger number of students at various levels of proficiency in other institutes might give us better insight into the phenomenon. Second, a qualitative investigation, using students’ opinions, class observations, and teacher interviews can be undertaken to gain an in-depth opinion of the existing relationship. Further, there are different kinds of learning projects. This study only made use of magazine and wall newspaper formats. Application of other learning projects might open a new horizon in research into this area.

**References**


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Designing a Course in Statistics for a Learning Health Systems Training Program

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Duke University, Durham, NC 27705

Abstract

The core pedagogic problem considered here is how to effectively teach statistics to physicians who are engaged in a “learning health system” (LHS). This is a special case of a broader issue – namely, how to effectively teach statistics to academic physicians for whom research – and thus statistics – is a requirement for professional advancement. A distinguishing feature of these students is the degree of imbalance between high levels of scientific maturity and relatively low levels of training in mathematics and computer programming. Using a constructivist framework, the curriculum is organized around a set of model cases and an explicit conceptual map of how those cases are related. When teaching LHS physicians, the model cases should be different from those used to teach statisticians: they must be simple, clinically relevant, and developed by example. To create such cases, the discipline of statistics must not only be deconstructed but must also then be reconstructed in a framework that is accessible to its students. This is a principle that should also be generally applicable to teaching statistics to non-statisticians from other disciplines.

Keywords: Data science, deconstructing the discipline, learning health care, statistical education.

Narrowly constructed, the core pedagogic problem considered here is how to effectively teach statistics to physicians that are engaged in “learning health systems” (LHS). Learning health systems are defined in many ways, our working definition being: “A LHS leverages new developments in health information technology and a growing health data infrastructure to access and apply evidence in real time, while simultaneously drawing knowledge from real-world patient care delivery to promote health system change and innovation that is rooted in clinical data”. (Greene, Reid, & Larson, 2012) This is a special case of a broader issue: namely, how to effectively teach statistics to academic physicians for whom statistics – whether used to assist in research, clinical care, or both – is a requirement for professional advancement.

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Presently, physicians at Duke who wish to obtain formal statistical training do so under one of two models: either a physician-focused model or a statistician-focused model. To illustrate the distinction between these two models of instruction, those physicians that wish to obtain masters-level training in statistics can either enroll in the Masters of Biostatistics program or the Clinical Research Training Program. The Masters of Biostatistics program is designed to train statisticians – for example, the “theory” courses are taught in the languages of calculus and linear algebra. The instruction is on the statistician’s terms, and the challenge for the occasional physician that enrolls in this program is to get fully up to speed on calculus training that happened at some time in the past.

At the other end of the spectrum is the Clinical Research Training Program. Although students are provided with tools to perform data analyses, the overall emphasis is on interpretation, and the goal is to train investigators to become sophisticated consumers of statistics who can effectively collaborate with statisticians. Mathematical formalism is discouraged, and the instruction is designed to be on the physician’s terms. A description of the active-learning-based implementation of the advanced modeling course is provided elsewhere (Samsa, Thomas, Lee, & Neal, 2012).

Both the Masters of Biostatistics and the Clinical Research Training Program models are “extreme” in the sense that their instruction is tightly linked with a single disciplinary perspective. Despite their positive aspects, the single-minded disciplinary perspectives of these programs have raised concerns. Some physicians are concerned that the Masters of Biostatistics program has too much mathematics – especially, that the investment of time required to become proficient in calculus and linear algebra exceeds the benefits of the resulting statistical training. Some statisticians are concerned that the Clinical Research Training Program has too little mathematics – especially, that those students who are unfamiliar with the mathematical derivations of statistical techniques won’t understand those techniques in sufficient depth to use them appropriately (or even recognize that they shouldn’t be doing the statistical work themselves but rather should call in help and then refocus energy on interpretation).

Context

Presumably, what is needed is something in between the above extremes. The specific context is a new LHS training program. LHS has been variously described (e.g., Ethereedge, 2007; Greene et al., 2012), but one way to think of it is as an extension of the traditional framework of evidence-based medicine. In evidence-based medicine, physicians are trained to critically review the medical literature in order to determine how to treat an individual patient in a specific clinical context. LHS, at its most basic, extends evidence-based medicine by empowering physicians to review their own data to better understand how they are actually practicing medicine, and to use the insights gained thereby to improve the processes and outcomes of patient care. Understanding of data can expand beyond one’s own practice to understanding aggregate practice at one’s own site, or across larger systems of care. The idea that LHS practitioners use aggregate clinical information as evidence was succinctly stated in one of the interviews used to guide the vision-setting
process for the LHS training program at Duke: what most distinguishes LHS practitioners from other physicians is that they “get” data.

To help train physicians for the learning health system environment, we established the first Learning Health Systems Training Program (LHSTP). The LHSTP will include core statistical training early in the curriculum, followed by group projects that are similar in appearance to quality improvement initiatives. As an example of a typical project, a LHS trainee might be concerned about the quality of anticoagulation management in an outpatient clinic. The electronic medical record could be queried for patients that are receiving long-term warfarin therapy, the resulting dataset reorganized to estimate the average time in target therapeutic range, and this average compared with national benchmarks. If the time in target therapeutic range is below the desired level the process of care would be redesigned – for example, with eligible patients switched to home-based monitoring – and time in target therapeutic range re-estimated. The final step would be to compare the costs of revising the process of care with the benefits, these latter benefits being estimated through a model that links quality of anticoagulation management with the expected number of clinical events. Beyond traditional so-called “quality improvement” cycles, a LHS system does this in a more seamless and expedited fashion, and as a more active part of routine patients care.

Apart from introductory statistical instruction, additional statistical training will take place on an as-needed basis. Using the anticoagulation example, the advantages and disadvantages of pre-post designs would be discussed, as would various approaches to simplifying the longitudinal patient-level data about anticoagulation levels into (ideally) single summary measures per patient. This, in turn, would provide a practical link between the case example and the statistical thinking underpinning a variety of study designs and analytic approaches. Moreover, careful review of available data and its attributes such as missingness and reliability would serve to reinforce understanding of “what are data” and “what can I do in my own practice to improve the quality of data collected”?

At the time of this writing, the first cadre of LHS trainees is beginning their work. Curriculum development will be cooperative – in particular, the trainees will have a significant voice in the content and delivery of the statistical curriculum. Accordingly, what are described here are not the details of a finished curriculum. Instead, it is a preliminary answer not to the question of “what statistical content should be taught” but, instead, to the question of “how statistical content should be delivered”.

**Conceptual framework**

From the perspective of statistical instruction LHS practitioners must among others be able to:

- Pose clinical questions in a fashion that is amenable to subsequent statistical analysis.
- Select an appropriate study design, which in this context often means to design a sound database query.
• Design a statistical analysis plan.
• Understand how to implement a statistical analysis plan, which in this context often means to understand the flow of data at a sufficient level of detail to be able to diagram those data flows.
• Understand data elements and their attributes (e.g., scale of measurement such as categorical, ordinal and continuous).
• Understand issues that affect data quality.
• Understand how to interpret database queries that utilize statistical modeling – including issues of data quality, validation and limits to proper interpretation.
• Given the results of a statistical analysis, suggest a proper course of action.

One of the distinguishing features of this application is that curriculum development must take into account the unbalanced nature of its students. Among their many positive attributes, the LHS trainees are intelligent, motivated and scientifically sophisticated. On the other hand, relative to other students in graduate-level statistics courses they tend to be quite weak in mathematics and computer programming – so much so that the design of a traditional course that relies on calculus-based derivations and facility with data analysis simply won’t work for them. The principles of sound educational pedagogy apply to “unbalanced” students no less than they do for “balanced” ones; nevertheless, the general disgruntlement with statistical training among this community of learners suggests that statistical training for academic physicians is a curriculum development task that is unique and particularly challenging.

In designing the statistical instruction, we applied a constructivist framework similar to that of Fields (Fields, Baxter, & Seawright, 2006). More specifically, we assumed that our physician students will be constructing their understanding of statistics around (a) model cases; (b) a conceptual map of how the principles and techniques illustrated by those model cases fit together; and (c) analogies to assist in applying the model cases and conceptual map to actual problems (Hofstadter & Sander, 2013).

To illustrate the use of conceptual maps in statistics, one way that statisticians typically conceptualize modeling uses scale of measurement. For example, models that use time-to-event as an outcome variable fall within the category of survival analysis, and models that have a dichotomous outcome (e.g., good versus poor) as an outcome variable fall within the category of logistic regression. Models that have a continuous outcome variable and a 2-category predictor fall within the general category of linear models, and the specific category of the t-test (which, in turn, is a special case of the 1-way analysis of variance). Once the appropriate model is selected, other conceptual maps are also utilized. For example, a conceptual map of modeling strategy would include the distinction between an adjustment application (i.e., which answers the question: controlling for Y, does X predict Z?) and variable selection (i.e., which answers the question: which of the set of variables X and Y predicts Z?).
Conceptual maps use model cases as building blocks. Using the t-test as an example, the standard analysis can be reduced to a protocol.

- Create box-plots for both groups to visualize the data.
- Verify that the sample means for both groups are a reasonable summary of their central tendencies.
- Calculate the means and standard errors for both groups.
- Perform a t-test and use the resulting p-value to assess statistical significance.
- Calculate the difference between the group means and generate a confidence interval for that difference.
- Assess the values within the confidence interval for clinical significance.

The model case is an application of this protocol to a memorable problem, and would also include the computer code required to perform the analysis.

When performing a t-test in practice, the statistician would compare the current problem with the model case. For example, if it appeared that the sample means in question were not representative summaries of central tendency the standard protocol would have to be modified. In this case, the statistician might instead apply a non-parametric test by first transforming the data into ranks and then applying a t-test to the ranked data. The relevant analogy (which turns out to be sound in the case of the t-test) is that non-parametric tests are often equivalent to transforming the data into ranks and then proceeding as usual.

As an example of a higher-level conceptual map, the design of a LHS project typically involves a series of steps that culminate in a statistical analysis plan. These steps can be understood as providing answers to the following increasingly specific questions:

- In medical terms, what is study question?
- How can the medical question be translated into study aims?
- What study design can best achieve the study aims?
- Given the study design, how can the study aims be translated into statistical hypotheses amenable to analysis?
- How can the statistical hypotheses be translated into a statistical analysis plan?

At each of these steps, the project design benefits from an explicit review step – for example, to assess whether the study aims are an adequate representation of the essence of the clinical question, to assess how well the study design can meet its aims, to assess how closely the statistical hypotheses match the underlying medical questions, and to assess how well the statistical analysis plan will test the statistical hypotheses. Such a review is more likely to occur if the LHS practitioner is aware of this higher-level conceptual map.
Application of the conceptual framework

Consistent with the constructivist framework, the curriculum design task was conceptualized as involving the identification of those elements of applied statistics that are relevant to LHS, the deconstruction of those elements into model cases, and the reconstruction of those model cases into an explicit conceptual map. Another element of the curriculum design task was the identification of materials that were consistent with this approach.

Fortunately, van Belle’s book on statistical rules of thumb (van Belle, 2002) provided an illustration of one possible way to implement the above teaching strategy. The book is organized around rules of thumb, which roughly correspond to model cases. The order of presentation is (a) an introduction; (b) a statement of the rule of thumb; (c) an illustration of the rule; (d) the basis for the rule; and (e) discussion and extensions. Oriented toward statisticians, the text pertaining to the basis of the rule is often explained algebraically. Moreover, the conceptual map that links the rules of thumb is implicit, consisting of the “tacit knowledge” possessed by members of the statistical community. We propose to use the same general structure as van Belle, but with a somewhat different implementation of steps “c” and “d”.

Using van Belle’s structure as the basis for the model cases, two design questions appeared to be fundamental:

- How (if at all) should the presentation of the model cases differ when the target audience changes from statisticians to physicians?
- Recognizing that the conceptual maps of statistics used by physicians are likely to be rudimentary at best, how can physician students be encouraged to develop more sophisticated conceptual maps of statistics?

The response to these design questions is discussed below.

Response 1: The model cases should be different.

Physicians should be taught statistics using model cases that are simple, clinically relevant, and developed by example. Regarding simplicity, a principle that can be illustrated to a statistician in a single model case might require multiple sub-cases when designed for a physician. (The reason is that the physician has less tacit knowledge of statistics upon which to rely.) Regarding clinical relevance, the ideal is for model cases to build upon one another and use examples that are clinically interpretable. (For example, as far as a statistician is concerned the model case for a t-test is based on scale of measurement – any 2-category predictor and continuously-scaled response will do. A physician, on the other hand, prefers the example to be realistic. Clinical relevance isn’t necessarily critical to simple examples that illustrate the technical mechanics of the computations involved with a t-test, but attains greater importance when developing memorable model cases to which the physician can later refer.) Regarding development, the basis for explaining the model cases should be example rather than mathematical derivation. The model cases should include hands-on interaction with the data, including interpretation.
This is not only a good general principle to follow in any event, but is consistent with the “see one, do one, teach one” model of medical education with which physicians are already familiar.

Appendices 1 and 2 illustrate what is envisioned, and have been used successfully in teaching physicians in other contexts. Of particular note are (a) the step-by-step development of the cases; and (b) the explicit translation of the principle illustrated by the example into words.

Response 2: Students should be encouraged to describe and talk through their conceptual maps.

Vocalizing, drawing, or otherwise making explicit their conceptual maps can be considered part of the “teach one” component of the usual model of medical education. In particular, if it is discovered that a student’s conceptual map of statistics is unsophisticated or inaccurate then this deficiency – now explicitly identified – can be addressed. During this process, describing our own conceptual maps of statistics (i.e., “deconstructing the discipline”) can be extraordinarily helpful (Middendorf & Pace, 2004; Diaz, Middendorf, Pace, & Shopkow, 2008).

As they “do one”, it is helpful to ask students to talk through the task. In most cases, technical proficiency (e.g., the ability to follow a standard data analytic protocol) is achieved before higher-level proficiency (e.g., the ability to select a data analysis, the ability to interpret results, the ability to determine which features of the current problem differ from the model case).

A particularly natural application of explicit conceptual maps pertains to the treatment of data. This treatment should be organized around a statistical analysis plan (in essence, the “analyst’s story”) that diagrams the tables, graphs and other elements of the planned analyses. This analysis plan is then compared with its data requirements – in other words, the structure of the datasets that the plan requires. The LHS practitioner would then work backwards from the data requirements to more detailed information about the data source and the data elements. This is the point where the LHS practitioner would potentially discover mismatches between the actual and desired structure of the data elements – for example, when the analysis plan requires a data element for the presence of absence of chronic atrial fibrillation but the available datasets only contain this information within free text fields. This is also the place where a review of likely data quality would occur.

Discussion

We have attempted to delineate some general principles for teaching statistics to physicians that will be practicing within learning health systems. A central notion is that of first deconstructing the discipline of statistics and then reconstructing it into an annotated set of model cases, with these cases being linked through an explicit conceptual map.
Moreover, this reconstruction is designed to take into account the particular characteristics of its target audience.

The LHSTP is new, and thus formal evaluation data are not yet available. However, some factors do lend encouragement. First, the course development has been theoretically driven, and is consistent with over two decades of experience with a target audience that has a unique set of characteristics (Samsa et al., 2012). Second, the structure of the model cases illustrated in appendices 1 and 2 has proven to be successful in the past. Third, this approach was pilot tested in a short course in statistics for biomedical researchers (principally biologists but also including physicians). The notion of using model cases and an explicit conceptual map was discussed at the start of the course, and was received enthusiastically. Indeed, observation suggests that one of the things that non-statistician students of statistics particularly crave is information about how everything fits together – sometimes stated as “I know how to proceed if you tell me what to do but am not confident that I can decide what to do” – which in essence is a plea for a conceptual map.

Fourth, the proposed methods for statistical instruction are fundamentally consistent with guidelines endorsed by the American Statistical Association (Aliaga et al., 2010). These guidelines, originally intended for first undergraduate courses in statistics but applicable more generally, include six overall recommendations. These recommendations, and examples of how they are implemented within the statistical curriculum, are provided in Table 1 below.

Finally, when presented with a draft of this document for comment the LHS trainees and faculty were supportive of the approach proposed here. The current version reflects their comments.

In the biomedical context (among others) statistics is usually practiced within interdisciplinary teams. Non-statistician investigators typically need to (a) be able to perform some basic statistical analyses; and (b) in more complex applications, interpret statistical results and otherwise collaborate with statisticians. These investigators do not need to be exposed to an entire statistics curriculum, nor could they necessarily tolerate one – in other words, they cannot be taught statistics in the same fashion as were their instructors. LHS trainees are an example of such investigators, but are just one example out of many.

The purpose in summarizing the LHSTP curriculum development efforts to date is to engage the statistical, medical and educational communities in a discussion of how to more effectively teach statistics to physicians. The urgency for doing so, even in the absence of a formal evaluation of the LHSTP, is driven by the premise that something fundamental is wrong with the way that statistics is usually taught to physicians (and also to others outside the discipline of statistics). Although a modest-sized literature exists on teaching statistics outside the discipline and a smaller literature exists on teaching statistics to medical students and physicians (e.g., Freeman, Collier, Staniforth, & Smith, 2008), physicians consistently express dissatisfaction with their statistical training. For example, the orientation session of the Clinical Research Training Program’s advanced modeling class.
Table 1: GUISE Recommendations and Their Implementation.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emphasize statistical literacy and develop statistical thinking (i.e., understanding the need for data, the importance of data production, the omnipresence of variability, and the quantification and explanation of variability).</td>
<td>Data quality, and also developing a detailed understanding of how the elements within databases are derived, are points of particular emphasis.</td>
</tr>
<tr>
<td>Use real data</td>
<td>Just in time statistical instruction will be based upon LHC trainee projects using real data.</td>
</tr>
<tr>
<td>Stress conceptual understanding rather than mere knowledge of procedures.</td>
<td>This is facilitated by using explicit conceptual maps, and also by having the LHC trainees translate statistical principles into their own words.</td>
</tr>
<tr>
<td>Foster active learning in the classroom.</td>
<td>Among others, the project-based orientation encourages a hands-on approach.</td>
</tr>
<tr>
<td>Use technology for developing conceptual understanding and analyzing data.</td>
<td>Data will typically be obtained from electronic medical records and analyzed using statistical software such as R.</td>
</tr>
<tr>
<td>Use assessments to improve and evaluate student learning.</td>
<td>Making conceptual maps explicit facilitates assessment of conceptual understanding.</td>
</tr>
</tbody>
</table>

begins with an assessment of its students’ working knowledge of statistics and their confidence in that knowledge. These assessments consistently show that physicians are usually taught statistics in a highly protocol-based fashion, have a relatively low level of working knowledge of statistics, and an even lower level of confidence in their ability to apply that knowledge.

We believe that the fundamental error is that when teaching physicians statisticians so often “do the same thing, only less”. For example, when designing a course for physicians, a statistician instructor might take a traditional 2-semester course in applied data analysis for statisticians, remove the content from the second semester, remove some of the mathematical proofs, change the examples to biomedical ones, and assume that the result will be effective. In essence, the course retains the same construction of statistics as the original, and has simply presented to the student selected elements of that construction. Instead, what is needed is a more extensive change: namely, a reconstruction that is tailored to the needs of the target audience. This is a principle that should be generally applicable to teaching statistics to non-statisticians from other disciplines.

Although speculative, we anticipate that even in another context – for example, bench scientists – what would stay the same is the benefit of having students describe and talk through their conceptual maps of statistics. What would change is not the principle that
model cases should be adapted to the needs of the target audience, but instead would be
the choice and presentation of those model cases. Model cases need to encapsulate the
correct statistical content, include examples that resonate with their target audience, and
use language that is familiar to that audience. Development of such cases only likely to
occur when the statistician: (a) is familiar with the field under study; and (b) is willing to
take the initiative to bridge the gap across disciplines.

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Appendix 1 – Illustration of a Model Case: Multiple Testing

Verbal descriptions of the principle:

- The more you look the more you will see, even if nothing is going on.
- The more statistical tests you perform the more statistically significant results you will observe, even if none of them are real.
- If large numbers of tests are performed, be suspicious of statistically significant results.

Model case: (assumes that the tests are independent and p=.05 as a benchmark for declaring statistical significance)

<table>
<thead>
<tr>
<th># tests</th>
<th>Probability that all tests are non-significant</th>
<th>Probability that at least one test is significant</th>
<th>Expected number of significant tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.95</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>2</td>
<td>.90</td>
<td>.10</td>
<td>.10</td>
</tr>
<tr>
<td>3</td>
<td>.86</td>
<td>.14</td>
<td>.15</td>
</tr>
<tr>
<td>10</td>
<td>.60</td>
<td>.40</td>
<td>.50</td>
</tr>
<tr>
<td>20</td>
<td>.36</td>
<td>.64</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>.005</td>
<td>.995</td>
<td>5</td>
</tr>
</tbody>
</table>

Derivation:

- The probability that one test is significant = .05 (i.e., because this is the type 1 error rate of the test). Note: In practice, this isn’t necessarily intuitive to the student and requires review of the structure of a hypothesis test.
- Thus, the probability that one test is non-significant is .95.
- Thus, the probability that two tests are both non-significant is (.95)(.95).
- Thus, the probability that three tests are all non-significant is (.95)(.95)(.95).
- Thus, the probability that K tests are all non-significant is (.95)**K.
- Moreover, the probability that at least one test is significant is one minus the probability that all tests are non-significant.
- Finally, the expected number of significant tests is (.05)**K.
Appendix 2 – Illustration of a Model Case: Testing for a Rare Disease

Verbal description of the principle:

- If the disease is rare, positive test results probably don’t indicate disease.
- The operating characteristics of sensitivity and specificity aren’t enough to understand the performance of a diagnostic test – prevalence also matters.
- For rare diseases, even if the specificity is high large numbers of patients without disease will generate large numbers of false positives – even if the test has perfect sensitivity these false positives will overwhelm the small number of patients with disease.

Note: This illustration assumes that the student is familiar with sensitivity and specificity, and also with the structure of a 2x2 table of disease status versus test result.

Model case with derivation:

Assume: sensitivity=99%, specificity=99%, prevalence=0.01%, population size=1,000,000.

Population size=1,000,000

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test negative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td></td>
<td></td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Population size=prevalence=0.01%

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test negative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>100 (i.e., .0001*1,000,000)</td>
<td></td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Number of patients without disease obtained by subtraction

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test negative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>100</td>
<td>999,900</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>
Sensitivity=99%, specificity=99%

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td>99 (i.e., .99*100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test negative</td>
<td></td>
<td>989,901 (i.e., .99*999,900)</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>100</td>
<td>999,900</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Remainder of the table interior obtained by subtraction

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td>99</td>
<td>9,999</td>
<td></td>
</tr>
<tr>
<td>Test negative</td>
<td>1</td>
<td>989,901</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>100</td>
<td>999,900</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Other totals obtained by addition

<table>
<thead>
<tr>
<th></th>
<th>Disease present</th>
<th>Disease absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test positive</td>
<td>99</td>
<td>9,999</td>
<td>10,098</td>
</tr>
<tr>
<td>Test negative</td>
<td>1</td>
<td>989,901</td>
<td>989,902</td>
</tr>
<tr>
<td>total</td>
<td>100</td>
<td>999,900</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Calculate PPV: 99/10,098 = .01 (only 1% of patients with positive tests actually have the disease).
Who is White? Assessing Students’ Perceptions of Whiteness through Active-Learning Effectiveness and the Construction of Racial Doubt

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Abstract

Building on previous studies on action-oriented strategies for teaching race-related courses, we explore the general effectiveness of teaching about racial stereotypes and racial/ethnic identity construction in two undergraduate race and ethnicity courses. Given that race and the term “White” are culturally constructed and serve to maintain racial power in the U.S., this study focused on student conceptions of the categorization of whiteness. Specifically, we ask to what degree students’ general perceptions of race, their confidence in identifying the percentage of Whites or non-Whites from a list of twenty-seven countries, can change after exercises in critical thinking and active learning. We found that students’ generalized perceptions of people from other countries were in fact radically different after going through the lessons and projects. Students who received the materials were less confident in who was White or not and thus overwhelmingly answered that they were “not sure” when prompted to classify the racial/ethnic backgrounds of each of the twenty-seven different national groups.

Keywords: Active learning, critical pedagogy, race and ethnicity.

Teaching courses that center on race, diversity, and inequality in America can be a challenge for instructors due to student resistance (Case & Cole, 2013; Case & Hemmings, 2005; Chan & Treacy, 1996; Cleary, 2001; Higginbotham, 1996; Hunter & Nettles, 1999; Jackson, 1999; Lawrence & Bunche, 1996; Moulder, 1997; Nunnally, 2009; Omi & Winant, 1994; Tatum, 1992, 1994, 2003). Students often enter these courses with strong personal opinions and viewpoints about their own race and the races of others, typically shaped by a host of forces throughout their lives (Cole, Case, Rios, & Curtin, 2011; LaB-eff & Clark, 1986; LaDuke, 2009; Lucal, 1996; Tatum, 2003). Instructors teaching these courses often face the arduous task of attempting to challenge these prior opinions and viewpoints, as well as the responsibility of constructing course content in such a way that can reverse students’ stereotypical assumptions about race (Davis, 1992).

The first step in carrying out this task is getting students to question what they know, and what they think they know about race by establishing a sense of “racial doubt” that chal-

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Assessing Students’ Perceptions of Whiteness

Challenges their own preconceived assumptions, stereotypes, and experiences in a diverse world. This questioning process, we contend, potentially opens their eyes to broader issues such as racial inequality (Picca, Starks, & Gunderson, 2013). This approach also helps instructors overcome resistance to learning about racial inequality and allows students to see and understand how the social construction of race can ultimately lead to structural inequalities (Bonilla-Silva, 1997; Goldsmith, 2006; Haddad & Liberman, 2002; Sweet & Baker, 2011). This is particularly true for students from white privileged racial backgrounds who may find it challenging to recognize structural inequality in the United States (Johnson, 2005; Sue, 2010). More specifically, students with race privilege are typically unaware of their unearned advantages that come with being perceived as White (Case, 2007, 2013; McIntosh, 1988, 2012, 2013). By introducing racial doubt, especially to those in the majority or dominant group, instructors can help build critical thinking skills as a means of getting students to understand their relationships and connections to broader social structures and forces. Most thinking is not critical; in fact, it is often biased, uninformed, and even prejudiced (Paul & Elder, 2009). Critical thinking, on the other hand, is disciplined, self-directive thinking. When students think critically, they must examine their assumptions about a subject and reflect upon how those assumptions shape points of view and beliefs (Paul & Elder, 2009). We believe that the introduction of racial doubt in the classroom develops students’ critical thinking skills by encouraging students to question their previously held assumptions and beliefs about race.

Building on Jakubowski’s work (2001) on action-oriented strategies for teaching race-related courses, we explore the general effectiveness of teaching about racial stereotypes and racial/ethnic identity construction in two undergraduate race and ethnicity courses. Specifically, we examine the degree to which students’ general perceptions of race, their confidence in identifying the percentage of Whites or non-Whites from a list of twenty-seven countries can change after exercises in critical thinking and active learning.

Teaching Critical Thinking about Race

Many social science courses on race, diversity, and inequality in the U.S. follow traditional college course design patterns. They may begin by introducing students to the concepts of race and ethnicity, then move to the classical and contemporary theories attempting to explain how these social constructions shaped social interaction and contributed to the stratification of American society. However, many students not only initially experience difficulty understanding these more abstract concepts, but also may become resistant to evidence in course readings and lectures that challenges their preconceived beliefs and assumptions on race and ethnicity (Case & Cole, 2013; Case & Hemmings, 2005; Higginbotham, 1996; Jackson, 1999; Misra, 1997).

Critical pedagogy values the creation of learning environments that encourage students to think critically about their position in society (Chaissin, 2004). Developing from Freire’s conceptualization of “conscientization” (1970), these critical approaches focus on a range of educational challenges to oppressive systems through feminist, queer, anti-racist, and multi-cultural pedagogies (Case, Kanenberg, Erich, & Tittsworth, 2012). Within this array of critical pedagogies, instructors challenge students to not only ques-
tion their own assumptions and understandings, but also challenge the social systems in which they interact (Case et al., 2012; Enns & Forrest, 2005). At the same time, critical pedagogies ask them to become agents of social change by acting on what they have learned (Bonilla-Silva, 1997; Enns & Forrest, 2005; Fisher, 2001; Lopez, 1996; Quillian, 2006).

This investigation of effective pedagogical approaches for teaching race and racism also draws on the work of critical race theorists and critical white studies scholars (Crenshaw, 1997; Crenshaw, Gotanda, Peller, & Thomas, 1995; Delgado, 1995; Kennedy, 1995). Delgado (1995) described critical race theory as calling for students to analyze racial myths, racial assumptions, and the social construction of reality. By challenging the dominant discourses on racism within society as a whole (Ladson-Billings, 2000), critical race theory has much to offer pedagogical research on teaching and learning about whiteness and constructions of race in the sociological classroom. Critical white studies arose as the area of critical legal studies concerned with the legal and social construction of whiteness and its impact on racial oppression. Of particular relevance to this study of student learning, critical white studies scholars examine the invisibility of whiteness in American culture (Grillo & Wildman, 1995; Wildman & Davis, 1995).

Numerous problems arise when teaching courses that address race and ethnicity that deserve attention within pedagogical discussions about effective approaches (Wahl, Perez, Deegan, Sanchez, & Applegate, 2000). These courses often require instructors to explore so-called “uncomfortable” subjects despite student resistance (Bobo & Kluegel, 1993; Case & Cole, 2013; Davis, 1992; Haddad & Lieberman, 2002; Hedley & Markowitz, 2001). Without sound pedagogy, these courses can potentially negatively affect students’ understanding of race-related issues (Case, 2007; Chang, 2002; Cole et al., 2011; Hogan & Mallot, 2005; Jakubowski, 2001).

Over the last decade, scholars introduced a host of pedagogical approaches to ease students’ sensitivity to these subjects and heighten their understanding of race (Case & Cole, 2013; Cleary, 2001; Marullo, 1998; Moulder, 1997; Pence & Fields, 1999; Wahl et al., 2000; Williams, Garza, Hodge, & Breaux, 1999). Instructors often attempt to reduce ethnocentrism and prejudice through service learning projects and field observations (Dinka, Mazzella, & Pilant, 1980; Hondagneu-Sotelo & Raskoff, 1994; Marullo, 1998; Puffer, 1994), ethnomethodological experiments (Chesler & Zuniga, 1991), research article critiques and novels (Fitzgerald, 1992; Haddad & Lieberman, 2002), and the use of popular music and film in the classroom (Downey & Torrecilha, 1994; Martinez, 1994; Valdez & Halley, 1999). Using these strategies, the central focus of instruction has been to foster an intellectually safe environment that better connects students to course content and addresses critical pedagogical concerns. These approaches often ask students to “take the role of the other” (Smith, 1992) through oral histories (Poll, 1995) or the use of intensive interview data that focus on personal explorations and experiences with issues of race or privilege versus traditional texts (Chaisson, 2004; Davidson, 1987).

The consensus across these studies suggests that by making race-related issues more personal, students a) understand the course content better and b) take strides toward reducing
their own prejudicial or privileged attitudes and beliefs. Although these studies make invaluable contributions to our pedagogical approaches, they have rarely evaluated their effectiveness in introducing racial doubt as a means to challenge students’ stereotypical views about race and ethnicity.

Pedagogical research in mathematics, science, family counseling, and education highlight the benefits of doubt and uncertainty for enhancing learning (Carter, 2008; Kaiser, McAdams, & Foster, 2012; Zaslavsky, 2005). This disconnect between students’ current categorical beliefs and newly introduced information that Piaget (1970) referred to as “disequilibrium” provides students with an opportunity to reevaluate previously held assumptions, such as the assumption that racial categories are distinct, clearly defined, and predictable. As Singh (2012) states:

> At their best, the classes we teach are shaped by our goal of challenging our students’ assumptions and unsettling the narratives of America or race that they might have already received from uncles and aunts, priests and politicians, friends and neighbors, teachers and mentors, myth and folklore. (p. 8)

Active learning can be a beneficial pedagogical approach when discussing race-related topics and requires reflection that moves students beyond merely participating in a class activity (Braxton, Milem, & Sullivan, 2000). This type of learning allows for more exploration of attitudes and values, which is critical when teaching about race. It allows the students to discuss their beliefs and current understanding, while receiving immediate feedback and engaging a higher order of thinking (Braxton, Milem, & Sullivan, 2000). Active learning techniques can also be used to help raise doubt and challenge students’ previous assumptions about race and ethnicity. Mobilizing data collected in two undergraduate courses on race and ethnicity at a diverse public college in a major metropolitan city, we assessed the effectiveness of critical thinking and active-learning projects towards these ends.

### Setting and Data

Data were collected in two undergraduate sociology courses on race and ethnicity at the authors’ institution over two semesters ($N = 97$) with institutional human subjects approval. The student body is both traditional and non-traditional and represents a rather diverse group in terms of age, sex, and race/ethnicity. The average age of students is 31. The presence of so many older students could potentially influence the results, as non-traditional students often have more life experience, which can either further entrench their stereotypical preconceptions about race or lead to increased social contact that unravels these views. The university’s student population is 64% female (36% male), 36% racial and ethnic minorities, and 10% international students (with no specific race or ethnicity data available other than an “international” designation). Looking at the specific ethnic/racial breakdown, not including the international students, the students identified as 54% White, 11.5% Black, 21.8% Hispanic, 5.9% Asian/Pacific Islander, 0.6% American Indian, and 0.5 unknown or “other.” Given that the university has a Hispanic population constituting over 20% of the overall student body, it is a federally designated His-
panic Serving Institution (HIS).

The sample drawn from these two classes consists of 31% male and 69% female juniors and seniors. In terms of racial and ethnic self-identification, the sample identified as 20% Black, 39% White, 21% Hispanic, 7% Asian, and 13% Bi or Multi-Racial/Ethnic. These two courses serve the university core curriculum as a social science requirement for many degrees, as well as a key course in the diversity elective pool, and therefore, the sample represents students from a host of disciplines. The racial/ethnic composition of the class was more diverse than the university overall; while over half of non-international students at the university are classified as White, only 39% of our sample identified as White. In our sample, no racial/ethnic group achieved majority status. The greater diversity of the class may be due to racial minorities having a greater interest in taking courses specifically on race; this comment was noted by many students in their end of course evaluations in both courses.

The classes were taught once a week, Tuesdays from 1-4pm, for roughly three hours minus a brief break, in consecutive spring semesters - spring one and two. Although both courses were relatively the same in terms of content/topics covered in lecture and student population, only one course received the materials and lessons designed to increase racial doubt and challenge racial assumptions. This first course, spring one, we call the “treated” course. It received all the critical and active-learning lessons, described in detail in the next section, in addition to a service-learning component. The second course, spring two, the “non-treated” course, did not receive these materials and lessons designed to increase racial doubt and was strictly lecture with no interactive PowerPoints. It did not have a service-learning component either. We set up this control course as a means to evaluate the effectiveness of both the “treated” course materials and the success of introducing racial doubt as a means to challenge students’ preconceived assumptions about race. Both courses received a pre and post-test survey. Both courses, again, met once a week for three hours allowing, in the case of the “treated” course, a great deal of flexibility for discussion and active learning projects. We believe that the projects and lessons we outline below would be equally effective for classes that meet twice a week for an hour and a half.

The survey we administered is based on the work of Vernellia Randall at the University of Dayton Law School that was adapted by the Science Museum of Minnesota for the American Anthropological Association’s project RACE, Are We So Different? The project, funded by the Ford Foundation and the National Science Foundation, is both a traveling and virtual online exhibit that draws together: 1) every day experiences of living with race in the United States; 2) the history of “race” as an idea; 3) the role of science in that history; and 4) the findings of contemporary science that are challenging and deconstructing race and its foundations (see http://www.understandingrace.org/home.html). The physical exhibit was in the home city of the authors during the time of data collection; students in the treated course actually visited the exhibit while it was here. Both the traveling physical exhibit, now on permanent display at the Smithsonian, and the website project are widely considered some of the best anthropological resources for teaching race (see for example the review of the original Minnesota exhibit, Horrigan, Tomlin, El-
lenbogen, and Pizza 2007). As a result, both the exhibit and the on-line materials served as the basis for the structure of our own study. This allowed for greater comparative analyses with well-established methods and measures.

**Critical and Active-Learning Lessons**

During the second week of class, prior to fully introducing the concepts and definitions of race, ethnicity and identity construction, we asked students in both classes to fill out the race and ethnicity section of the 2010 U.S. Census. We then asked them if they had any difficulty self-identifying themselves. In both classes, 97% of the students reported having no issue filling out the form and were confident in their understandings of their own race and ethnicity. We then asked students hypothetically if they felt they could identify the race and ethnicity of others either by seeing a picture of them or by giving them information about the country of origin. Most students again stated that they would have no difficulty with the task (94%). We then gave out the survey and asked students to a) self-identify themselves by race and sex and then b) identify people from twenty-seven different countries simply by their stated nationality with no pictures, as either white, not white or state that they were "not sure." The list of countries comes from the American Anthropological Association’s project and includes: Albanians, Algerians, Belgians, British, Canadians, Chileans, Congolese, Cubans, Dutch, Egyptians, Germans, Iranians, Israelis, Italians, Japanese, Kenyans, Latvians, Moroccans, Nigerians, Poles, Puerto Ricans, Romanians, Russians, Spaniards, Swedes, Ukrainians, and Vietnamese. The countries selected are identical to those used by Randell’s original project, which was a random sample drawing on countries by first letter and descending through the alphabet. Only the names of the countries were listed with no pictures of people from these nations. This was done deliberately both in our study and the original study to allow for students to draw on their own experiences, knowledge, and/or imagination in describing nationalities.

![Figure 1. Average Number of Countries Identified as “White,” “Non-White,” and “Not Sure” at Time 1 (N = 97)](image)

Results of these pre-lesson assessments found that students in the treated class identified, on average, approximately 9 of the 27 nationalities as White, 12 as non-White, and 6 of the 27 as not sure. Students in the untreated class had similar results; they identified, on average, approximately 7 of the 27 nationalities as White, 13 as non-White, and 6 of the 27 as not sure. In sum, students in both classes were fairly confident about who was White or not White by indicating one or the other and were only “not sure” about roughly 22% of the nationalities. T-tests revealed that there were not any statistically significant differences between the two classes in the number of nationalities identified as White, non-White, and not sure.

After this exercise, students in the treated classes broke into groups to discuss why they identified certain nationals as white or not. They then returned to the larger class to report on their small group discussions through guided interaction with each other and the instructor. Students were allowed to explore personal experiences and feelings in the context of the week’s reading on racial construction—selections from Gallagher’s (2012) *Rethinking the Color Line* including “How Our Skins Got Their Color” (Harris), “Drawing the Color Line” (Zinn), “Racial Formations” (Omi and Winant), and “Defining Race and Ethnicity” (Snipp). During discussions, most students suggested that they identified certain countries as White based on previous knowledge. When asked where this knowledge about other countries came from, most students admitted that they had not actually visited these countries, but rather had derived a general perception of a country’s population based on media depictions in movies, television, and newspaper or magazine articles. Students also stated that they largely identified countries as non-White by the same process but added that if they had not heard of the country, or were not sure where it was, that “it must be non-White.” Breakout sessions and guided discussion did not occur with the non-treated class because the structure of the class, as a control for the study, did not allow for these sessions. The treated course was more interactive, thus allowing students to reflect deeper and more critically on the material (Braxton et al., 2000).

Over the next several weeks, we introduced students in both courses to the concepts of race and ethnicity through a series of lessons. In the treated course, students were introduced to these concepts through interactive lessons, projects, and strategies that previous research demonstrated as successful in not only introducing students to racial concepts, but also in helping students recognize the impact of racial construction on a host of issues including structural inequality (see for example, Cleary, 2001; Dinka, et al., 1980; Goldsmith, 2006; Haddad & Lieberman, 2002; Hodagneu-Sotelo & Raskoff, 1994; Picca et al., 2013; Poll, 1995; Smith, 1992; Sweet & Baker, 2011; Valdez & Halley, 1999). These pedagogical strategies included having students read key literature in the field, go through interactive lectures on the origins and use of the terms race and ethnicity, watch episodes from the documentary series *Race the Power of an Illusion*, and visit the American Anthropological Association’s local museum exhibit *RACE, Are We So Different?*

Students also completed a personal narrative describing their own personal experiences with their own race and those different from themselves. The personal narratives helped raise racial doubt because students learned how other students self-identified in terms of race/ethnicity. These self-identifications sometimes contradicted how a classmate would
have identified his or her classmate’s race. In a culminating exercise during the fifth week of class, we returned to the question we had asked students at the start of the semester. Can students identify race/ethnicity based on pictures? Students in the treated class were presented with a PowerPoint slide with the pictures of twelve individuals that the instructors knew personally and had interviewed. We asked the students to break into groups and then describe the people in the pictures in terms of their race and ethnicity. At the start of the semester, 94% of students said that they would feel confident identifying individuals’ race/ethnicity based on pictures. We found, however, that after five weeks of course content designed to raise racial doubt students found the exercise difficult. The class actually asked us to give them the self-defined identities of the individuals. After playing a guessing game with the identities, we then told the students how the individuals self-identified.

Building on course readings, namely Nagel (1994) and Sanders (2002), we went on to describe how the process by which a person self-identifies is rather complex and built on more than physicality. We highlighted how it is possible for race and ethnicity to be both asserted and ascribed. That is, how people can assert an identity versus how people view them or assign an identity on them. Furthermore, we discussed how this process of identity formation around race and ethnicity could lead to self-identifications that are both thick and thin in the ways in which they shape people’s lives and their experiences of themselves regardless of their country of origin. For example, people with a so-called thick racial or ethnic identity may lead lives largely through the lens of that identity shaping and managing their daily social interactions. However, people’s social actions and interaction with a so-called thin racial or ethnic identity may only be minimally shaped or managed by these identities.

While both classes completed the same readings and heard versions of the same lectures, it is important to note that the lectures in the non-treated course were considerably longer with no personal student reflection outside of occasional questions. In addition, there were no activities and lessons designed to raise doubt about race and ethnicity. Students did question various aspects of race in this course, but they were not challenged beyond the straightforward presentation of the material through lecture - whether they chose to listen or take notes could thus only be judged by exams, and even here, doing well may not be an authentic assessment of changing students’ attitudes and beliefs about race. We believe that targeted exercises, like the photograph identification activity, provide a better assessment of students’ understanding of race/ethnicity. The lectures in the treated course were briefer and broken up by active learning sessions that allowed students to put their own experiences into the context of the readings and lectures, which allowed the instructors to contextualize their biographies using the sociological imagination - seeing the general in the particular contours of their life experiences/understandings about race.

After having the students in the treated class collectively tell us that they were thoroughly confused about the saliency of race and ethnicity, we gave them the post-lesson survey before we moved forward with the courses and any clarifications. Again, the goal of these lessons and exercises was to create confusion or a certain level of racial doubt that could challenge students’ preconceived assumptions about race and ethnicity. We hoped to find
that students in the treated course differed in their racial and ethnic assessments after our lessons and projects than students in the non-treated course.

**Post-Lesson Findings**

Findings suggest that students’ generalized perceptions of people from other countries differed after going through the lessons and projects. Students who received the materials were less confident in who was White or not and thus overwhelmingly answered that they were “not sure” when prompted to classify the racial/ethnic backgrounds of each of the twenty-seven different national groups. Figure 2 summarizes these findings.

![Figure 2. Average Number of Countries Identified as “White,” “Non-White,” and “Not Sure” at Time 2 (N = 97) **Identifications between the two classes are statistically significant at the 0.01 level.**](image)

While there were not any statistically significant differences in identification at Time 1 between the two classes, there were statistically significant differences in identification at Time 2. After the lessons, students in the treated class were overwhelmingly likely to be “unsure” about racial classifications. Student in the treated class identified, on average, approximately two of the 27 nationalities as White, four as non-White, and 21 as “not sure.” Conversely, students in the non-treated class were far more certain in their identifications. They identified, on average, approximately seven of the 27 nationalities as White, 12 as non-White, and eight as “not sure.” From this data, it is evident that students in the treated class were far less certain about racial classification then students in the non-treated class.

In addition, the data in Table 1 reveal that all students in the treated class were likely to become more uncertain about racial classifications after receiving the lessons and course material. Due to low sample sizes in several of the racial/ethnic subgroups, we did not
Table 1. Average Number of Countries Students in Treated Class Classify as “Not Sure” (N = 63).

<table>
<thead>
<tr>
<th>Race^</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>2.7</td>
<td>19.7</td>
</tr>
<tr>
<td>Black</td>
<td>5.8</td>
<td>21.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5.2</td>
<td>19.1</td>
</tr>
<tr>
<td>Asian</td>
<td>4.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Multiracial</td>
<td>18.1</td>
<td>26.5</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>6.8</td>
<td>21.5**</td>
</tr>
<tr>
<td>Male</td>
<td>4.0</td>
<td>19.0**</td>
</tr>
</tbody>
</table>

** Two-Tailed t-test statistically significant at the 0.001 level.
^Due to small cell sizes, no tests of statistical significance conducted.

test for statistically significant differences in identification at Time 1 and Time 2. We do think, though, that this data is still meaningful to examine in terms of how much of a shift there is in identifications across racial and ethnic groups. At Time 1, only multiracial students were likely to be uncertain about racial classifications. They identified, on average, approximately 18 out of the 27 nationalities as not sure, compared to Whites who were the least likely to be unsure. They identified, on average, three nationalities as not sure. White students were only “not sure” about 11% of the nationalities. This is not that surprising given what we know in the literature (Case, 2007; Chaisson, 2004; Haddad & Lieberman, 2002; Pence & Fields, 1999). White students, whether it is a matter of assumed privilege or the result of simply being part of a majority population, are often confident in who they are, have not been faced with questioning who they are as much as minorities, and are often certain in their assessment of others who are not white (see ibid). Students who identified as Black, Hispanic, and Asian were also relatively certain in their identifications at Time 1. Blacks identified, on average, approximately six of the 27 nationalities as “not sure” while Hispanics averaged approximately five nationalities and Asians approximately four. At Time 2, all racial and ethnic groups demonstrated a much greater likelihood of being unsure. Whites and Hispanics identified, on average, approximately 20 nationalities as “not sure,” while Blacks identified approximately 22 and Asians approximately 19. Finally, multiracial students demonstrated a very high level of uncertainty at Time 2; they identified, on average, all 27 nationalities as “not sure.”

In addition, both males and females demonstrated an increasing likelihood to be uncertain after receiving the course lessons. At Time 1, males identified, on average, only four of the 27 nationalities as “not sure.” By Time 2, males identified, on average, 19 of the 27 nationalities as “not sure.” The results for females followed a similar pattern; at Time 1, females identified, on average, seven of the 27 nationalities as “not sure” compared to 22 of the 27 nationalities at Time 2. We did test for statistical significance, due to having enough numerical power in each subgroup. For both males and females, the increase in uncertainty was statistically significant.
When students in the treated class were asked why they were now more likely to be unsure about racial classifications, students explained that they “had to think a lot harder” and “were really confused.” Many students also referred to the assigned and shared personal narratives exercise and stated that there were students who considered themselves White that they did not think looked White and vice versa—students who considered themselves as non-White that they thought of as White. The introduction of doubt, therefore, seemed to challenge students to explore previously held assumptions and beliefs. Most students discussed some form of personal connection through the course exercises that challenged their previous thoughts. One student even cried a bit and suggested that she was embarrassed that she had not really gotten the opportunity to get to know different people and hear their stories—“I just feel like I have been living in my own little bubble.” Other students also stated that they were confused about the “whole biology of race thing.” As one student put it, “we all came from Africa so it makes sense that we are all Black, but Africa is not all Black, so we are all just mutts.” While some students in the non-treated class did express confusion about the biology of race, they did not refer to personal or emotive points in the prior weeks that had moved them to change their perception of various populations. By making interpersonal connections and emotively investing in the stories of their classmates’ otherness, students in the treated class demonstrated more racial doubt and in doing so opened themselves wider to understanding the social consequences of racial construction.

Discussion

Controversial courses abound in the social sciences but few are more intense and/or meet with more resistance from students than race related courses (Wahl et al., 2000). Despite these challenges, we cannot stop teaching these courses (Hedly & Markowitz, 2001). Given the fact that the U.S. will become a minority majority population over the next fifty years, teaching these courses has never been more important. This is particularly true given the fact that a) American racism has not disappeared since the Civil Rights Movement and in some cases it has gotten worse, and b) the fact that the nation remains highly socio-economically stratified by race (see Bonilla-Silva, 1997; Quillian, 2006; Smith, 1992).

Throughout this paper, we argued that the effective use of critical pedagogy through active-learning projects is vital to creating a safe environment in which instructors can challenge students’ misinformed racial beliefs and stereotypes in race-related courses. Building on the work of previous studies, we suggested the first step in raising this challenge is getting students to doubt or question what they know or what they think they know about both their own race and the racial identity of others (see Chaisson, 2004; Jakubowski, 2001; Wahl et al., 2000). Our findings illustrate that raising doubt and uncertainty among students makes it difficult for them to apply historically entrenched racial stereotypes to others. Pedagogically speaking, the students’ change in generalized perceptions of the racial and ethnic make-up of geographic locales highlights the importance of the need to “confuse” students’ stereotypical generalizations by introducing substantive material that helps to dismantle racial stereotypes. If instructors utilize exercises to raise levels of racial doubt among students, they can open the pedagogical door to productive group dis-
Discussions of racial social constructions that feed over-generalization, othering, and assumed homogeneity of out-groups. Exercises that raise doubt help develop students’ critical thinking skills and provide them with the tools needed to examine and evaluate previously held assumptions. As stated earlier, raising doubt should be the first step in teaching courses that center on race, diversity and inequality. Instructors that prepare such courses should be mindful of the preconceived stereotypes of students entering the class and must be willing to create course content in a way that challenges stereotypical views from the onset. They must acknowledge that students of privilege and majority may have the most to gain, but they also may manifest the most resistance. Likewise, they must also be cognizant of the fact that bi or multiracial students may have not only shifted their racial and ethnic expressions over time, but they also may have experienced a certain amount of racial ambiguity that complicates their understanding of race (Jackson, 2010).

Although further work is necessary to more fully understand and address these issues, we contend that our approach should become a starting point for future pedagogical studies that center on teaching courses on race, diversity and inequality. Race can be understood more efficiently when all students in a course delineate on the important concepts and theories and avoid racial stereotypes. While our study focuses on a course with race-related content, we do believe that raising racial doubt can be an effective pedagogical tool across courses and disciplines because it can directly challenge negative racial stereotypes. Negative stereotypes often influence students’ performances in classrooms. Steele (1997), for example, argues that the performance of students who are under a “stereotype threat” may be improved by situational changes that reduce the negative stereotypes students face. We believe that raising “racial doubt” about those stereotypes is one such method through which situational changes can occur. While our findings provide only limited insights into these areas and cannot speak to how “unlearning” affects future learning in other classes, we hope that this study will stimulate a breadth of research that will further investigate these approaches with the understanding that doubt is the beginning, not the end, of greater wisdom.

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