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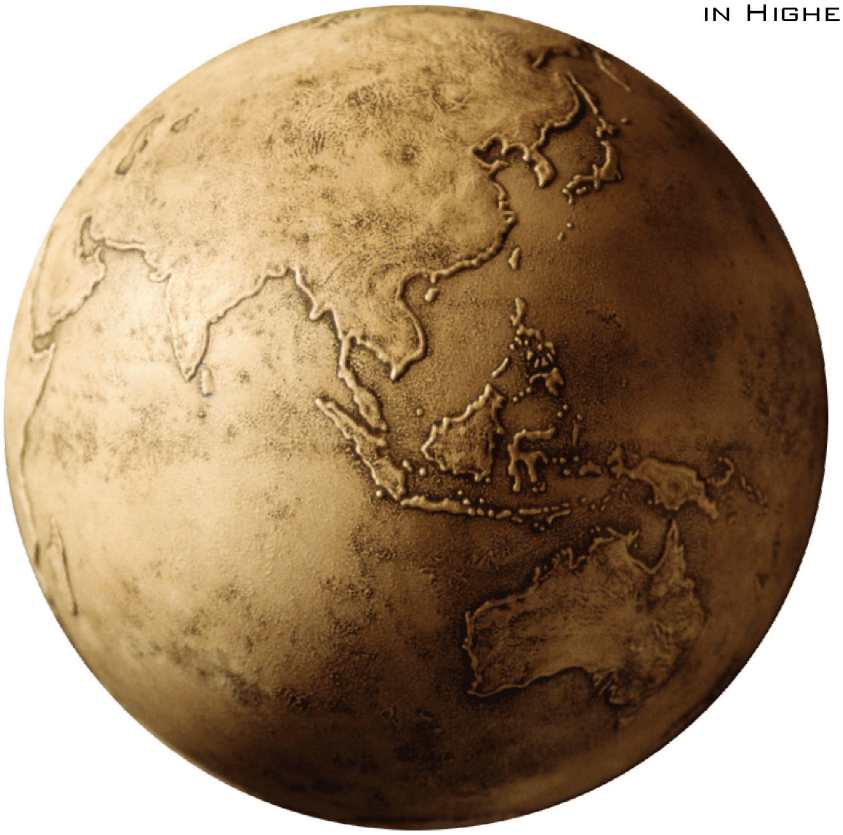

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Purpose

The International Journal of Teaching and Learning in Higher Education (ISSN 1812-9129) provides a forum for the dissemination of knowledge focused on the improvement of higher education across all content areas and delivery domains. The audience of the IJTLHE includes higher education faculty, staff, administrators, researchers, and students who are interested in improving post-secondary instruction. The IJTLHE is distributed electronically to maximize its availability to diverse academic populations, both nationally and internationally.

Submissions

The focus of the International Journal of Teaching and Learning in Higher Education is broad and includes all aspects of higher education pedagogy, but it focuses specifically on improving higher education pedagogy across all content areas, educational institutions, and levels of instructional expertise. Manuscripts submitted should be based on a sound theoretical foundation and appeal to a wide higher education audience. Manuscripts of a theoretical, practical, or empirical nature are welcome and manuscripts that address innovative pedagogy are especially encouraged.

All submissions to IJTLHE must be made online through the Online Submission Form. In addition, all manuscripts should be submitted in English and in Microsoft Word format. The following Submission Guidelines pertain to all manuscript types, that is, Research Articles, Instructional Articles, and Review Articles. Ultimately, authors should follow the guidelines set forth in the most recent edition of the Publication Manual of the American Psychological Association (APA).

Review Process

Following a brief editorial review, each manuscript will be blind reviewed by two members of the Review Board. The review process will take approximately 90 days. At the end of the 90-day review process authors will be notified as to the status of their manuscripts - accept, revise and resubmit, or reject - and will receive substantive feedback from the reviewers. Manuscript authors are responsible for obtaining copyright permissions for any copyrighted materials included within manuscripts.

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Quantifying the Value of Service-Learning: A Comparison of Grade Achievement Between Service-Learning and Non-Service-Learning Students

Shauna Brail
University of Toronto

This study evaluates whether students who participate voluntarily in a service-learning activity achieve higher learning outcomes, measured by grades, than students who voluntarily choose not to participate in service learning. Analysis is based on a study of an introductory urban studies course at a large North American research university over a four-year period. Findings indicate that, overall, students achieve higher grades as a result of participation in service learning, and additionally that females, international students, and students who are enrolled in either the Urban Studies minor program or who are non-Urban Studies students benefit most from optional participation in service learning in terms of grade achievement.

Dewey (1938), Dale (1969) and Kolb (1984)—all significant and relatively early proponents of experiential learning—are often credited with raising the profile of combining learning and doing in an academic context, as well as highlighting the role of connectivity between academic learning and community engagement as a means of teaching.

Emphasis on learning through experience in academia dates back at least many decades now to Dewey's (1938) book *Experience and Education* in which the functional role of learning through experience was highlighted, as well as the required criteria to ensure that experience and learning were connected and continuous. Dale's (1969) focus on actionable learning suggested that learning outcomes and knowledge retention are related to the ways in which knowledge is transferred to learners: the more experiential the learning, the higher the level of knowledge retention. For instance, it has been said that after two weeks, one remembers 20% of what they heard in a lecture and 90% of what they did in a demonstration on the same topic. To this day, Dale's (1969) influence continues to underlie best practices in engaged teaching, both in the form of experiential and active learning pedagogies. For instance, Revell and Wainwright (2009) note that

> the prevailing wisdom amongst pedagogic scholars now is that students do not actively listen very much at all in formal lectures, unless they are broken up with multiple rest periods and activities that help to lift attention levels back up again (p. 210).

Furthering attempts to understand how to promote active learning through connecting experience with knowledge, Kolb (1984) depicted an experiential learning cycle that connects a continuum of actions from concrete experience, reflective observation, abstract conceptualization, and active experience. Together, and in a cyclical fashion, these notions form a learning cycle in which learning by experience through feeling, watching, thinking, and doing all play a part in the promotion of learning. Kolb (1984) contended that learning should be understood as a process and not an outcome, and he defined learning as "the process whereby knowledge is created through the transformation of experience" (p. 38).

Today, experiential learning opportunities such as service learning, internships and work integrated learning are being heralded as a means of supporting undergraduate student learning by providing opportunities for students to develop transferable, functional, and practical skills. This paper focuses on a case study that attempts to quantify the impacts of service learning participation on learning by using grade achievement as a key demonstration of learning.

Service Learning: Measuring Learning Outcomes?

Service learning is a form of experiential learning that focuses on enabling and enhancing student learning through experience, reflection and connection to academic learning. Service learning is defined in this paper as a means of promoting learning through the creation of connections between community service volunteering and academic learning, and it has been touted as a pillar of university education that has the potential to contribute to deep student learning, community engagement, acceptance and understanding of difference, and the promotion of students' future civic engagement (Astin & Sax, 1998; Astin, Voglegesang, Ikeda, & Yee, 2000; Eyler & Giles, 1999; Felten & Clayton, 2013; Keen & Hall, 2009).

In a study of student achievement and service learning, Brail (2013) concludes that service learning enables students to develop a deeper understanding of discipline-specific knowledge. For example, students that volunteer in a food bank suggest that they can learn more about the realities of inequality, hunger, and

poverty through 10 hours of volunteering than through innumerable hours spent reading or listening to lectures.

While these qualities are admirable, research on the role and value of service learning still begs the question: can the impacts of service-learning outcomes be measured and quantified? From Eyler and Giles' (1999) "Where's the learning in service learning?" to critical pieces that question the value of traditional vs. critical and reconstructive vs. deconstructive forms of service learning (Holdsworth & Quinn, 2012; Mitchell, 2008), there are numerous calls for implementing best practices in service learning as pedagogy and practice.

In part, the justification for these critiques stems from the sheer fact that many claims related to the advantages of service learning are focused on qualitative evidence, whereas there are relatively few studies aimed at measuring quantitative outcomes. Furthermore, several high quality quantitative studies of the impact of service learning are based on surveys of student perceptions of learning and measures of satisfaction associated with service learning (Kezar, 2002) rather than quantifiable outcomes that provide evidence-based proof of service learning's contribution to learning as measured by the outcome of student grades.

Furthermore, it needs to be acknowledged that using grades as a measure of student achievement and student learning remains an imperfect and potentially imprecise measurement due to challenges associated with the validity and objectivity of grading practices (Allen, 2005). Grading practices associated with service learning are often, by the very nature of service-learning pedagogy, implicitly if not explicitly focused on practices subject to potential bias, such as the assessment of narratives, reflective journals, and interviews. In addition, measurements of key types of learning frequently associated with benefits of service learning – such as the development of critical thinking skills, higher order reasoning, engagement between theory and experience, and integrative learning (Jameson, Clayton & Ash, 2013) can pose assessment challenges. This acknowledgement is intended not to suggest that grades cannot or should not be used as a measure of learning, but rather that the use of grades to measure learning is complicated by the types of learning being measured. However, this uncertainty can be mitigated through assignment design that aligns assignment objectives clearly with learning outcomes, as well as grading practices that adhere to consistency and clarity.

Studies focused on the impacts and potential of service learning to contribute to student learning from a quantitative perspective are limited. Astin and colleagues (2000) conducted an extensive longitudinal study of 22,236 undergraduate students at US-based universities that focused on both quantitative and qualitative outcomes associated with service learning. Their findings demonstrated a positive relationship between service learning and 11 measured outcomes, including academic performance (Astin et al., 2000).

In other studies of specific service learning achievement outcomes based on studies of individual courses (Mpufo, 2007; Strage, 2004) findings suggest that student achievement, as measured by grades, is positively influenced by participation in service learning. While Mpufo's (2007) study of rehabilitation services students found that service learning did not have an impact on student mastery of course content, service-learning students achieved the greatest gains in their ability to respond to essay questions on case studies, although there was little measurable difference in service-learning students' ability to successfully respond to multiple choice test questions. Following up on an earlier study on the impacts of service learning for students in an introductory child development course, Strage (2004) found that "differences in student performance in upper division child development course work favored the 'service learning' students, although they failed to reach conventional levels of statistical significance" (p. 259). Mansfield (2011) demonstrated that mature students benefit the most from participation in a full year industrial placement in terms of grade achievement in their final year, a somewhat surprising finding given that these students likely already entered university with some work experience.

Along these lines, Kezar (2002) concluded that researchers examining traditional methods of assessment, such as grades, do not demonstrate significant improvement in achievement for service learners over non-service learners. Nevertheless, Kezar's findings supported service learning as a pedagogy that can have important and measurable learning outcomes for students, as measured by both traditional and more holistic forms of assessment (2002).

This paper presents an opportunity to explore and measure the ways in which service learning can contribute to student achievement as measured by student grades. The research reported on in this study includes an analysis of the grades of four cohorts of students enrolled in an introductory urban studies course in which participation in a service-learning module was optional / voluntary. Furthermore, in addition to examining whether voluntary participation in service learning contributes to enhanced learning as measured through grades, this study examines differences in gender, citizenship, and program of study on student grades.

About the Course

Introduction to Urban Studies is a second year undergraduate course offered at the University of

Toronto, a large North American research university. It is a full year interdisciplinary course in which students learn about theory and practices connected to the urban realm, including a focus on the state of urbanization around the world, industrialization, urban planning, urban form, civic engagement, inequality, and global urbanization. The course is a required course for all students enrolled in the Urban Studies Program (specialist, major and minor) and is also open to other students who meet the prerequisite of having completed the equivalent of at least four full year course credits, one of which must be in the field of either economics, geography, political science or sociology.

Students attend two hours of lecture each week for the full year, divided into two 12-week terms, as well as four hour-long tutorials focused on assisting students in preparing assignments

In the first term of the course, all students complete the same assignments and tests, and in the second term, students are asked to choose between participating in service learning or city learning. In service learning, students are placed in groups at a variety of non-profit, community-focused placements where they volunteer for 10 to 12 hours. Following their experiences, they submit a written assignment for grading in the form of a guided reflective journal. Students who select the city-learning option complete a research assignment in which they are required to examine a local neighborhood and prepare a term paper based on their research. All students, regardless of their selection of city learning or service learning, present a poster through which they highlight their research or service learning experiences during one of two in-class poster sessions. All students in the course also write a final exam at the conclusion of the course.

Goals of Study

An optional service-learning opportunity was implemented in this course beginning in 2008-2009. Implementation was largely based on the instructor's notion and understanding that experience provides an opportunity to learn in a way that can create a depth of learning that cannot be achieved in the classroom alone. It was also connected to the increased profile of and promotion of experiential learning by university administration.

Anecdotally, there are multiple examples of students who have participated in this service- learning opportunity that have gone on to excel in both graduate studies and in the community. For instance, one student who was placed at a food bank as part of his service learning several years ago, worked at the food bank the following year as part of a work-study arrangement, and upon graduation continued to volunteer at the food bank and shortly afterward became a member of the food bank's Board of Directors. Many other such anecdotal examples tell the stories of ways in which participation in the service-learning opportunity have impacted students' learning and, more significantly, their lives post-graduation. In addition, a qualitative study of 31 student journals submitted as part of this course over the period 2009 to 2011 revealed that service learning promoted student development of "critical thinking and analytical writing skills related to understanding themselves and others, gained perspective on stereotyping and tolerance, and in large part described a greater connection to civic engagement by the end of their service learning" (Brail, 2013).

However, there remains limited quantitative support to confirm these and other findings (Astin & Sax, 1998; Keen & Hall, 2009; Markus, Howard, & King, 1993; Mpofu, 2007; Shastri, 2001; Strage, 2000; Strage, 2004; Wittmer, 2004; Wurr, 2002) related to understanding the potential learning impacts of service learning. This study therefore aims to answer the question: does service learning impact student achievement as measured by student grades? The study is based on four years of student data and records from the course, combined with data on gender, citizenship and subject POSt. Subject POSt defines programs of study at the university: students have the choice of enrolling in a combination of specialist, major or minor programs. Urban Studies is a subject POSt that includes each of these three program options. As such, this study presents an opportunity to definitively understand whether, and under what circumstances, service learning contributes to student learning, as measured by student grades.

Method

The service-learning opportunity has been offered as part of the course since the 2008-2009 academic year and has operated yearly with the exception of 2011-2012 when the instructor was on sabbatical. This study therefore includes student data from the following years: 2008-2009, 2009-2010, 2010-2011, and 2012-2013.

Table 1 identifies the number of students in the class each year, as well as a breakdown of students by number and percentage who selected service learning and those who selected the alternative city-learning option. Based on course enrolments of between 82 and 86 students each year, student participation in the service-learning option ranged from just over 45% in 2012-2013 to nearly 70% in 2010-2011.

A total of 343 students completed the course during this four year period. One student was removed from the database prior to analysis due to an incomplete final grade that had not been resolved at the time of data collection. Four additional student records were removed from the database as outliers. These four students either received final grades of 25% or lower in

Table 1
Course Enrollment: Service-Learning and City Learning

Year	Total Enrollment	Service-Learning	City-Learning
2008-2009	84	40 (47.6%)	44 (52.4%)
2009-2010	86	56 (65.1%)	30 (34.9%)
2010-2011	82	57 (69.5%)	25 (30.5%)
2012-2013	86	39 (45.3%)	47 (54.7%)
Total	338	192 (56.8%)	146 (43.2%)

the course and/or did not complete the final exam. This results in a total analysis of 338 student records, with 192 (57%) participating in service learning and 146 (43%) participating in city learning over the four-year period under study.

Assignments

Throughout the first term, the work submitted by students varied somewhat from year to year; however, in each year the first term assignments included the submission of at least two written pieces of work, and in all years with the exception of 2008-2009, the students completed a mid-term test. In every year, the total proportion of the grade earned during the first term equaled 40% of the student's total grade for the course. In order to compare achievement across all four years, a summary of all grades earned in the first term was calculated.

Assignments for the second term in all four years were weighted in the same way and consisted of the same assignments. Over the four year period, some changes were made to accepted research topics in the city-learning assignment and details about the service-learning assignment that were shared with students were altered slightly over time. Second term assignments included a written component that was worth 15% of the final grade and a poster presentation worth 10% of the final grade. The written assignment was comprised of an eight page research paper for city-learning students and an eight-page reflective journal for service- learning students. Clear and specific criteria for each assignment were communicated to students by means of an in-class discussion as well as a detailed assignment guidelines document describing the tasks involved and format required for each assignment.

Students selecting the city-learning assignment were tasked with studying a particular problem (i.e., inner suburban challenges or opportunities) in a specific neighborhood of their choice. Students were required to demonstrate that they had visited the neighborhood to make observations and take photos to introduce their topic of study, to connect their neighborhood-based research to a broader literature review using both scholarly and non-scholarly materials, and to identify how the neighborhood under study connected to the broader literature and discussion on the particular topic or problem.

In the service-learning assignment, students were informed that the assessment of their journal would be based on their ability to successfully demonstrate their learning as a result of their participation in the service-learning option. Reflective journals were graded based on the students' ability to successfully follow the required structure of the assignment, connect service to learning, develop their reflections based on connections with academic literature, include relevant theoretical links in APA format, and demonstrate critical reflection based on experiences, observations and reflection.

While there were obvious differences between the written assignments, most notably the introduction of personal experience and perspectives in the service-learning journal, both assignments required students to demonstrate strong writing and communication skills, clear knowledge of literature and theory, the ability to create connections between observations/experiences and literature, and critical thinking.

The poster assignment was similar for both groups of students – students were tasked with creating a poster that described either their research or service learning, and all students were required to participate in an in-class poster session during which their posters were evaluated by course teaching assistants and instructors. One difference in the poster assignment was that service-learning students were permitted to work in groups to develop and present their posters, whereas city-learning students presented their posters individually. The reason for this difference relates to the group element of the service-learning placements. City-learning students did their research individually and therefore were required to present their work individually. Working as a group may provide benefits to students who might otherwise have created weak posters, if they were placed in a group in which a highly capable student(s)

contributed a greater share of effort towards the poster preparation. However, group work can be notoriously tricky and while in some cases students may benefit from being placed with high achieving peers, in other cases students feel penalized by being placed with a group in which the dynamics do not contribute to a well-conceived output. It is also for this reason, and to provide some degree of autonomy for students, that service-learning students are given the option of presenting their posters either individually or as a group.

In terms of support for preparing assignments, all students in the course were invited to participate in an optional, hour-long tutorial to discuss the requirements of the written assignment as well as a second tutorial in which the focus was on helping students to prepare for their poster presentation. Students were divided into tutorials based on their selection of either service or city learning. All assignments were graded by two course teaching assistants, with oversight from the instructor. The teaching assistants were tasked with grading a portion of both the research papers and the reflective journals. With the exception of the written assignment in the second term, all students in the course completed the same assignments and were graded under the same conditions.

Students completed an exam at the conclusion of the course that was valued at 30% of the final grade. The exam consisted of a variety of short answer keywords and longer answer essay and article / map analysis questions; there were no multiple choice questions on the exam.

Additionally, students were assigned a participation score worth 5% of their total course grade. The participation score essentially rewards students for being present in class at five random dates throughout both the first and second terms of the course. In order to earn 1% of their final grade at each random participation day, students respond to a question posed during the lecture, and submit a written response to the instructor during class time.

Data Collection and Analysis

A database was created for each of the four years that included the following information:

1) Student name and student number;
2) Participation in service-learning (1) or city-learning (0);
3) Grade at mid-term point /40;
4) Second term written assignment /15;
5) Second term poster assignment /10;
6) Grade on final exam /30;
7) Participation grade /5;
8) Final grade /100.

The database was then sent to the Office of the Faculty Registrar in the University's Faculty of Arts and Science for the addition of the following information for each student: 1) gender, 2) subject POSt, and 3) citizenship. It should be noted that information on subject POSt / program of study was captured at the time of data collection (ie: Fall 2013) and not at the time of student enrollment in the course. The Faculty of Arts and Science Registrar also then randomized the order of the student data, removed all personal identifiers including student name and student number, and returned the database to a research assistant working with the author.

Results

The results presented below for grade achievement are based on four key comparisons: 1) service-learning and city-learning students, 2) female and male students, 3) international and non-international students, and 4) students enrolled in the specialist, major, minor and non-Urban Studies students.

Service vs. City

Students were divided into two groups: 1) those who participated in the service-learning activity and 2) those who participated in the city-learning activity. Grades were reported based on final grades as well as the individual components that comprised the final grade.

As all students completed the same assignments during the first term of the course, the results demonstrate student grade achievement prior to student selection and participation in either service-learning or city-learning. Mean grades at the mid-year point, prior to the selection of service-learning ($n = 192$) or city-learning ($n = 146$) demonstrate that there was no statistically significant difference in grades at the mid-year point between service-learning (mean = 72.1%, SD = 3.14) and city-learning students (mean = 71.7%, SD = 2.54) ($p = 0.56$).

In contrast, students who participated in service-learning achieved statistically significant higher final grades as compared to those who selected city-learning (75.1% vs. 73.1%, $p = 0.002$).

Further analysis of individual second term assignments demonstrates statistically significant findings in favor of service-learning student grade achievement in all second term assignments, with the exception of the final exam (see Table 2).

Gender

Female students ($n = 183$) achieved a mean final grade of 74.7% which was not significantly different (p

Table 2
Grade Achievement Breakdown

Grading	Service-Learning n=192 M	Service-Learning n=192 SD	City-Learning n=146 M	City-Learning n=146 SD	p value
			Prior to Selection		
Mid-year grade / 40	72.1	3.140	71.7	2.54	0.560
			After Selection		
Paper /10	75.1	1.480	72.1	2.12	0.021
Poster /15	85.2	.630	78.4	1.39	0.001
Participation / 5	93.6	.597	83.2	1.06	<0.001
Final exam / 30	72.2	2.210	71.7	2.14	0.545
Final grade /100	75.1	5.580	73.1	6.29	0.002

Table 3
Subject POSt

	Specialist and Major			Minor			Not Urban Studies			No Program			
	M	SD	n	M	SD	n	M	SD	n	M	SD	n	P value
All students	75.1	4.67	150	74.7	5.41	112	70.5	7.03	73	67	13	3	<0.001
Service-learning	76.5	4.56	97	75.0	5.71	64	71.8	6.83	30	67	n/a	1	<0.001

0.11) than male students (n = 155) who achieved a mean final grade of 73.7%.

Within service-learning, there was a non-significant trend towards females (n = 116) having a higher mean final grade compared to males (n = 76) (75.8% vs. 74.2% respectively, p = 0.052).

International and Canadian Student Grade Achievement

Of the 338 students enrolled in the course during the study period, 67 or 19.8% were international students, somewhat higher than the proportion of international undergraduate students at the university overall. In Fall 2014, 17.5% of undergraduate students at the university were identified as international students (University of Toronto, 2014). Twenty two percent of students participating in the service-learning option were international students, and those students achieved an average final grade of 72.9% (n = 43), which was lower than the overall average final grade for all service-learning participants of 75.1% (n = 192) and higher than the average final grade of 72.1% for all international students (n = 67).

Enrollment by Subject POSt

Table 3 presents results for student grade achievement in the course based on subject POSt data. For all students in the course, regardless of whether or not they participated in service learning or city learning, students with an Urban Studies Program subject POSt achieved statistically significant higher final grades than those who were not enrolled in the Urban Studies Program subject POSt. For both service-learning and city-learning students, there is a regressive relationship between final grade achievement in the course and student enrollment in the Urban Studies Program.

Discussion

Service vs. City

The data shows that final grades of students who participated in the service-learning opportunity achieved an average of a full grade higher (B instead of B-) at the end of the course in comparison to students who participated in the city-learning option. Looking at each grading component in the second term presents a nuanced picture of the ways in which service-learning students demonstrated greater learning and ultimately higher achievement than their city-learning counterparts. In all graded elements of the course with the exception of the final exam, students who participated in the service-learning option achieved higher grades than those who participated in the city-learning option.

Furthermore, across all components of the grade in the second term (with the exception of the final exam) the standard deviation was larger in the city-learning group than in the service-learning group. Anecdotal evidence suggests that this may be the case because groups of students at both the top and bottom levels of the grading spectrum select the city-learning option, albeit for different reasons. Some high achieving students select the city-learning option because they would prefer to gain additional research experience and might not directly connect the concept of service-learning to academic learning—it is a conscious decision. The service-learning option requires high levels of student organization, time management and focus far in advance of the assignment due date. This may dissuade some students at the lower end of the grade spectrum from choosing this option.. While these are, admittedly, generalizations and do not apply across the board to all students, they may nevertheless help to explain the more dramatic variation in standard deviation amongst the city-learning group.

An underlying question related to the finding that service-learning promotes academic learning is as follows: do students who choose to participate in service-learning demonstrate greater academic achievement as a result of participation in service-learning, or is it the case that brighter, higher achieving students select service-learning in the first instance?

As the choice between service-learning and city-learning is optional within the course, and given that this research demonstrates significant differences in achievement between service-learning and city-learning students, it is important to test whether some of this difference might be related to student strengths in the course prior to the selection of either service or city-learning in the second term.

In order to rule out the argument that higher achieving students are selecting the service-learning option, we looked at mid-year grades to ascertain whether it is not the service-learning that is leading to enhanced learning outcomes, but rather the self-selection of students. Analysis of data demonstrates that there is no significant difference between achievement at the mid-term point for students who selected the different options, regardless of whether one examines the average or the mean.

The participation grade is measured at five random dates throughout the full course where, one each occasion, students had the opportunity to earn a one percent grade by responding to a question in lecture and submitting a written answer to the instructor during class. Based on this measure, achievement among service-learning students was greater than amongst non-service-learning students. In addition to higher achievement, the participation grade is also a proxy for class attendance, thus demonstrating that students who participated in the service-learning option had greater attendance levels than those who participated in city learning. This finding is especially significant in the context of this study as it is an objective measure of achievement that does not vary based on grader bias or subjectivity, and yet it shows significant differences in achievement for service-learning students.

One somewhat surprising finding relates to the lack of statistical difference in student achievement on the final exam. In earlier studies, (e.g., Mpofu, 2007), it has been found that service-learning leads to higher grade achievement when testing is in the format of essay answers as opposed to multiple choice. The final exam in the course is based on a variety of answer formats, including keywords, article analysis, short answer essay and longer essays. This finding deserves further future attention to understand the manner in which service-learning does and does not contribute to higher achievement on final exams.

Gender

Previous studies have identified a gender imbalance in service learning, with Astin & Sax (1998, 253) indicating that "being a woman" was identified as a predisposing factor to predicting participation in service-learning. The findings of this study indicate that females tend to dominate service-learning opportunities with 60% of service-learning participants from this study being female.This female participation rate is notably also higher than the proportion of total females to males enrolled in the course (54% female, 46% male).

While achievement by gender as measured by final grade is not significant, when achievement in service-learning is taken into consideration, a strong significant trend is evident with female students participating in service-learning obtaining an average grade of 75.8% while male students achieve an average grade of 74.2%.

International and Canadian Students

Data also provided insight into whether there were differences in achievement between Canadian citizens and international students. Of note, the proportion of international students that participated in the service-learning option was significantly higher than the proportion of Canadian students that participated. Whereas 55% of all Canadian students selected service-learning, more than 64% of international students enrolled in the course selected the service-learning option. Though it was not a goal of this study to understand how service-learning uptake by students might be differentiated through citizenship, it is an important finding that could be addressed in future research. This finding might suggest that service learning offers an opportunity for international students that is valued above and beyond a traditional class curriculum.

Furthermore, service-learning opportunities tend to value diverse language skills which international students may possess, and at the very least, generally do not discriminate against students for whom English may not be their first language. Finally, for students who are limited by their status in Canada in terms of off-campus employment, service-learning offers an opportunity for these students to obtain experience outside of campus in a way that may otherwise not be easily available to them. International students are eligible to work off campus; however, they must take the additional step of applying for a Social Insurance Number at a Service Canada office in order to be eligible to accept paid work.

In terms of the impact of service-learning participation on international student grades, the findings are more reserved. While not statistically significant, results demonstrate that the course average for international students increased from 72.1% to 72.9% for those who participated in the service-learning option. Furthermore, the mean final grade achieved by international service-learning students in the course was equal to a B, whereas the mean final grade for international city-learning students was a B-.

Enrollment by Subject POSt

It might be expected that students enrolled in the Urban Studies Program would achieve strong results in Urban Studies courses for several reasons: first, Urban Studies is a relatively small program at the university with approximately two hundred students enrolled at any one time (across second, third and fourth year and beyond) and students who seek it out tend to have a very keen interest in cities; second, as a program in which admission is selective, students enrolled in the program already have to demonstrate a relatively high achievement in first year courses as admission is limited to those who have a minimum grade of 72% in a selection of first year courses.

One limitation of the study data is that information on subject POSt was captured at the time of data collection (i.e., Fall 2013) and not at the time of student enrollment in the course. It could therefore be hypothesized that some students who did not do well in the course may have chosen to switch their focus away from Urban Studies in subsequent years, or they may have elected not to enroll in the subject POSt after expressing an initial interest, while those who excelled may have elected to apply to the specialist program which can only be entered upon completion of the Introduction to Urban Studies course, or to the major program.

While it is somewhat disheartening to find that students who are not enrolled in an Urban Studies subject POSt perform less well in the course overall (average course grade of 70.5% as opposed to 75.9% for majors and specialists and 74.7% for minors) the data does demonstrate that participation in service-learning for non-Urban Studies students has statistically significant and demonstrable benefits where grades are concerned. While the average course grade for non-Urban Studies students was 70.5%, students without an Urban Studies subject POSt who selected service-learning achieved a course average of 71.8%. This represents the difference between a final grade of C+ and B-. Participation in the service-learning option provides a clear benefit to non-Urban Studies students in terms of grade achievement.

Achievement for Urban Studies majors and specialists is also impacted by service-learning participation. For majors and specialists of the Urban Studies Program, service-learning participation in the course raises the average final grade from 75.9% to 76.4%.

Astin and colleagues (2000) attribute some of the positive impacts associated with service-learning to the role that increased interaction with their peers, as well as with faculty, can provide. This explanation may also help to underscore the achievement benefits found in this study for all participants, and particularly for non-Urban Studies students as well as international students who have a heightened opportunity to engage in discussion and interactions with classmates, community members, and supervising faculty through participation in the service-learning option.

Conclusion

This study quantifies the impact that participation in service-learning can have on undergraduate student grade achievement. The data demonstrate that participation in service-learning results in statistically significant student achievement as measured by student grades. Furthermore, the effects of grade achievement

are especially pronounced for females, international students, and non-Urban Studies students. This study represents data on grade achievement as a result of participation in service-learning from a novel perspective by highlighting the potential impacts that service-learning participation can have on grade achievement for various groupings of students according to gender, citizenship, and program of study.

While this study is specific to undergraduate students enrolled in an Urban Studies course, the findings are consistent with other interdisciplinary and discipline-specific studies, particularly as they relate to the role of service-learning in highlighting gains in student achievement. Furthermore, the application of service-learning as a means of promoting deeper subject-based learning and critical thinking is believed to be responsible in part for the higher grades achieved by service-learning participants. The results presented here support the findings of previous studies conducted across a variety of disciplines that also emphasize higher achievement for service-learning students (Astin et al, 2000; Mansfield, 2011; Mpufo, 2007; Strage, 2004).

The findings presented here suggest that from a policy and administration perspective, we need to understand more about how service-learning participation is relevant and possibly beneficial to different groups of students in terms of grade achievement. For instance, how can and should information about the value of participating in service-learning for international students (a growing and much-desired cohort at many Canadian universities) and students who are not enrolled in a particular program of study be shared to the benefit of both students and community partners that make service learning possible while at the same time ensuring that the quality of the service-learning initiative and adherence to best practices is not diluted?

In addition, this study does not tell us how or why international students and students studying outside the field of Urban Studies managed to achieve higher learning outcomes than their peers as a result of their participation in service learning. One might surmise, however, that perhaps it was the role of group work and enhanced opportunities for interaction with peers and others outside the classroom that helped lead to higher achievement.

This study suggests that a detailed classification of students is relevant to understanding the relationship between service-learning and student achievement. Knowledge about the differential effects of service learning based on demographic and citizenship features presents a new lens through which to examine the potential impacts and benefits of service-learning. Eyler (2000) has insisted that service-learning research needs to focus not only on the outcomes of service-learning for students but also on ways in which educators can improve service-learning outcomes from an academic standpoint. Kezar (2002) echoed these sentiments in her call for examining service-learning outcomes by focusing on forms of assessment that are holistic and capture the full range of learning that may ensue as a result of a service-learning pedagogy. This research attempts to contribute to both of these calls by breaking down student grade achievement and providing a finer grained analysis of both participation in service-learning and achievement as a result of the optional selection of service-learning in a multi-format course. Along these lines, it is apparent that further conversation and exploration about who participates in service learning, why, and to what outcomes is warranted.

Finally, it should be noted that while grades are certainly an important measurement of the value of service-learning as an experiential learning activity to students, educators and university administrators, they remain only a part of the value of service-learning initiatives. In short, assessment of grades may demonstrate student learning, and improved student grades as a result of service-learning may contribute to students' future success in academic and postgraduate endeavors; however, higher grade achievement is also largely irrelevant from a learning perspective if it does not also go hand in hand with students' abilities to develop deep connections through critical and reflective experience alongside connection and relevance to service-learning partners.

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Promoting Academic Socialization Through Service Learning Experiences

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This study explores the narratives of eight students who served as journal reviewers on a non-course-related service activity. The aim of this study was to develop an understanding of their experiences. The review board was multi-disciplinary in composition; the majority of its student and faculty members were from communities historically excluded from, and marginalized within, structures of U.S. higher education. Student engagement in learning how to manage an online journal fostered academic socialization through collaboration and collective learning. Students' perceptions of the benefits of working on the journal were categorized across five themes: Academic Career Enhancement, Practicing Faculty Work, Illuminating Faculty Roles, Demystifying Writing for Publication, and Grappling with Prioritization. The benefits and challenges of promoting academic socialization through service learning and mentorship, as well as showing how service engagement can be integrated in academic and personal identities, are discussed.

Tierney and Bensimon (1996) describe academic socialization as consisting of an Anticipatory and Organizational Stage. Anticipatory socialization occurs during graduate school as students participate, observe, and interact with faculty members (Rosser, 2004). Organizational socialization occurs prior to entering the academy and continues as individuals develop their roles as a faculty. Weidman, Twale, and Stein (2001) suggest that, in addition to the Anticipatory Stage, there are the Formal, Informal, and Personal Stages. They extend the definition of the Anticipatory Stage by suggesting that during graduate school students become aware of the behavioral, attitudinal, and cognitive expectations of prospective faculty. Observing the roles of new and older students, as well as learning the department norms and regulations and how they are carried out, are tasks in the Formal Stage. The Informal Stage is guided by interactions with older students and faculty as graduate students learn to observe and act in ways that are normative to the profession. During the Personal Stage (akin to the Organizational Stage) students internalize the social roles and structures characteristic of the profession, accept a value orientation, and relinquish former ways as they develop their own professional identity. Although socialization may vary widely by institution and discipline (Gardner, 2008), the literature implies that an understanding of faculty work begins in graduate school (Austin, 2002).

Graduate education offers students opportunities to experience the skills and expectations characteristic of faculty work (Austin, 2002). They undergo several socialization processes simultaneously related to the role of the graduate student, academic life, the profession, and a specific discipline or field (Golde, 1998; Staton, & Darling, 1989). Students facing socialization tasks ask the following questions: 1. Can I do this? 2. Do I want to be a graduate student? 3. Do I want to do this work? 4. Do I belong here? (Golde,1998).

Service learning is integral to training and preparing students for future roles as practitioners or professors (Felten, & Clayton, 2011). Unlike the lecture or other teacher-centered instruction, it helps students recognize the benefits of working with others and offers authentic opportunities to integrate the linkage between theorizing, learning information, and applying it in practice. Service learning is a required component of study in such disciplines as counselor education, (Arnold & McMurtery, 2011), medical education, teacher education (Ethridge, 2006), gerontology, computer graphics (Hutzel, 2007), and social work education (Maccio, 2011). Typically, service-learning experiences—also referred to as practicums, internships, or field-based placements—require tuition be paid. In the academy, service learning is described as committee work; faculty senate work; service within the department, college, or institution; or external service at the local, state, national, or international level (Rosser, 2004). In the latter context, faculty lend their expertise and time; it is not required and rarely remunerated. It is this type of service that is the focus of this research inquiry.

Documenting students' experiences during service activities and discussing them simultaneously can facilitate the students' capacity to bridge classroom learning with actual practices. As a pedagogy that depends on reflection to facilitate learning (Jacoby, 2003), the definition of service learning has broadened. Felten and Clayton (2011) summarize the potential benefits of service learning as the following:

- Advancing learning goals (academic and civic) and community purposes
- Fostering reciprocal collaboration among students, faculty/staff, community members, community organizations, and educational institutions to fulfill shared objectives and build capacity among all partners
- Stimulating critical reflection and assessment processes designed to facilitate and document meaningful learning and service outcomes (p. 76).

Challenging students to become producers of knowledge, service learning encourages transformative change. Thus, engagement in service learning can help students surpass their traditional classroom identities as consumers of unalterable knowledge (Felton & Clayton, 2011). Researchers suggest that service learning has a positive impact (Maccio, 2011) and emphasize developing skills that help students respond to community needs in accordance with their disciplines (Arnold & McMurtery, 2011; Baker & Murray, 2011; Leung, Liu, Wang, & Chen, 2006; Maccio, 2011). Continued research into service-learning experiences can improve practice and contribute to the knowledge base of educational practices. Nevertheless, there is a dearth in the studies that identify the contributions of service learning beyond the non-profit sector (Carpenter, 2011). Research about student experiences in service might augment educators' and professors' knowledge about the type of preparation, foundational knowledge, and skill-based learning that students need to maximize the benefits of field-based practice.

The purpose of this study was to explore the experiences of eight graduate student participants who acted as journal reviewers on a service-learning project while assisting with the management and production of an online educational journal. The researchers' aim was to develop an understanding of how students benefited from working under faculty supervision outside of the classroom. Three research questions guided this inquiry: 1. What themes emerge from students' experiences with service learning while working on an online journal? 2. How are students' academic socialization experiences highlighted by the themes of their narratives? 3. Based upon student experiences, what is the potential for this type of service learning to be implemented and for its capacity to build bridges between the classroom and knowledge-creation?

Theoretical Framework

In this study, the faculty student relationship within service learning experiences is organized around the framework of mentorship, often a central activity in the Anticipatory Stage of academic socialization. The aim of this study is to explore mentoring through the student-advisor relationship and the interactions that characterize it. In the academy, mentoring is a personal relationship with more experienced faculty who provide knowledge, advice, challenge, counsel, and support. Mentoring is significant to the development of students' scholarly potential and to promulgating the traditions of intellectual inquiry (Rosser, 2004).

Betts and Pepe (2005) showed that success, awareness, and advancement are among the positive benefits of mentoring. Facing the arduous process of publishing, faculty mentors play a pivotal role when they show graduate students how to turn their ideas into publishable papers. Mentoring and service learning experience in the academy provide opportunities for graduate students to identify career trajectories, and to be exposed to experiences that are akin to actual job placements while still having access to the mentor's expertise, knowledge, and experiences. A growing body of literature suggests that the role of the graduate mentor is neither as central nor as extensive in socializing students into the academy as traditionally assumed (Bieber & Worley, 2006) due to an overreliance on inactive means for transmitting knowledge and building student capacity. In the advisor-advisee mentoring relationship, knowledge is often transmitted passively. As applied in this study, service learning as an occasion for mentorship will extend the concept of mentorship for developing student capacity through progressive engagement.

Methods

Participants

Eight graduate students who served on the editorial board of the online journal were invited to participate in this study. As part of the board, they assisted in managing the online journal and reviewing manuscripts for potential publication. The board met monthly to discuss the reviewers' comments on manuscript submissions and to determine whether or not to publish a manuscript in its current form, request a revision, or reject the submission. The aim of the journal was to build a body of educational leadership studies that accomplished the following: 1) fostered an appreciation for faculty and staff diversity; 2) promoted culturally

and linguistically responsive teaching; and 3) explored how those practices affect student achievement, school climate, and instruction. Each year, one doctoral student was appointed to serve as an assistant editor who was responsible for assigning manuscripts to reviewers, ensuring that prospective publications were sent to another student—also appointed—who maintained the journal's tracking system, and sending completed reviews to the Editor-in-Chief for final dispositions. All of the participants were doctoral students seeking degrees in educational leadership, higher education, counselor education, and school psychology. Four females and four males participated in the study including one student from China and one from Pakistan, three African American students, and three White students.

Data Collection and Analysis

Two doctoral graduate students, who had served on the journal's board for less than one year, interviewed the remaining eight graduate students (participants) who had more than two years of experience on the board. Students conducted the interview to minimize bias from the editors who served as the mentors and, also, because they had some familiarity with the roles of journal's board members. Participants were interviewed about their experiences while serving on the editorial board, their perceptions of service learning, lessons they learned about getting published and doing the work of a reviewer, and insights they gained from observing interactions between the journal's Editor-In-Chief and Associate Editor.

Participants were asked to respond to the questions in Table 1**.** Interviews were scheduled at mutually agreed upon times and locations and ranged from 30 to 90 minutes. After receiving signed consent forms, the participants' responses were audiotaped and transcribed verbatim by the interviewers. One of the interviewers and a professor with expertise in qualitative research open coded the data independently. After recording the open codes of the eight interview transcripts, the first and second authors met to compare their analyses. Using NVivo 10, they reached consensus on the themes and related conceptual definitions. Qualitative methods were used because they permitted a greater depth of insight and emergent understanding than a quantitative approach. The names used for participants and professors are pseudonyms.

An analysis of the interview transcripts revealed five emergent themes including the following: Academic Career Enhancement, Practicing Faculty Work, Illuminating Faculty Roles, Demystifying Writing for Publication, and Grappling with Prioritization. Conceptual definitions of the themes are shown in Table 2.

Results

The five themes that emerged are presented in rank order from highest to lowest frequency along with exemplars of each theme.

Academic career enhancement. Stan described the importance of working together, sharing that he "liked being a part of creating a group of diverse publications that tied into each other." He particularly liked working with others on the board: "It is like being in this process as a student without having those shackles of produce, produce, produce." Hamid enjoyed the lack of bureaucratic structures that typify most organizations: "I found that there was no hierarchy, that you could approach anyone and communicate your own thoughts." Similarly, Chan commented about the social aspects of working on the board, "It is really helpful for me to feel comfortable working together with other board members and communicating with the others."

Participants explained what they learned by observing interactions and listening to others. Working in teams to complete reviews of each manuscript was essential to ensuring fairness. They proffered that having only a single person conduct a review might lead to questions about the veracity or validity of the reviewer's comments. Soliciting colleagues across the nation to participate in the review process, they believed, helped build a network for both the journal and themselves. Aside from the process of reviewing, participants reported that the editors had a great working relationship and were supportive of the students. Participants felt that they were committed to developing partnerships and strong networks and that they were supportive of prospective authors.

When asked to describe how serving in the role of reviewer enhanced her academic career, Antonia reported that she "learned tons, [including the] day-to-day, the nuts and bolts [of] getting a paper through the entire review process." She described how the journal helped her sustain her course of study: "It kept me here, it kept me grounded, gave me hope, I guess, [because] it gets very lonely in this college." The journey towards earning a doctoral degree is often a single and solitary focus. Unless a doctoral student is going to school with friends who share similar interests, curiosity, or skills, often there are few people outside the academy with whom they can describe their work, share conversations, or explain the activities that occupy their daily lives. Stan reported that he had "gained a new respect for what's going on and then understanding the process of what it takes, [sometimes] the three or four reviews of an article." Having served on the board, he believed, was "really going to allow me, when I become a professional academic, to really participate in being an editor." Moreover, he felt that

Table 1
Service Learning Experiences Questionnaire for the Graduate Student Participants

1.	Describe your experiences as a board member.
2.	What have you learned?
3.	What have you liked/disliked in your role as an editorial board member?
4.	What have you learned from being a reviewer?
5.	What have you learned from watching professors interact during board meetings?
6.	What have you learned about the flowchart of procedures pertaining to conducting reviews?
7.	What have you learned about the process of online publication/publication?
8.	How have you balanced the responsibilities of editorial board service and graduate studies?
9.	What have you learned about "quality" research from your editorial board service?
10.	What have you learned about the role of service in academia?

Table 2
Themes and Conceptual Definitions

Themes	Conceptual Definitions of Themes
Academic Career Enhancement	Mentoring through journal work; describing how serving as a reviewer enhanced academic career opportunities.
Practicing Faculty Work	Applying journal review protocol; identifying characteristics of good research.
Illuminating Faculty Roles	Expressing beliefs about the meaning of service.
Demystifying Writing for Publication	Acquiring insight into writing for publication.
Grappling with Prioritization	Completing reviews in a timely manner.

reading "other people's research and seeing it, helped me to be a better researcher." Candy emphasized the transportability of her work, exclaiming that she would "be able to use [this experience in her] own writing and [while] working with someone else." She reported having become more professional, especially when having to e-mail colleagues and indicate that their papers were not accepted. For all of the members, this was their first time serving on a review board; it provided a unique opportunity unlike those they had in their courses. Describing the relationship among board members and the editors, participants observed the interpersonal communication and spoke about maintaining a professional stance. Molly found that disagreeing with others did not have to result in disagreeableness: "Even if you disagree, it is not really personal as long as everyone has the philosophical underpinnings of [the] journal. Then the disagreements can be solved in a reasonable fashion." She appreciated the dynamics cultivated by the editors that led to a group norm such that "opinions were respected" and that board members received the same credibility as the professors. Hamid explained that the service learning experiences enhanced his academic career "immensely [pointing out that he] now [had] five publications in the year [following his graduation]." He explained the differences between his Far Asian university culture with the university where he completed his doctoral work, and noted the following:

> Many of the PhD's in my university [rarely] start with publications in the first two years because they feel overwhelmed. But because [getting published] was ingrained in me early [in my studies], I think that gave me a lot of impetus.

Nate was reassured as he acquired "more insight or confidence [indicative that he] was doing things the right way." He learned that he only needed an invitation from scholars and professors, that he had just needed someone who would share "the secret [because I had] never learned about publication." After being invited to write for the journal and recognizing the gift of fostering others' growth, he discovered the importance of "being as giving as possible to people who are new." For several students, the journal offered their first venue for getting published. Feeling a sense of accomplishment and joy in getting their research published fueled some board members to seek other venues for their work, but with a discernible sense of purpose and confidence.

The editors tried to impart to students the necessary knowledge about how to conduct reviews effectively, solicit other professors to review, and develop an online journal publication. Students described how the editors'

interactions influenced their own growth as prospective academic professionals. Overwhelmingly, students felt that the professors' interactions were exemplars. Chan stated, "I think it is a very good example of how collegiality works in college, because faculty members can work together to expand their own specialty, and put together all their good ideas and get something done." Stan described the balance between the Editor-in-Chief and Associate Editor and how he liked that "one's expertise would support one area of the publication process and then the other's expertise in another area." He also appreciated that "the Editor-in-Chief and the [Associate] Editor were really all about diversity [and] about work that benefitted participants." Nate stated the following:

> I love watching Dr. Harper and Dr. Walker interact; it was almost fun. They kind of have fun with hard work. They joked and were very personable in their style. They are extremely organized [and] incredible writers [who] are able to create agendas and time lines very efficiently. They kept teamwork as their main theme but always showed appreciation. No matter how much you put in, or how little, you got a lot of love, and that was consistent. They made me feel important.

Candy expressed her indebtedness to Dr. Harper who provided her with unique opportunities: "[In] my other graduate degree [program] I didn't have these experiences." She explained, "She pushed me to do [what] has been so beneficial and so educational." Molly appreciated the collegiality provided by the editors and the students, grateful that everybody worked together "in a positive fashion." Antonia summarized the group's sentiments, pointing out that she learned a lot about "what mentoring could look like." Participants also expressed their appreciation for the opportunity to serve in this role. Candy stated, "We didn't walk in there knowing this. Instead she guided us and we learned by doing and learned by watching her do. And I think that's the only way to learn something like this is to get your hands wet, and we did." Also, because the review process often took them out of their comfort zone, they were grateful that the professors valued their opinion.

Students felt empowered and respected. Receiving praise for work completed and a certificate acknowledging their service at the end of the year affirmed their contribution. They acknowledged the professors' openness to their various contributions. Because she worked full time, Molly could rarely attend monthly meetings. Yet, she provided input because she knew that her perspectives were welcomed. Max concurred, stating that having mentors who understood that students were grappling with many responsibilities was helpful.

Commenting about the characteristics of quality research, Candy "learned what kinds of studies were appropriate [or] were really considered scholarly when they arrived." At times she was flabbergasted "with the level [of work] that people would send" to the journal when they did not quite finish the manuscript or the topic did not fit the journal's aim. Stan remarked that he "really learned the importance of beginning clear" in writing. He opined that quality research was conditional as well as dependent on the journal's focus, "so I'm looking for research that is going to give us new information, not a complete repetition of what is already out there." Molly reported, "There is also a lot of variation in the quality of research. Some of it was really low-level, not really well thought out; others were." Overall, students discerned the differences in the characteristics that distinguished quality and non-quality studies. Weaknesses of some studies, they discovered, oftentimes occurred due to unacceptable style format. The lack of clarity actually influenced their opinion of the manuscript's quality. Nate surmised that quality research is an author's ability to "explicate the theory, content or the idea of the hypotheses into a digestible format." Participants reported that quality research articles must be clear and supported by substantial evidence, by numerical findings in quantitative studies, or by rich thick descriptions for qualitative studies.

Practicing faculty work. Describing those experiences she had while analyzing manuscripts using the journal's American Psychological Association (APA) reference system, Chan reported "learn[ing] a lot about [the] detailed format style." After observing the tedious nature of reviewing manuscripts for their correctness of style, Max stated, "APA is extremely intricate." He noted that at times there are "subtleties that you would not normally pick up on unless you've seen a lot of articles." Prospective authors may not realize how using the proper citation affects an individual's ability to provide a substantive review. However, as one participant noted, reviewers may be so distracted by APA errors that they end up focusing more on style than the content of a manuscript. This can hinder a critical analysis or supportive critique.

Antonia and others described the benefits and disadvantages of being a reviewer, as well as their perceptions of the procedural guidelines that governed the review process: "A lot of work was completed independently and there were holes in decisions that needed to be attended to." She observed that when the board was together there were at least about six eyes on any one thing. Candy concurred, stating, "A lot of sets of eyes is helpful and so clarifying." Chan noted the following:

> [I] liked [the] opportunities to learn how to run a journal, from the very beginning [including] how to identify reviewers, how to communicate with authors, how to design a call for manuscripts, [as well as how] to target some certain researchers and let them know that there is such a journal.

Max appreciated the opportunity to work with an international author, later adding, "When I first got into the journal I was a little surprised [about the intensity of what] I was encountering as far as the process of review." However, because the quantity of articles he had to review was limited, he focused more intensely on the process rather than "just doing for the sake of doing it."

Students were grateful that their introduction to becoming a reviewer was eased by sitting down together reviewing and the journal's mission and objectives. This discussion gave everyone an idea about the journal's purpose and the kind of articles that were being sought. During the Editor's second year, the review process was standardized with use of a flowchart that included stages and related procedures, as well as the type of decision letters that would be sent to the prospective authors. Prior to that, the review process was at times exasperating, muddied by the lack of a clear procedure that guided the process.

Illuminating faculty roles. Students described their beliefs about doing service and the benefits. Antonia explained, "People who don't get this experience don't think that that is their responsibility to the society or to their community." Chan described the way that service is typically perceived: "Before this experience I always thought that service was just something required by a university." From serving on the board, she surmised that "actually doing service is an integrated part of your own academic work." Prior to serving on the editorial board, Max believed that service was a personal decision and that publication and teaching were the most important university activities, "but since watching these two professors work, I'm becoming more opposed to that notion." He found that "engaging in service on the journal helped me understand [and] to engage in reflective practice as a rule." Molly criticized the lack of service outreach provided by higher education faculty and pointed out that they did not "do as good of a job as K-12" in providing service-learning opportunities.

Participants enjoyed learning outside the classroom and acknowledged like Chan that being a reviewer "helps your research [and] teaching because it gives you opportunity to see academic work from other perspectives." Students also agreed that editorial board work was clearly different from community outreach or undertaking administrative responsibilities. Others cautioned not becoming mired in excessive service commitments, pointing out that the dominant, hegemonic university culture would not be supportive.

Demystifying writing for publication. When asked to explain her understanding of how to develop and submit journal manuscripts, Antonia remarked that, before she was on the board, she was aware that "oftentimes what is published is controlled so it does not really represent the extent of knowledge available instead it represents the knowledge that certain people deem knowledge-worthy." Nate shared that "writing and publishing a manuscript was [a] mystery." He described that getting published was "a secret nobody was willing to invite me to learn about." Candy believed that reviewing others' manuscripts "improved her writing." Most of the participants stressed that carrying out the research design carefully and reporting sufficient information was indispensable. They emphasized the importance of becoming familiar with the journal's main purpose and aligning research with the journal's focus. Echoing this point, Stan described writing a manuscript as "an iterative process and conversation, so even if you submit and you get rejected, you know to go back and restructure and find another journal that would fit." He also surmised that writing a manuscript was really a "true dialogue between a group of professionals [and] reviewers [who] are experts [who] hopefully can provide dialogue."

Grappling with prioritization. Antonia had "nightmares about things not being finished." Nate shared how difficult it became to prepare timely reviews when he "was overwhelmed" with practicum and course work. However, he found that having another board member to turn to during this time "was really beneficial." Through this experience, Max found that being organized is essential to being successful in the academy. He observed, "Academic life is hard, and it is a lot of work in massive quantities." Along with developing organizational skills, students learned the importance of allocating time and pre-planning in order to complete reviews and other journal tasks.

Discussion

Five themes emerged from this study of eight graduate students' experiences while serving as editorial board members of an online journal. These themes, described in order of frequency, included the following: Academic Career Enhancement, Practicing Faculty Work, Illuminating Faculty Roles, Demystifying Writing for Publication, and Grappling with Prioritization The themes aligned with components of Betts and Pepe's (2005) five factor theory, including the identification of success (Academic career enhancement and Demystifying writing for publication), awareness (Practicing faculty work,

Illuminating faculty roles, and Grappling with prioritization) and advancement (Academic career enhancement).

The board experience improved students' capacity to see themselves as future academicians. Participants found that opportunities to learn outside the classroom broadened the depth of their research scholarship and teaching (Felten & Clayton, 2011). They expressed healthy academic socialization in comparison to some of their peers. Doctoral students, who report feeling stuck, usually feel a lack of belonging or connectedness to a learning community. Left without a compass, often they are compelled to wander and figure things out on their own. However, for these participants, who represented less than 1% of the college's total number of graduate students, their academic journey was enriched. Moreover, as this study showed, the participants were keen observers and listeners. They attended to the professors' remarks and interactions (Austin, 2002). Unlike Bieber and Worley's (2006) findings, the journal editors actively socialized and mentored students into the academy. The participants spoke at length about those experiences they had and the skills they developed, emphasizing their value and application to future work as members of an academic institution. They expressed gratitude for being mentored in their research and publications. Others described how the collaboration inside and outside of meetings was helpful to easing the requirements of board service and balancing it with their doctoral studies, as well as providing a comfortable social setting.

Convening meetings and conferencing with other students reduced participants' sense of isolation and helped them recognize that their experiences in classes, with professors and other students were not unique: instead, they were quite universal. Observation of the editors' interactions helped them learn the importance of being collegial. They discovered that in the academic world it is not about disagreeing or agreeing: it is about diplomacy and expressing intellectual viewpoints with civility and clarity (Rosser, 2004)

This particular service activity was not a requirement for degree seeking students. Given the students' commitment, attendance at monthly board meetings, constancy with completing reviews, communication with prospective authors, and maintenance of the journal's website tracking system, the process very nearly mirrored some of the service work that university faculty are often asked to do. The participants developed a deeper understanding of how to review manuscripts and acquired insight into publishing an online journal. In some respects, being a board member provided a microcosm of the arduous work that researchers must undertake in order to become published, as it mirrored the tasks that researchers face and the inherent challenges of expressing one's scholarly voice.

The findings suggest that these graduate students benefited from critiquing scholarship, reviewing manuscripts, and understanding the publication process in general. Some of the service experiences were liberating as students came to identify their own conceptions of scholarship. As they acquired a sense of themselves as scholars, they felt affirmed and empowered. Group interactions strengthened the conviction that putting forth their own scholarship was an important contribution to building knowledge in their disciplines.

Societal expectations of the academy have changed as community leaders ask how the university and faculty can contribute to the well-being of its citizens (Austin, 2002). Participants acquired clarity about what types of activities could be identified as service experiences and how they be could be translated into scholarship. The participants also expressed dismay that more of the professors in their discipline were not engaged in service. Initially, participants struggled as they tried to understand what service is, when to accept it, and what its personal value is. They also grappled with their service's value to the institution, as well as colleagues' assessment of their service engagement.

Participants reflected upon the qualitatively different experiences that the board offered in contrast to course work. For example, several participants found the academy unappealing because its political structure marginalized individuals, minority students in particular. Like those students who come to the academy because they believe that it offers a promise to change society, some participants discovered that the institutional structure does not favor the ends they hope for. Several of the participants had learning experiences that inculcated a sense of powerlessness rather than agency, thus highlighting the challenges associated with the four socialization tasks articulated by Golde (1989). Without the benefit of these mentoring relationships, they would not have had the opportunity to publish. In the institution, most students remain unexposed to the processes that show them how knowledge is codified, as well as which knowledge is considered worthy to the educational research community and, thus, disseminated. For some participants, serving on the board refueled an interest in the academy as a potential career. The editorial board experiences provided them with a glimpse of how to become published. In contrast, many of the participants were repelled when they realized that in fact it was often someone else, unknown to them, that assessed the value and credibility of research studies. These discoveries heightened their fear that their own work might be rejected and remain unknown by others. For students who have been historically marginalized, it seems that the board work offered a collegial setting by providing a sense of belongingness and hopefulness and that indeed their

scholarly contributions merited appreciation. Moreover, perhaps the authenticity of the interpersonal interactions and the persistent focus on the board's primary agenda also signaled that there are places in the academy where marginalization, micro-aggression, and disregard for individuals based on racial and ethnic background are not a constant in everyday work life.

Serving as editorial board members helped demystify the process of writing for publication and publishing in a journal. Interactions with the editors, in particular, and with other board members gave credence to students' research interests, affirmed their potential and ability to write, and increased their self-efficacy as scholars. This service learning provided opportunities for student reflection that could deepen the nexus between information processing, hypothesizing, and applying new skills, particularly as several students began to write for publication and experience success. The study findings mirror previous studies that have found service learning augments students' self-efficacy. In a study that explored the effects of service learning and community service on the cognitive and affective development of 22,236 college undergraduates' service, Astin, Vogelgesang, Ikeda, and Yee (2000) found that thirty percent of the undergraduates had participated in course-based community service (service learning) during college, and an additional 46 percent participated in another form of community service. Their findings showed that service participation had significant positive effects on all 11outcome measures of academic performance, including self-efficacy. In a meta-analytic review of the existing evidence on extent and types of change in participants in service-learning programs, Conway, Amel, and Gerwien (2009) found that self-efficacy increased as result of service (Billig, 2002; Eyler, 2002; Yates & Youniss, 1996).

Serving on the board, though unlike community outreach, was another avenue to fulfill service. The graduate student participants acknowledged that universities typically consider service important for faculty while pointing out that colleagues and mentors often caution newer faculty to guard their time and not to over-engage (Griffin, 2013). Their caution about not taking on too many service commitments showed that they were mindful of departmental philosophies and cultural norms (Austin, 2002).

Since the conclusion of this study, it is noteworthy that six of the board members who matriculated with their doctoral degrees have been hired into university settings, and two have attained candidacy.. We make no claim that there is a casual relationship between journal board service and academic placement.

The academic socialization evidenced in this study illustrates that the necessary knowledge, skills, and values that students need for successful entry into a professional career can be acquired via journal editorial board service (Weidman et al., 2001). The findings point to the central role that mentoring and collaboration played in these young scholars' Anticipatory Stage of academic socialization. Although the long-term impact of service engagement on these participants is unknown, serving on the editorial board provided an opportunity for participants to consider how service engagement can be integrated in their academic and personal identities (Griffin, 2013).

This paper presents a case study of eight students who served on an editorial board for an online journal, highlighting what they saw as the benefits of their participation. In conclusion, the findings present an exploration of the way a particular kind of academic service learning is involved in the academic socialization of doctoral students.

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The Impact of Feedback as Formative Assessment on Student Performance

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This article provides an evaluation of the redesign of a research methods course intended to enhance students' learning for understanding and transfer. Drawing on principles of formative assessment from the existing academic literature, the instructor introduced a number of increasingly complex low-stakes assignments for students to complete prior to submitting their final project. Concrete, constructive feedback from either the instructor or peers or both was offered at each stage of the project so that students could have the opportunity to review their work and improve particular aspects prior to moving on to the next assignment. Student performance on each subsequent submission was assessed through the use of a scoring rubric. Although there was significant improvement from one draft of a given assignment (T1) to the next (T2), the instructor's decision not to require a preliminary draft of the final project ultimately yielded mixed results at the end of the course (T3); this serves to highlight the importance of providing multiple active learning opportunities for students by using a progressive scaffolding approach.

For the past ten years, the culminating project in my research methods course has consistently been a research proposal. As early as the first day of the semester, students are given a description of the assignment and a copy of the rubric that will be used to assess their work. All learning outcomes and objectives are student-centered, highlighting knowledge that they will be able to evaluate critically and skills that they will be able to demonstrate upon completion of the course. The first half of the semester is content-driven. Students spend approximately eight weeks surveying various methodologies, comparing and contrasting their utility and function with respect to answering specific criminological questions, with the intention of clarifying their thinking about their own research agendas. Toward the end of that eight-week period, they are expected to submit their research question for approval, a necessary preliminary step in light of the fact that some ideas are too broad, some are too narrow, and some simply do not lend themselves to any kind of empirical measurement. The second half of the course emphasizes skill development; lessons highlight important considerations in conducting literature reviews, choosing a data collection technique, and preparing for data analysis procedures. Every year, I remain confident that students are being provided with all of the necessary resources and skills that they might need in order to complete the assignment. Alas, every year I am disappointed with the results. Some students demonstrate that they are unable to differentiate between a literature review and an annotated bibliography while others are so baffled by the idea of proposing a research methodology that they misconstrue the assignment and invent hypothetical data, reporting their fictitious findings in their papers. As summative assessment measures go, this has taught me one very important lesson: that what we think we are teaching our students is not necessarily what they are learning.

Literature Review

Accordingly, I decided to go back to the metaphorical drawing board and revisit my pedagogical approach. Pellegrino (2006) asserts that understanding the nature of learning is a fundamental step in making curricular and instructional improvements. Specifically, he discusses the reciprocal interplay and alignment that must occur between curriculum, instruction, and assessment. He defines curriculum as the set of knowledge and skills that students are expected to learn as a result of a given course; in a research methods course, for example, this would include the aforementioned foundational details about various methodologies and designs as well as proficiency in information literacy and the ability to communicate effectively in writing. Instruction, according to Pellegrino (2006), refers to the pedagogical approaches and particular learning activities utilized by an instructor to achieve a set of desired learning outcomes. He lists a number of principles about learning and understanding and suggests that the optimal instructional approach affords students opportunities to "learn with understanding" (p. 4) rather than simply to memorize and regurgitate. This is how they can develop a base of usable expertise and experience which might then be successfully accessed in other contexts, allowing for transfer of both knowledge and skills. Being able to organize information into a relevant, meaningful conceptual framework is key, and Pellegrino contends that providing students with multiple opportunities to apply what they have learned is a superior approach to relying upon a singular assignment for the purposes of achieving that goal. Assignments are subsumed under assessment, which Pellegrino describes as the process by which learning outcomes are evaluated as having been achieved (or not). Since the culminating project I had been using for the course was clearly ineffective as a form of

summative assessment, it was logical to conclude that my instructional approach needed to be modified to incorporate new and different learning activities.

Carpenter and Lehrer (1999), in their discussion of how mathematical understanding develops in school-aged children, reinforce the idea that learning for understanding facilitates the likelihood of transfer to new settings and contexts. They posit that this is especially important given the emergence of new technologies on a continuous basis, cautioning that students need to be prepared to solve problems which are currently impossible to anticipate; this can only be accomplished, they argue, if students are encouraged to learn for understanding, a process which encompasses ongoing mental activity through the construction of relationships, the application of existing knowledge, the practice of self-reflection, an articulation of what has been learned, and a sense of ownership that makes the learning process personally relevant. Their recommendation is that learning activities must include first-hand application and practice, a more active than passive sort of learning, so that students become engaged with the material in a meaningful way.

There are multiple observations made throughout the literature on ways to support meaningful learning and teaching for understanding that highlight the importance of scaffolding the learning process and providing constant feedback to students. Darling-Hammond (2008) asserts that using feedback and formative assessment continuously has incalculable implications for effective teaching and learning. She notes that structuring performance-based assessments thoughtfully and concretely allows students to stretch beyond a rudimentary demonstration of their abilities and encourages them to improve upon their own work. Moreover, teachers can benefit from crafting appropriate formative assessment measures by using these as diagnostic tools and becoming more reflective and intentional about their own pedagogical practices, and similarly, students who engage in self-assessment assume greater responsibility for their own learning. She refers to studies across various disciplines which have consistently shown that effective teachers facilitate the process of meaningful learning by scaffolding the learning process, assessing student learning continuously, and providing clear standards and constant feedback (Darling-Hammond, 2008, p. 5).

Earlier work by Perkins (1993) likewise prioritizes the provision of meaningful formative assessment in teaching for transfer and understanding (pp. 34-37). He argues that there must be a combination of active engagement or performance on the part of the students and ongoing, rich, appropriate feedback provided by the instructor (Perkins, 1993, p. 31). While Perkins focused most of his research (1993; 1998) on improving teaching approaches aimed at middle-school children, he was highly influential in describing understanding as a form of performance or action, challenging the prevailing misconceptions that understanding is something that could be known, perceived, or possessed. Accordingly, he recommends using ongoing assessment and informative feedback so that both the teacher and student are able to evaluate whether understanding is actually taking place during the learning process. Wiske (1999) describes this pedagogical approach as a performance view, one which encourages students to spend the greatest amount of time possible progressing from "messing about [to] guided inquiry [to] culminating performances" (pp. 238-239).

The value of providing useful feedback to students, and the appropriateness of the way in which this is accomplished, cannot be overstated. Nicol and MacFarlane-Dick (2006), following a comprehensive review of the literature on formative assessment, propose seven principles of good feedback practice to facilitate the development of student self-regulation and to aid in the active construction and acquisition of knowledge and skills by students. Firstly, they posit that good feedback practice helps clarify what good performance is, possibly by providing students with written documentation outlining assessment criteria that define various levels of achievement; rubrics, then, are key, particularly ones that are clearly articulated and involve concrete, measurable outcomes. Secondly, Nicol and MacFarlane-Dick propose that good feedback practice facilitates the development of self-assessment and reflection in learning; structured opportunities for self-monitoring comprise a critical part of the process. Thirdly, the authors advocate the delivery of high quality information to students about their learning, where quality can be interpreted as insight that focuses not only on pinpointing strengths and weaknesses in student work but also offering corrective, constructive advice for improvement that relates back to the goals of the assignment. Nicol and MacFarlane-Dick further recommend encouraging peer and teacher dialogue rather than viewing learning as a process that involves a unidirectional transmission of information; discussions with the instructor and with classmates may be highly motivational and may also prompt students to view their own work with greater detachment. The emphasis on positive motivational beliefs and self-esteem is at the heart of the fifth principle mentioned by Nicol and MacFarlane-Dick, which suggests crafting multiple low-stakes assignments that are intended to generate feedback for the purposes of helping students gauge progress and achievement rather than to focus on grades as indicators of success or failure. Closing the feedback loop, that gap between current and desired performance, is the penultimate principle presented by Nicol and MacFarlane-Dick, and they specifically call

for providing opportunities for students to resubmit a piece of work following an external feedback cycle to see whether performance has improved. Finally, and consonant with the aims of assessment in higher education, good feedback practice should also provide useful information for teachers that can be used to improve subsequent activities and courses.

Methods

I thought about some of the higher-order thinking skills associated with learning for understanding: application, evaluation, analysis. This is what I wanted my students to be able to do with various data collection techniques, but we seem to have gotten stalled at the lower levels so that their attention was focused on recall, identification, and description: all of those competencies that the literature discussed as being unlikely to result in true learning for understanding and subsequently to aid in the transfer of knowledge. I decided a drastic redesign was called for, and the next time I taught the class, I implemented an entirely new approach. Firstly, I abandoned the use of a textbook, with the rationale that textbooks are too prescriptive. Students become so intent on highlighting and memorizing definitions with a view to regurgitating the information on their tests (the aforementioned passive sort of learning I want to avoid) that they inadvertently become terrified of deviating from anything the textbook says. Thinking independently, therefore, and deciding which methodology would best fit their individual needs, seemingly involves great risk, one which they are reluctant to take. I revised my lecture notes to ensure that important content was covered, but the underlying central message was always simple: there is no single universal "best method" out there, and different strategies may be more or less suited to answering different research questions. I reiterated that message in every new unit, encouraging students to think about their own personalities and preferences in order to determine which methods they found promising (and why).

Secondly, in recognition of the literature cited above, I acknowledged that learning for understanding could only take place if students were provided with opportunities to become actively engaged with course content. The course redesign involved using fewer lecture-based lessons and more interactive strategies. Students were involved in small group discussions, an on-site presentation with the information literacy librarian, and various activities that incorporated the use of social media (including Twitter, Facebook, and in-class polling). These innovations were intended to clarify particular issues addressed in lectures and to highlight possible research-related applications that students had not previously considered.

The third key element of the course redesign, and the one which was studied most intensively for the purposes of this article, pertained to scaffolding and the ongoing use of feedback. Since the research proposal assignment in its original form had repeatedly failed to meet its intended outcomes, I believed that breaking it up into discrete successive steps and working with students to move progressively and incrementally toward the final draft would be a much more sound pedagogical approach. Consequently, students were instructed to complete a number of low-stakes mini-assignments throughout the semester, each of which would garner specific, concrete feedback and would necessitate making revisions prior to moving on to the next. This, perhaps more than any other strategy employed in the course redesign, proved to have a tremendous positive impact on student learning, as Nicol and MacFarlane-Dick had predicted it would, and ultimately comprised the substance of my data collection and data analysis efforts. I intended to document students' grades (as scored by specific rubrics) at three separate points in time (T1, T2, and T3, as described below) and subsequently to utilize descriptive statistics both to note relevant measures of central tendency at each interval and to trace students' progress on individual and aggregate levels from one time period to the next.

In accordance with institutional review board protocol, I took steps to minimize any potential harm to my students during the data collection and data analysis processes. I explained to my class—both at the outset of the semester and midway through, when the progressive low-stakes assignments began in earnest—how and why I had redesigned the course. They were informed that, although they would have to complete the assignments for course-related purposes and for individual grades, they had the option of declining to have their scores (and any qualitative comments gleaned from self-reflection) included in my data collection and analysis efforts; moreover, they were also notified that they could opt out of the research at any stage, even if data had already been gathered at an earlier interval, and that their withdrawal would have no impact on their subsequent grade for the course. They were also instructed that they could decline to participate in the student perception survey that would be administered at the end of the semester. Furthermore, I assured them that their results and comments would be anonymous and that any statistical calculations during the data analysis stage showing progress from T1 to T2 to T3 would not be conducted until after course grades had been submitted for the semester. All students in the class consented to participate and to have their scores and comments included in the final report.

The initial step taken in the implementation of progressive low-stakes mini-assignments was informed by a phenomenon I had observed in previous iterations of the course. Typically, I lectured on the basics and mechanics of literature reviews and asked students if they had any questions, a prompt which was invariably met with a resounding silence. Wanting to understand how they truly felt, I engaged students in one-on-one conversations and learned that many of them feared the "blank screen," that unavoidable time when they would sit down to write their first draft and would have no idea how or where to begin. In order to help them overcome that fear and bolster their internal motivation in the current semester, I delivered the same lecture as before; however, for the following class period, students were told to bring in two of the journal articles they had already identified as useful sources (having submitted a preliminary bibliography for approval the week before) and detailed notes about the main points contained in each. They were then prompted with specific questions to address in their summaries (i.e., what was the research objective in the article? What was the author's hypothesis? What do we know about the methodology used in this article? What findings and conclusions does the author discuss?) and provided with sample papers for examples of transition statements that would reflect a familiarity with the ways in which the articles connected to one another (i.e., they were methodologically similar or possibly sharply contrasted with respect to findings). Class time was then used to work independently on this initial stage of drafting a literature review as I worked my way from student to student to discuss all of their strategies and struggles with them; by the time the class was over, students had a product they could take home with them and to which they could continue to add. That initial "blank screen" obstacle had been overcome.

A few days later, students were instructed to submit a preliminary draft of their literature review, addressing a total of three sources. My reasons for the low number of sources at this early juncture were two-fold. Firstly, I wanted to be able to ensure that students were on the right track and to offer feedback to redirect their efforts if necessary before they got too far into their writing efforts and felt discouraged. Secondly, many of my students were more concerned with the page count of the final assignment than they were with the content of the literature review, and I wanted them to be able to reflect on their own work after summarizing and synthesizing three sources and to see how much more they had produced than they had anticipated. Indeed, some of the same students that had expressed concern about writing a ten- to fifteen-page final paper handed in very thorough, comprehensive reviews of three academic sources that were between six and eight pages in length. Their sheer delight in having written so much so soon was infectious.

The next class session was spent engaging in peer evaluation. I removed any identifying information (such as student name and ID number) from the cover page, made two copies of each assignment, and distributed one copy throughout the class so that each student was charged with evaluating a classmate's paper. The rubric that was provided to students was the same one that I used to score these drafts. Students could earn anywhere from one to four points on a number of dimensions, including assignment basics (i.e., the number, quality, and provenance of the articles cited), content (i.e., summary, synthesis, articulation of research question, and reference page), and presentation (i.e., length of individual summaries measured as a function of sufficiency rather than actual paragraph or page counts, APA format, and grammar and punctuation). In addition to calculating students' grades out of a maximum of twenty points, the peer evaluators were also instructed to make comments on the actual student papers if they believed a sentence needed to be rephrased or if certain paragraphs would be better moved elsewhere, as well as noting general observations and insights on the back of the rubric. Some time was spent at the beginning of the class session to review the importance of constructive criticism. Students were discouraged from writing hostile or negative comments. All evaluator remarks were aimed at helping the writer improve by making specific suggestions, and the importance of framing comments in a positive light was discussed. The intent of this peer evaluation process was not only to give students an additional perspective on their work (other than mine) but also to help the evaluators themselves reflect on their own writing with greater detachment as they highlighted areas of improvement for their classmates.

I then scored the second copy of the students' papers, also with the identifying information removed. I have found that too often I embark on the grading process with certain preconceptions or expectations about the performance of particular students, and I wanted this experience to be as objective as possible. This way, in theory, I had no way of knowing whose paper I was grading. However, given that the class only had twenty-three students enrolled and that preliminary bibliographies had been submitted to me previously, there was a slim chance that I would recall which students were researching which topics and thus connect the paper to the author. In addition to scoring the rubric as the peer evaluators had done, I spent an extensive amount of time reading and rereading each assignment in order to correct as many spelling and grammatical mistakes as I could find and to be able to offer specific suggestions for improvement moving forward. However good or bad the papers were, my comments always began by commending or praising

students on something they had done well, and the tone was intended to remain as upbeat and encouraging as possible, even if the list of items that needed remedying appeared exhaustively long. Grades for the first draft (n=19) were somewhat discouraging (see Table 1), but it was more important to me to point students in the right direction than to have them fixate on the grade they had earned. This was a low-stakes assignment, and the grade would only comprise a small percentage of their final project; what was far more important was that students would take the comments they had been provided by both their peers and by me and make the necessary revisions moving forward. It should be noted that the scores of four students should be regarded as more accurate representations of poor time management skills than of actual performance; two points were deducted for each day that the assignment was late, and for some, this had a tremendously deleterious effect on their initial grades.

Students were given back their papers the following class period and instructed that a second draft of the literature review, this time including five sources, was due the following week. By incrementally adding only a couple more articles at a time, I hoped to keep student anxiety levels low and their confidence and motivation relatively high. I also wanted to capitalize on the momentum we had already built so that they could continue working on their literature reviews while their concentration was optimal and before distractions from assignments in other classes set in. When they submitted their second drafts, I was the only evaluator. Using the same rubric I had used for the preliminary drafts, I noticed an appreciable increase in all scores, even though the number of sources required was greater (see Table 1). The mean percentage change for the students that handed in both assignments (n=19) was 41.6 and the median was 43. The mode, surprisingly, was 65. Along with their revised scores, students were again given very concrete, positively framed feedback. I avoided making statements like "very well written" and chose instead to specify which transitions were particularly effective and which aspects of certain articles were especially clear and easy to follow. I continued to make certain comments on the paper itself as well as outlining general observations and points to consider on a separate sheet of paper, and I allowed for time during the class period when these were returned to students to meet with them individually and address any questions or concerns.

While students continued working outside of class on subsequent drafts of their literature reviews, the focus in class turned to data collection and data analysis procedures. I continued alternating between lecturing and leaving time in class to work on individual projects so that students could review their notes and identify how the key concepts and questions addressed in the lecture might apply to their own work. They submitted reflection journals in which they documented what they learned from reviewing the literature and which techniques appeared particularly promising and/or have been largely underutilized. These reflections were ungraded; their sole aim was to enable me to monitor student progress and continue to offer feedback and advice. By the time we entered the final week of the semester, I felt reassured that each student in the class understood the purpose, nature, and format of the final project assignment and had made significant progress toward completing it.

Results

Sadly, I was mistaken. What I had failed to take into account was that, although students had developed a keen understanding of the requirements of a literature review and had had ample opportunity to reflect on what they would want to propose for their data collection and data analysis procedures based on their research, they had not been provided with the opportunity to put it all together into a preliminary final draft. The essence of what the literature review scaffolding exercise had taught me – namely that practice and formative assessment improves student performance – had not been applied to this final component of the course. Most grades improved between the first draft of the literature review (T1) and the final proposal (T3), with the exception of one that stayed exactly the same. The mean percentage change from T1 to T3 was 42.4, with a median of 28 and a mode of 15 (see Table 2). However, the same trend did not prove to be true for changes from the second draft of the literature review (T2) to the final proposal (T3). Results from this stage were mixed, with some grades improving significantly, others showing only marginal improvement, and still others declining (see Table 2). Subsequently, the measures of central tendency evaluating the percentage change from T2 to T3 were far more closely clustered, with a mean of only 4.2, a median of 2, and a mode of 3.

Two students did not hand in their final proposal, so a comparison could only be made across all three phases for seventeen students. It should also be noted that some of the students who demonstrated the most marked improvement from T1 to T3 still earned below average grades; significant increases in scores did not always amount to excellent quality. Yet a comparison between the final proposal grades during the current semester and those from a previous semester yields somewhat encouraging results. The mean score for T3 during the current semester was 79.6, with a median of 75 and a mode of 68; the last time the course was offered, before the redesign had been implemented and any of the scaffolding techniques utilized, the mean

Table 1
Percent Change in Student Grades from T1 to T2

T1 (out of 20 points)	T1 as Percentage	T2 (out of 20 points)	T2 as Percentage	% Change
11.8	59	12.5	63	6
14.0	70	16.0	80	14
10.0	50	15.0	75	50
9.4	47	15.0	75	60
10.6	53	17.5	88	65
17.6	88	20.0	100	14
14.4	72	15.0	75	4
15.6	78	19.0	95	22
13.0	65	15.0	75	15
9.8	49	14.0	70	43
6.4	32	8.0	40	25
10.6	53	17.5	88	65
8.8	44	14.5	73	65
17.6	88	18.8	94	7
5.6	28	13.0	65	132
8.0	40	13.0	65	63
11.6	58	19.0	95	64
9.4	47	13.0	65	32
10.8	54	15.5	78	44

Table 2
Percent Change from T1 and T2 to T3

T3 as Percentage	% Change from T1	% Change from T2
68	15	7
70	0	-14
79	58	5
67	43	-12
68	28	-29
98	11	-2
83	15	11
96	23	1
75	15	0
72	47	3
80	150	100
95	79	8
71	61	-3
97	10	3
69	73	6
97	67	2
68	26	-15

score for T3 (when n=15) was 76.1 and the median was 72; the mode was 70. It is expected that the inclusion of an additional assignment, namely a practice attempt at the final proposal in its entirety submitted before the true final proposal, might make a meaningful difference at improving overall student performance further.

In addition to these direct measures of assessment to track the impact of the scaffolding approach to the final research project, I also employed a student perception survey as an indirect measure of learning. At the end of the semester, students were asked the following three questions: Firstly, in comparison to other research methods courses, how would you rate your learning in this course? Secondly, which aspect(s) of the course had the greatest impact on your learning? Lastly, which aspect(s) of the course did you enjoy the most? The majority of students (n=19, or 82%) indicated that they learned "somewhat more" (n=10, or

43%) or "much more" (n=9, or 39%) than they had in previous classes, with the remaining four students, or 18%, distributed between "about the same" (n=3, or 13%) and "somewhat less" (n=1, or 4%); no student described their learning as "much less" than other courses. Moreover, students commented that the most meaningful course elements were "seeing how I was doing before I handed in the final paper" and "finding out specific things I needed to work on," suggesting that the scaffolding approach with its successive steps and specific points of feedback were helpful. "Getting to get someone else's take on my paper" and "reading someone else's paper to see what I was doing right" were noted as two of the more enjoyable aspects of the course, although a number of additional remarks pertained to the students' happiness at "getting to use my cell phone in class" and "seeing how what we were learning could be applied to real life things like Twitter," suggesting that the active learning strategies focusing on social media are also promising approaches to explore further in the future.

Finally, a thematic analysis of qualitative data gathered from students' reflection journals, specifically about the literature review assignment, revealed further encouraging insights. Six students reported feeling that the assignment was worthwhile and represented time well spent. Comments included such statements as, "This definitely wasn't busy work. I feel like I really got something out of it." Another student wrote, "I thought it was going to be a pain to hand in draft after draft but it [sic] actually end [sic] up getting a better grade in the end." Five students remarked about the usefulness of the peer evaluation process. Observations such as, "I wasn't happy at first about having some other person read my stuff but what they wrote was really good. It made me see what I was doing wrong when I thought I got it," revealed that feedback from peer evaluators was largely regarded as helpful; likewise, such statements as, "I never really got the whole point of reading my paper over and over to catch typos like you tell us to, because I figure spell check catches stuff. But then you see someone else's paper and you're like it's really distracting to have to keep circling spelling mistakes," demonstrated that serving as a peer evaluator facilitated students' own self-reflection. Two students reported struggling with writing a literature review, with one mentioning, "I still don't get it," and the other stating, "This is really confusing." Since my intention was to promote learning for understanding, I found these comments worrisome. However, given that no additional information was provided, ascertaining the source of these students' confusion was problematic. I tried to solicit more details by asking questions during the journal review process, but none were forthcoming.

Discussion

The process of redesigning my research methods course to align more closely with each of the principles of good feedback practice outlined by Nicol and McFarlane-Dick (2006) and to facilitate greater student learning for understanding confirmed some beliefs I had already held and revealed other important considerations. Firstly, the construction (and dissemination) of clearly articulated rubrics that detail concrete rather than vague concepts and outcomes is vital. Students need to be made aware of exactly what it is that they will be expected to do and how they will be expected to perform. Instructors may find that students will fixate – rather infuriatingly – on the more cosmetic, superficial aspects of the assignment, such as the length of the paper or the point value of each category on the rubric. This is normal, and will begin to subside as students get more involved in the assignment and begin to take ownership of their work.

Secondly, shifting the paradigm from focusing on teaching for information transmission to emphasizing learning for understanding requires relinquishing a certain amount of instructional control. I realized early on during this process that I would probably not be able to cover as much content as I had previously done in other classes, simply because I was devoting class time instead to independent and peer-based work on student projects. Initially this felt worryingly foreign and wrong; how could I possibly be teaching if the students were working quietly on their individual papers? I reminded myself my intention was to foster greater student learning for understanding, and that this type of active, engaged, performance-based process required me to assume a different role. In a sense, I functioned as more of a coach than a teacher, abandoning my strictly lecture-based approach in favor of one that recognized the value of praise, advice, and constructive criticism. I may not have covered as much content in class, but ultimately, more learning took place; moreover, what the students learned was far more likely to be retained and applied in subsequent assignments.

Thirdly, providing a greater number of progressive, low-stakes assignments as opportunities for students to practice and hone their skills prior to submitting a final project does not equate to lowering the bar. The fact that I only required students to address three journal articles in the preliminary draft of their literature review instead of the twelve required in the final paper is not symptomatic of a lighter approach nor of less stringent standards; it merely recognizes that scaffolding an assignment and breaking it down into its composite parts so that students gain a clearer understanding of what is expected enhances the likelihood of learning. Students are less likely to be afraid of taking risks and making mistakes since the assignments are not the be-

all and end-all of their final course grade and, consequently, are far more likely to be receptive to the formative assessment resources with which they are being provided. In other words, they focus on the feedback they have been given rather than the grade they have earned, but only if the feedback is both positive and constructive, if it is framed in a motivational way by both the instructor and their peers, and if the comments offered are both specific and concrete. It should be noted that this practice of offering ongoing formative assessment is invariably time-consuming, particularly if the class is large. Instructors wishing to adopt this type of strategy need to be mindful of the amount of time and energy they can expect to expend reading and rereading student work and providing very detailed feedback.

I will be implementing this same approach to teaching and learning the next time I teach research methods with two minor modifications. I will ask students to keep reflection journals throughout the course so that they can chart their own progress from brainstorming through to execution, that process of graduating from "messing about" to "guided inquiry" to "culminating performances" described by Wiske (1999). I will also insert an additional low-stakes assignment between the second draft of the literature review (T2) and the final research proposal (T3), since students clearly need to have the opportunity to practice assembling their final paper and receive—and respond to—feedback on it before submitting a higher-stakes version that comprises a significant proportion of their overall grade. Otherwise, although the literature review contained within the paper is much improved, the other sections may be alarmingly poor. Unsurprisingly, if students have come to rely on the value of formative assessment, failing to provide that for them when it matters most seems a woefully ineffective practice.

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Developing a Teacher Identity: TAs' Perspectives About Learning to Teach Inquiry-based Biology Labs

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Becoming a teacher involves a continual process of identity development and negotiation. Expectations and norms for particular pedagogies impact and inform this development. In inquiry-based classes, instructors are expected to act as learning facilitators rather than information providers. For novice inquiry instructors, developing a teacher identity may be fraught with contradictions. Inquiry-based learning approaches have been widely adopted in university biology laboratory courses. Teaching assistants (TAs) teach the majority of these labs. Despite TAs' importance in university science instruction, we know little about their teacher identity development. This study analyzes interviews and written reflections to explore how teaching science as inquiry figures into TAs' teacher identity formation. Through five case studies, the study characterizes the trajectories of TAs who made or did not make inquiry teaching practices their own. Most TAs made progress toward developing an inquiry-oriented teacher identity by shifting their focus to student learning. These TAs came to see their students as doing science rather than simply participating in a lab class. Findings also highlight beliefs that conflict with inquiry practices in order to inform strategies to support TAs' changing conceptions about science teaching and the development of inquiry teacher identities.

Teaching assistants (TAs) play an important role in university science instruction, especially in terms of teaching laboratory courses. In recent years, laboratory courses have frequently been the focus of education reforms. Inquiry-based learning is a pedagogy that has been adopted in many college biology laboratory courses (Beck, Butler, & da Silva, 2014; Sundberg, Armstrong, & Wischusen, 2005). This active engagement instructional approach engages students in problem solving as they develop and test their own hypotheses (Chinn & Malhotra, 2002; Minner, Levy, & Century, 2010). In inquiry-based labs, students take more ownership for their learning, including information-seeking and building conceptual understanding, while supported by the instructor's guidance through questioning and facilitated peer learning (Minner et al., 2010; Winter, Lemons, Bookman, & Hoese, 2001). This pedagogy is more authentic to the practice of science research than traditional "cookbook-style" lab curricula (Sundberg et al., 2005). Moreover, numerous benefits for student learning have been documented (Beck et al., 2014 and references therein; Brickman, Gormally, Armstrong, & Hallar, 2009), and graduate TAs enhance their own research skills as a result of teaching inquiry-based labs (Feldon et al., 2011). We have some knowledge about pedagogical development strategies to best support TAs' implementation of inquiry (Gormally, Brickman, Hallar, & Armstrong, 2011; Hughes & Ellefson, 2013; Miller, Brickman, & Oliver, 2014; Winter et al., 2001; Wyse, Long, & Ebert-May, 2014). However, our knowledge about TAs' lived experiences of learning to teach science as inquiry is limited (Volkmann & Zgagacz, 2004). In particular, we know little about the trajectories of TAs developing teacher identities through this process.

Becoming, and in fact being, a teacher involves a continual process of identity development and negotiation (Eick, 2009; Simmons et al., 1999; Saka, Southerland, Kittleson, & Hutner, 2012). Teacher identity formation serves as a touchstone for teachers, a foundation for making professional decisions and guiding classroom teaching behavior (Eick, 2009). Settlage, Southerland, Smith, & Ceglie (2009) describe teacher identity development as "a continual project of forming and reforming oneself." Identity is ongoing construction; it is neither singular nor static (Gee, 2000-2001; Varelas, House, & Wenzel, 2005). Identity development can be considered as a trajectory that an individual constructs from her experiences in her lived worlds, allowing her to be recognized as a certain type of person (Holland, Lachicotte, Skinner, & Cain, 1998; Saka et al., 2012; Settlage et al., 2009). Beginning to see oneself as a teacher is radical departure from one's long-term identity as a student.

Expectations and norms for pedagogy impact and inform teacher identity development (Varelas et al., 2005). In inquiry-based classes, instructors are challenged to acclimate to atypical expectations for student-teacher roles, to facilitate rather than instruct: facilitating group dynamics to support peer learning and facilitating discussion to reveal student thinking (Gormally, Sullivan, & Szeinbaum, 2016; Gormally et al., 2011; Winter et al., 2001). Most novice instructors have never experienced inquiry-based learning themselves as learners. So, depending on their learning histories, instructors may not have memories of role models to leverage as they develop teacher identities. Additionally, some instructors may be uncomfortable with the "messiness" of inquiry as students work to find their own solutions (Crawford, 1999). Therefore, for

novice inquiry instructors, teacher identity development may be fraught with contradictions. Yet these contradictions in themselves are not inherently problematic. In fact, if these contradictions are discovered, examined, and discussed, they become opportunities for learning and reflection (Varelas et al., 2005). Moreover, these teaching practices potentially align well with TAs' (those of whom are graduate students) burgeoning identities as scientists.

Teacher identity development is also influenced by one's beliefs about teaching and learning. Though many TAs are novice teachers, they may hold deeply ingrained beliefs about teaching and learning developed during their "apprenticeship of observation" as students themselves (Lortie, 1975). These beliefs may reflect teacher identities, for example, seeing one's self as the "keeper of knowledge" or as a "collaborator learning with students" (Simmons et al., 1999). Understanding teachers' beliefs can also be important for predicting classroom decisions (Luft & Roehrig, 2007) about classroom management and curricula (Pajares, 1992). This is important because TAs' long-held beliefs may be in conflict with essential tenets of inquiry, e.g., shifts in teacher-student roles such that teachers are not the major source of authority or information (Meyer & Crawford, 2011). While beliefs do not necessarily always translate into teaching practices (Crawford, 1999; Luft et al., 2011), beliefs are important as they may structure *how* as well as *what* novice TAs learn about teaching (Crawford, 1999).

While there is a wealth of literature about pre- and in-service K-12 teachers' pedagogical beliefs and inquiry teacher identity, we know little about TAs' teacher identities. TAs' career trajectories, unique dual-identities as scientists and educators, and teacher-training contexts are markedly different (Brownell & Tanner, 2013). This project was driven by the desire to learn from TAs in order to more effectively support them as they develop as teachers. Additionally, knowledge about TAs' teacher identity development and beliefs can inform more effective pedagogical development programs. The project focuses on TAs teaching introductory biology labs, who have a large but often 'underappreciated impact on future citizen scientists' (Gardner & Jones, 2011; Sundberg et al., 2005). These labs are characteristic of large universities: large student enrollments, multiple lab sections, and novice TAs. The project's intent was to listen to TAs' voices—their lived experiences of learning to teach science as inquiry—in order to understand their developing teacher identities, ultimately with the goal of better supporting TAs to teach inquiry. The following research questions guided this study: How do TAs describe who they are as teachers? How does teaching science as inquiry contribute to their teacher identity? What is the trajectory of their teacher identity formation?

Methods

Study Context and Research Participants

The study was conducted at a large public research university with high research activity located in the United States. The study focused on TAs who taught laboratory sections of two large-enrollment introductory courses, general biology and organismal biology (Table 1). Both labs were guided inquiry-based, utilizing questioning to guide students through the experimental process (Brickman et al., 2009). Research participants were recruited at the beginning of Fall 2011; a total of 22 TAs participated (Table 1). Participants were asked to choose pseudonyms. Most research participants (21 of the 22) had never been a student in an inquiry-based laboratory class.

Each TA taught two lab sections of the same course, teaching in pairs. Most often, TAs taught with two different TAs for their two labs. TAs for both labs were supported by weekly 1.5-2 hour laboratory preparation meetings (hereafter referred to as *Lab Prep*). Both Lab Preps were facilitated by the lab course instructor (the author). About 25-30% of both Lab Preps involved reflective professional development, including discussion and activity related to inquiry teaching practices (e.g., facilitating group dynamics). Reflective professional development included responding to reflective prompts in either writing, small group discussion, or whole Lab Prep discussion. For example, reflective prompts during week 2 of Lab Prep included, "What did you learn about teaching?," and, "What did you do to begin to get know your students?" During week 3, we discussed the prompt, "How do you know when your students are learning and what is your role in this?" For the majority of the Lab Preps, TAs discussed how to support student learning in tandem with the upcoming lab activity (e.g., identify potential experimental designs; anticipate challenges; brainstorm questions to guide students).

Data Collection and Analysis

A narrative approach was used to understand TAs' experiences in their "particular lived world" of teaching biology (Holland et al., 1998, p.42). Moore (2008) eloquently describes two pertinent benefits of narrative research: first, "it gives access to privileged information" and second, "the process of engaging in discussion about teaching provides…opportunities to reflect on past experiences learning, teaching, and developing as science teachers" (p. 688). Studying TAs' development through narratives 'gives access to privileged information' that has been relatively unexplored but is critical for improving TA preparation.

Table 1
TA Profiles

TA	Prior teaching experience	Course taught
Beth 4th year undergraduate student European-American Female Career goal: M.D.	Organized an after-school tutoring program serving primarily Spanish-speaking middle school students for 2 years during high school.	Intro organismal biology
Knox 4th year undergraduate student Asian-American Male Career goal: M.D. or medical researcher (PhD)	Peer-tutor for a number of introductory science classes at another university attended prior to State Tech. Concurrently a TA for a lecture-based recitation class in another science department for the 3rd semester.	Intro organismal biology
Quanah 1st year graduate student European-American Male Career goal: PhD/faculty	TA for 2 biology courses during his baccalaureate degree, which he completed at an international university	Intro organismal biology
Samantha 1st year graduate student Indian Female Career goal: PhD/faculty	Informally tutored students while in college	General biology
Sarah 3rd year undergraduate student Indian-American Female Career goal: M.D.	None	General biology

Four sources of data were utilized: written reflections, videotaped self-guided narrative interviews (TAs self-interviewing), semi-structured interviews (TAs interviewed by the author), and a researcher reflective journal. TAs wrote pre- and post- semester reflections in response to open-ended prompts about teaching and learning (Appendix A). During the first and last weeks of the semester, TAs individually conducted a videotaped self-guided narrative interview (Appendix B). TAs responded to interview guide questions about interest in studying science, learning experiences, beliefs about teaching and learning, self-conception as an instructor, and classroom experiences. Self-guided interviews were modeled after participatory videos (Prosser, 2011) as an opportunity for TAs to reflect and reconstruct their beliefs about teaching (Patton, 2002). TAs viewed their pre-semester video prior to recording their post-semester video, an additional opportunity for reflection. All TAs participated in the self-guided interviews as part of Lab Prep. Research participants' videotaped self-guided interviews were transcribed.

TAs were interviewed by the author at the end of the semester. The semi-structured interviews, lasting about 45 minutes, began with questions to elicit TAs' initial interest in science, and they included general questions that focused on TAs' experiences in science learning, beliefs about science teaching and learning, and lived experiences of teaching inquiry. A basic interview guide was used; however, the informal nature of the conversations allowed TAs to take the conversations in different directions given their own experiences (Appendix C). Interviews were audiotaped and transcribed.

Transcripts of interviews and self-guided interviews were read and coded with the research questions in mind: How do TAs describe who they are as teachers? How does teaching science as inquiry contribute to their teacher identity? What is the trajectory of their teacher identity formation? This was an iterative process, with codes identifying categories related to inquiry teaching and beliefs about teaching

and learning and teacher identity. Data was coded around stories TAs shared. A second level of analysis was conducted to classify the coded data using the teacher-centered to learner-centered typology developed by Luft and Roehrig (2007) from their Teacher Beliefs Interview (Table 2). Then, within-case and cross-case tables were constructed to explore, describe, and analyze the data (Miles & Huberman, 1994). The tables were used to consider TAs individually and collectively, to identify similarities and differences between TAs' experiences, and thus to select case studies.

Table 2
Representative Examples of TAs' Beliefs About Teaching and Learning, Classified Using the Teacher Beliefs Interview Typology (Luft & Roehrig, 2007)

Type		TA Beliefs	
Student-centered	Traditional (info transmission)	"I think the best way for [students] to learn is to make sure the teacher knows a lot about the topic. [I]f you know a lot about a certain topic you can throw out random facts and hopefully keep their interests. But I think they learn best if the teacher is prepared." (Knox)	
	Instructive (providing experience; teacher decides)	"…And you have spoken about forty minutes actually initially and [students] are still like 'why are we doing this again?' So at those points you have to explain to them why they are doing it and what exactly they are looking for this time. So even if you explicitly told it to the whole class sometimes you have to come and reinforce it [with small] groups. Some concepts are I guess hard." (Samantha)	"After we talked about the different types of crosses, we talked about how to set up all the crosses so what I think went well was the students knew what they were doing. I think my co-TAs and I did a good job of telling them exactly what you do. So there was no question about what to do and why they were doing it." (Sarah)
	Transitional (Teacher/student relationships; affective responses)	"[W]hen I walk around I just talk to them because they are just so excited about what they are doing. And they have all these different reason for why it couldn't work and they always want to try it again. And so I like that they are all motivated and they work together really well." (Sarah)	
Teacher-centered	Responsive (Collaboration, feedback)	"They learn to appreciate [their group members] as a valuable source of information and that is very important because at this stage in life they are going to realize that 'you know my teammate is going to be able to help me and I don't have to always run to the TA." (Samantha)	"I think the most important thing they're trying to learn in this lab is how to ask a question, how to address that question, and how to reflect upon it, and what it means to the actual concept, and learning the scientific method of experimentation, developing a hypothesis, how to analyze your hypothesis, and how to tie it back to the question you're asking." (Quanah)
	Reform-based (Mediating student knowledge, interactions)	"That's the whole point of the inquiry-based lab: to allow them freedom to look at whatever they wanted. They had to understand the material to come up with these really creative ideas." (Beth)	

Table 3
Summary of TAs' Conceptions of Their Teacher Identities

	Quanah	Beth	Samantha	Sarah	Knox
Motivations for teaching	▪ Inspire students to be passionate about biology	▪ Inspire students to be passionate about biology	▪ Wants to do a good job	▪ Inspire students to be passionate about biology	▪ Leading students in class ▪ Getting to know students ▪ Revisiting biology content
Evolution of teacher identity	▪ Shift to sharing control for learning with students ▪ Seeing science learning as problem solving	▪ Shift to sharing control for learning with students ▪ Shift in sense of responsibility for sparking students' interest ▪ Shift to become facilitator of group dynamics	▪ Shift to sharing control for learning with students ▪ Seeing science learning as problem solving ▪ Shift to become facilitator of group dynamics	▪ Shift in sense of responsibility for sparking students' interest ▪ Developed more confidence	▪ 'Already knew about grading and things like that from being experienced in TA-ing.'
Teacher identity	▪ "a big brother" ▪ "want to get my students' fire for biology going"	▪ "I don't act like I'm smarter than [my students] to be a good TA. I talk to my students like they're my friends."	▪ "I'm approachable." ▪ "I learn from my students." ▪ "I feel less and less like a teacher and more like a student who is guiding them."	▪ "I'm enthusiastic." ▪ "I use simple language to break down ideas."	▪ "I know the material enough to where I can teach it." ▪ "My main strengths are speaking up and being heard by students."

A case study approach was used in order to illustrate in-depth accounts of TAs' archetypal teacher identity trajectories of learning to teach biology as inquiry. Case studies are useful for exploration, as they provide rich descriptions of different perspectives of an event or experience (Patton, 2002). This research strategy complemented the research questions, which were exploratory in nature. Five individuals were selected as case studies: Quanah, Beth, Samantha, Sarah, and Knox. These TAs' trajectories embodied aspects of evolving and resisting becoming a more learner-centered teacher, representing the range expressed by the TAs (Table 3). TAs' developing teacher identities were considered in light of established conceptualizations of teaching science as inquiry ([NRC], 1996).

Efforts to Ensure Credibility and Study Limitations

Efforts to ensure credibility and trustworthiness of findings are particularly important in qualitative research studies (Patton, 2002). Patton (2002); Ely, Anzul, Friedman, and Garner (1991); and Corbin and Strauss (2008) recommend incorporating the following measures to ensure credibility: triangulation of data sources, member-checking by participants, audit trails, feedback from colleagues, and personal disclosure statements about biases and assumptions as related to the research study. Here I describe how I incorporated these measures into this work, beginning with personal disclosure statements.

As a researcher committed to ethical standards and personal accountability, I took conscious measures to insure trustworthiness. I recognized that this was particularly critical I was the solo researcher, author, and facilitator of both Lab Preps. I recognized the inherent power I held as the Lab Prep facilitator and acknowledged from the start of undertaking this project that this could potentially cause conflict or bias. I felt the weight of this responsibility throughout the research process and so examined and approached my various roles with care. This meant I spent much time reflecting on my role and obligation to TAs and research participants, as well as my own teacher identity. For example, both before and after beginning the process of interviewing TAs, I spoke with colleagues familiar with qualitative research methods to anticipate potential conflicts and debrief about the interview process.

I also spent much time reflecting about my teaching philosophy and, consequently, the dynamics of my position in relation to TAs. As the facilitator of the Lab Preps, I approached my role as supporting and learning from and with TAs. I was mindful of sharing my power in order to create an environment in which we were all responsible for learning. The Lab Preps were not neither graded nor courses; Lab Prep was a required part of TAs' teaching assignments. My goal for the Lab Preps was to build a teaching-learning community. I used bell hooks' commentary on building a teaching community as a guiding principle:

> When I enter the classroom at the beginning of the semester the weight is on me to establish that our purpose is to be, for however brief a time, a community of learners *together*. It positions me as a learner. But I'm also not suggesting that I don't have more power. And I'm not trying to say we're all equal here. I'm trying to say that we are all equal here to the extent that we are equally committed to creating a learning context (Hooks, 1994, p.153).

As a researcher, I worked on the assumption that research participants felt comfortable to choose to participate or not participate, and to share their honest perspectives, explicitly designing the research study in such a way that it was not evaluative. However, I took steps to check and challenge this assumption. First, multiple sources of data were triangulated, including participants' written reflections, self-interviews, and interviews. It should be noted that these types of qualitative data have limitations. Interview data and, indeed, written reflections as well depend on the participant's ability to interpret and respond to a question and articulate their perspective. That said, research methods such as direct classroom observations and surveys were not appropriate given the research questions and were beyond the scope of this study.

Second, research data (all interview transcripts) and the manuscript were shared with the research participants. Participants were invited to comment on the conclusions, and their feedback was incorporated. This member-checking enriched the data analysis and supported the validity of the findings (Ely et al., 1991; Patton, 2002). Third, I also kept audit trails: notes of the study process recorded as a researcher reflective journal. This included notes on the interviews as an additional source of data triangulation. Finally, at multiple stages of data analysis and writing, I asked two uninvolved colleagues to critically review the work to address potential concerns. Together, I think these efforts contributed to trustworthy findings.

Finally, two limitations to this research should be noted. First, despite my best efforts to ensure credible data, it is possible that TAs communicated statements that were biased toward wanting to please me or "say the right thing." Additionally, this study focuses on five case studies. Analysis techniques have been selected with this approach in mind in order to leverage the strengths of case studies while minimizing the possibility that study findings are overextended or generalized where that would be inappropriate.

Results

To address the research questions, each case is organized around *developing a teacher identity:* TAs' evolving beliefs about teaching and perspectives about teaching science as inquiry (Table 3). Then, the discussion highlights key themes that emerged and implications for pedagogical development opportunities.

Case 1: Beth—Helping Students "Forge" into Inquiry

> You need to be open-minded. You need to be a problem-solver. You need to know the material so that you can apply it in any way that they come up with... Inquiry-based, that's what you're trying to do...You're trying to find new paths, or let them forge, but you have to be there to support them (post-semester self-guided interview).

Beth began teaching as a senior (Table 1), aspiring to her elementary teacher's enthusiasm for biology, saying that her own students might think she's "an overactive hamster." As the semester progressed, Beth recognized that engaging students was more challenging than she expected. With this recognition, Beth came to see her role as an open-minded peer-mentor who listens to students' idea in order to share the responsibility for engaging in learning:

> You don't have to act like you're smarter than them to be a good TA... I didn't give them the answers. I think that's one of my strengths, I want them to understand it. I'm also very enthusiastic about it, so I'd like to think I encouraged creativeness…I was open to helping.

"Helping" to Beth meant constructive dialogue between the TA and student, as well as between students. Honing her ability to "think on your feet" to offer critical feedback through questioning for each group's unique experiment was key to this constructive dialogue. Beth also emphasized students' roles as they "forged" into biology: students had to "be willing to talk to one another," to take the first step to volunteer their ideas and constructively critique a group

member's opinion, seeing her own role as actively mediating group dynamics to support this process. Consequently, students took ownership for their experiments, as described in her post-semester self-guided interview:

> That's the whole point of the inquiry-based lab, to allow them freedom to look at whatever they wanted, and it was really cool when they came up with these really creative ideas that really stretched the lab and made it worthwhile for them. Because first of all, they had to understand the material enough to come up with these ideas and second that they wanted to put the time in, because usually the more creative ones were more time-consuming, that they were interested enough to put the time in, was really, really awesome to see.

Beth saw her role change from motivating students by contagious enthusiasm to facilitating students' ownership for their learning (Table 3). She took actions that gave more responsibility and "freedom to look at whatever they wanted" to her students. Moreover, she was "open to helping" by asking questions to offer constructive criticism. By sharing control for learning, Beth supported her students as they "forged" into inquiry, developing "really creative ideas that really stretched the lab."

Case 2: Quanah—Engaging Students in Doing Science

> …I think the most important thing they're trying to learn in this lab is learn how to ask a question, how to address that question, and how to reflect upon it, and what it means to the actual concept, and learning the scientific method of experimentation, developing a hypothesis, how to analyze your hypothesis, and how to tie it back to the question you're asking" (post-semester self-guided interview).

Quanah was beginning his first semester of graduate school as he began to teach (Table 1). Quanah began the semester feeling that he "was the one who was supposed to give them knowledge." At the end of the semester, he described a shift in his teaching stance:

> Now I feel like it's a two way street more… Sometimes the students just have ideas about even a certain thing that they are doing that I hadn't thought about like I hadn't looked at it from that angle. … that's just part of having lots of minds thinking about the same subject…one mind can't think of all the things that two dozen minds can.

Quanah began to see his role as creating a classroom atmosphere in which students felt comfortable asking questions and contributing ideas. He strived to ask questions to "spark their interest, to get their creative juices flowing" and "to get students' minds going." Quanah, like his own teachers who "got his fire going," wanted to inspire students to think outside of the box, "but not directing or guiding them." Like Beth, he noted the importance of being able to "think on your feet" to brainstorm questions to support students through trouble-shooting experiments. He saw his students learning in moments as they wrestled with problems, thinking through what happened in order to redesign their experiments:

> And then they are like, 'This is going wrong,' and then I will say, 'Well, think about why it's going wrong' and then try to push them along. And then when they get it, when they try it again and it works out because of what they altered, then I think they probably learned best then. I don't know necessarily if it's better to get it right the first time 'cause then you didn't consider all the angles, you just considered one, and it was right.

He contrasted how students learned through thoughtful trial and error in an inquiry-based lab with traditional step-by-step lab activities, explaining that in the latter case, "It's really easy for people to not learn anything…I don't think it really requires much abstract thought."

Quanah appreciated that students "being willing to talk to one another" was key for a group to work together successfully. Unlike Beth, however, who saw her role as a TA as facilitating group dynamics, Quanah expected that the responsibility for developing this "good group chemistry" rested with students. He explained that he was not sure how group chemistry developed, that perhaps it depended on the particular mix of students or if students happened to be friends outside of class. Relatedly, his most challenging teaching moments were when students were disengaged, and he struggled to determine his role in this process.

As Quanah became more learner-centered in his teacher identity, like Beth he began to share control for learning with his students (Table 3). While he recognized the importance of group dynamics, unlike Beth he did not recognize how he as a TA might shape group dynamics. However, Quanah recognized that his students had the opportunity to learn science in the way that scientists do science. He saw that his students were learning, especially in moments that involved failure, when students recognized, "this is going wrong." Quanah saw his role as using questions to support students through problem-solving.

Case 3: Samantha—"Science is Done in Collaboration."

> I understand that some people can't work in a group so I talk to those people who can't gel in a group…I explain to them that's not the point, it's not a question of whether you can do it alone, it's a question of working with people— that is a skill you have to acquire. And the sooner you acquire it, the more you adjust to people, the better it is for you, because science is done in collaboration…You have to talk to people. You have to find out flaws. When you talk to people you find out a hundred million things that you didn't think of (end-of-semester interview).

Samantha was a first-semester international graduate student when she began teaching (Table 1). Samantha began the semester so nervous that she would follow a checklist—"I had to do ABC, have I done it, tick, tick, tick. Go to D"—in a mechanical way to be sure that she had covered all the content. As the semester progressed, her role shifted:

> I feel like less of a teacher and more of a student who is sort of guiding them rather than a teacher. 'Cause a teacher sort of has a fixed role and tells them 'these are the things' and is very stern in my head. It may not be true. But I feel like less of a teacher now.

Like Beth and Quanah, she began to develop her ability to think on her feet to help students to problem solve. Like Beth, Samantha described that her interactions with groups varied depending on whether or not students were making progress in carrying out their experiment. Samantha, like Beth, noted the importance of being open-minded through this process, being willing to incorporate ideas that are different from your own. Samantha noted, "Even though you are teaching this course, you can learn a lot from your students."

Samantha appreciated the realistic perspectives about the nature of science that her own teachers had shared. She sought to share this perspective with her own students, particularly during challenging lab activities. Like Quanah, she recognized these moments of failure were also moments for learning:

> I had to constantly reassure them and tell them that that's how science is done. Failure is a part of the process. You have to learn from the failure; you can't be all upset. Let's see what you can take away from this...we had to basically get them out of their frustration and then tell them that it's okay if things don't work out, that's how it normally is…Sometimes there may not be something that you can salvage from it. That's fine.

Like Beth, Samantha saw collaboration as the key to successful problem solving and recognized her role as helping students to develop an effective group dynamic. Samantha told stories about "keeping an eye on" the dynamic: monitoring and intervening to model effective group behaviors. Samantha explained that students have to learn to listen to people, and "bringing them to this level has to be mediated by a third person":

> The most important thing is to hear what the other group members have to say. There are some groups in which just one or two people get away with talking because they are the assertive ones. They say 'we want this done, we are working on this hypothesis.' There might be four hypotheses on the table but no one will hear them…it is good if you catch it and say, 'hold on there I want to actually listen to what the other people want to say. And maybe they have a better idea than you. I'm not saying your idea is bad but I want to listen to the other ones.

As Samantha became comfortable teaching in the classroom, she described teaching practices that were shifting toward learner-centered. Samantha viewed collaboration as an essential part of what it means to do science (Table 3). Consequently, Samantha viewed her role as facilitating and modeling effective group behaviors in order to help her students to establish collaborative working groups to really do science.

Case 4: Sarah—From "Information Overload" to Thinking about Student Learning

> When I was learning biology...I learned a certain way…and I'm very thorough in what I'm doing. But I feel like when I have to teach it, sometimes the way I learn might be a little overwhelming for some people...And when I used to [teach in that way] …I realized that a lot of them got a little lost. So now as I'm teaching, I realize I kind of need to break things down…So teaching has kind of made me think of other perspectives to learn the concepts" (end-of-semester interview).

Sarah was teaching for the first time as a third year undergraduate (Table 1). At first, Sarah saw her role as being a source of information for students. She began the semester with trepidation about her ability to take on this role, concerned about answering students' questions effectively: "I won't be seen as a very knowledgeable source to the students." She began with the belief that enthusiasm was key to sparking students'

interest. However, as the semester progressed, Sarah, like Quanah, recognized that her enthusiasm alone was not enough to engage students. She identified this recognition as the most important thing that she learned:

> I had all these goals about motivating all my students and making them all into biology majors and become so passionate about biology like I was... But really what I've learned, realistically speaking, it just doesn't happen that way. There are many of my students who just want to get out of there as quickly as possible... And so probably the most important thing that I've learned is that it's not really my job to engage students, it's to present the material, and if they get engaged along the way, that's great, and I should do my best to facilitate engaging students, but I stopped beating myself about it when they didn't engage themselves.

While Sarah expressed a shift in her sense of responsibility for engaging students, she struggled with how to engage students in learning. Sarah identified that students' interest in the lab activity was a critical factor affecting a group's ability to work together. She continued to rely on her own enthusiasm to engage her students in learning biology, but she also described working to be more effective at what she saw her role to be, "to present information" by providing examples to relate concepts to students' prior knowledge, "to make biology seem to them like something that they could use in the future, that makes sense, you know, relevant to what they are studying."

Unlike Beth, Quanah, and Samantha, Sarah did not express a shift toward sharing control for learning, though she identified a change in her sense of responsibility for students' successes or failures. She explained that the biggest challenge she faced in her first semester of teaching was reconciling the feeling that "I want all my students to do well, so not having […] perform adequately in class is another challenge, because I have to make it less personal."

As the semester progressed, Sarah recognized that her strategies for learning differed from strategies that worked for her students. Sarah was able to function on "information overload," but her students understood new ideas better when she broke biological concepts into smaller chunks of information. As a result, Sarah began to incorporate multiple strategies to help her students learn biology. Describing herself as an auditory learner, she began to step outside of her comfort zone, using diagrams and graphs to communicate ideas. Sarah included relevant examples to connect concepts to everyday issues and to show relationships between biological concepts. She shared one story where a group of students were struggling to understand a concept. After Sarah gave them a number of "farfetched examples" to illustrate the concept, the students started explaining the concept, demonstrating that her examples helped them understand.

At the beginning of the semester, Sarah was concerned that she wouldn't be able to answer students' questions, that she "wouldn't be seen as a very knowledgeable source to the students." As the semester progressed, Sarah's descriptions of her teaching practices began to shift toward learner-centered approaches. Significantly, she recognized that the strategies she used to learn biology were not effective for her students. Sarah began to think about how her students learned, and she described planning to teach with this in mind. Her role as the keeper of knowledge, "a knowledgeable source" shifted as the semester progressed to a transitional, more learn-centered stance as consideration for student learning shaped how she explained concepts (Table 3). However, Sarah continued to see her role as the person who provides the explanations.

Case 5, Knox: Developing an Atmosphere of Approachability

> I think I am a better speaker and have really worked to improve the way students see me. I want to be on their level by understanding their problems, but I also want to maintain that connection that lets them know I am the person to come to when they have questions. When I speak, people tend to quiet down and listen (end-of-semester interview).

Knox was beginning his fourth year as an undergraduate when he began teaching for his first semester in biology. Knox was a peer-tutor for a number of introductory science classes at the first university he attended. He was also beginning his third semester as a TA for a recitation class in another science department. Knox had little interaction with students in this lecture-based class, explaining that "the students were unresponsive, and [it was] kind of difficult to get them to answer questions that you ask... the students have to be interactive, they can't be quiet all the time. They have to want to learn."

Knox, like Beth, Quanah, and Samantha, emphasized the importance of "thinking on one's feet" as a TA, specifically, being a "quick thinker, a creative thinker." However, Knox's explanation for why this ability was critical differed substantially from the other TAs' understanding of the importance of this skill:

> [Recalling the beginning of the semester] "A lot of the students didn't know how to approach creating an experiment…I would give them ideas and they

> were surprised at how many creative ideas I knew and they were like, 'Well, he's the TA for biology, he probably knows, he probably thinks of a lot of these ahead of time,' but that wasn't true; I literally think of them on the spot. So you have to be a quick thinker, a creative thinker, and that's basically what inquiry-based labs are all about."

Knox saw his role as a TA as being the source of knowledge for students, "being able to answer questions on the fly." He explained that the best way for students to learn was for the teacher to be well prepared: "I know the material enough to where I can teach it to the students and kind of apply it to real-world examples." For Knox, classroom management and conveying a sense of authority was also an important part of his role as a TA. While he sought to be seen as an approachable teacher, Knox simultaneously reinforced his role as the authority, asserting that creating an atmosphere of approachability was important because he wanted to "maintain that connection that lets them know I am the person to come to when they have questions." Further, Knox recognized the importance of student engagement but struggled to engage students consistently. Noting the importance of students working together effectively, like Sarah, he explained that interest in the lab activity was the biggest factor affecting a group's ability to work together:

> I would say that my favorite moment in the class was probably when I noticed that all the students were enjoying the labs that they were doing, because a lot of the labs this semester didn't really engage the students, even though they were inquiry-based, a lot of students felt like they'd rather have a step by step method. So when…the students actually enjoyed the lab… that kind of made me feel good, that I did a pretty good job in teaching them…it felt like to me that they learned stuff.

Unlike the other four TAs, Knox did not believe that his sense of being a teacher evolved as the semester progressed (Table 3). Of the five TAs, Knox began the semester with the most teaching experience. He explained that while teaching biology was a new experience, he had not "learned a whole lot" since he had prior teaching experience, but that he had gained "a bit more social skills in connecting with students" and "refreshed my memory on the basic biology." He commented on differences between his teaching experiences, explaining that he got to know his students in biology "because the day consists of you walking around the lab and making sure they're on track and learning." Knox described:

> I've gotten a little bit more comfortable talking to a large group of students… I've noticed that whenever I speak up, the students tend to settle down and listen to what I say. …My main strengths are probably what I said before: speaking up and being heard by the students... (post-semester self-guided interview).

As the semester progressed, four of the five TAs expressed changes in their views about teaching and learning. While these four TAs' conceptions became more aligned with inquiry tenets, each TA's views as a whole were not consistently learner-centered. Each case highlights one aspect involved in learning to teaching science as inquiry: Beth shared control for learning with students as they "forged" into inquiry, Quanah described the struggle to engage students in the process of science, Samantha facilitated collaborative learning, Sarah began to think about how students learn, and Knox balanced creating an approachable classroom climate with his role as the authority figure. Likewise, their teaching strategies described reflect their shifting beliefs and teacher identities.

Discussion

This study triangulates different sources of data, especially reflective data from TAs to explore and understand the trajectory of TAs' teacher identity formation as they teach biology using inquiry teaching practices. Analysis revealed that despite starting with traditional teacher-centered mindsets, by the end of the semester most TAs have progressed along a trajectory to develop a more learner-centered teacher identity (Table 4, 5). Here, hypotheses about commonalities amongst TAs' trajectories that propelled them to make this progress are discussed. I also discuss questions and hypotheses raised by this case study analysis. Finally, I make specific recommendations for supporting the development of inquiry (and learner-centered, more generally) teacher identities as well as avenues for additional research.

From the very beginning, each TA emphasized that they valued being a good teacher. While they all began with a teacher-centered mindset (Table 4), their conceptions of a "good teacher" included engaging students in learning biology. However, it is important to note that TAs' early conceptions were not closely aligned with conceptualizations of teaching science as inquiry. TAs' early visions illustrated that the weight of learning rested on their shoulders as teachers. By the end of the semester, TAs shifted their thinking from this early, fairly narrow teacher-centric perspective to one that focused on their students' experiences of learning (Table 4, 5). I hypothesize that this shift in focus to students' roles in class and student learning was key

for the four TAs who made big shifts in their teacher identities. TAs' conceptions of a "good teacher" became more complex, expanding from initial concerns about being a reliable source of information to considering how to create an environment for learning in their lab classroom. This perspective shift about what it means to be a "good teacher" has the potential to be leveraged as a tool for reflection for pedagogical development.

For the three most inquiry-identified TAs (Beth, Quanah, and Samantha), analysis suggests that this shift in focus to student learning led them to make lab class a more authentic experience for their students. For these TAs, lab class came to life: they saw lab not simply as a class but as an opportunity for students to really do science. Samantha and Quanah saw their students as doing science, identifying that this process included failure, problem solving, seeking constructive feedback from multiple perspectives, and asking questions: a process paralleling their own experiences of research. Along with Beth, they often emphasized the skills that their students were developing: collaboration, problem solving, and creativity. Making lab come to life also included its share of frustrations, reflecting the frustrations inherent in scientific research. For example, Samantha described one frustrating lab when each group failed to get results:

> I had to constantly reassure them and tell them that that's how science is done. Failure is a part of the process. You have to learn from the failure; you can't be all upset. Let's see what you can take away from this. (post-semester self-interview)

These case studies suggest that TAs (especially graduate TAs) may often leverage their own research experiences in the classroom in order to illustrate the commonalities between students' work and genuine research experiences. Further research is needed to investigate the relationship between TAs' multiple identities as students themselves, teachers, and scientists in order to better understand how we can support the development of integrated research-teacher identities.

Moreover, this shift to seeing their students as doing science, as opposed to working to get one "right" answer in order to finish a lab activity, necessitated sharing control for learning. Sharing control for learning meant that TAs began to value different teaching strategies. Rather than simply being well-prepared to share information with students, Quanah became a TA who "thinks on his feet," not to generate answers, but to develop questions to support students through the process of problem solving. This skill of "formulating and using questions effectively" is a critical component of inquiry teaching practices that many instructors find challenging (Winter et al., 2001). In contrast, Knox, who did not develop an inquiry teacher identity, defined the skill of "thinking on your feet" as brainstorming creative ideas to tell students, reflecting a continued focus on teacher-centric teaching rather than learning.

Table 4
How TAs' Beliefs About Teaching and Learning Changed Across the Semester, Classified Using the Teacher Beliefs Interview Typology (Luft & Roehrig, 2007)

	Traditional (information transmission)	Instructive (providing experience; teacher decides)	Transitional (Teacher/student relationships; affective responses)	Responsive (collaboration, feedback)	Reform-based (mediating student knowledge, interactions)
		Beginning of the Semester			
Beth		x	x		
Quanah	x	x	x		
Samantha	x	x			
Sarah	x	x	x		
Knox	x	x			
		End of the Semester			
Beth				x	x
Quanah			x	x	
Samantha		x	x	x	
Sarah		x	x	x	
Knox	x	x			

Note. TAs often held a mixture of beliefs, as represented by x

Table 5
Representative Example Statements From TAs to Illustrate how Their Beliefs About Teaching and Learning Changed Across the Semester, Classified Using the Teacher Beliefs Interview Typology (Luft & Roehrig, 2007)

	Beginning	End
Beth	Transitional "I want to be likeable I want to be a good TA I've had a lot of bad TAs and they've definitely affected my classes so I want to be a good one…"	Reform-based "You need to know the material so that you can apply it in any way that they come up with. You need to be able to adapt…You're trying to find new paths, or let them forge, but you have to be there to support them."
Quanah	Instructive "My biggest fear would be that I would be an inadequate teacher. That my students or the students I'm teaching don't really learn from me like as much as I'd want them to."	Responsive "I think understanding human social dynamics is almost as important as understanding the material because that's so crucial to how the students learn, and how they learn in groups …being able to communicate to all the members of these groups and getting them engaged is really a lot tougher than I expected. …I've also learned that …it's not just you getting up and lecturing the students, it's got to be a two way interaction for it to work properly."
Samantha	Traditional "You just can't take up a paper that someone has already prepared and just go and talk about it. You need to prepare yourself. You need to have a mental outline. You need to know what you're going to talk about. You just can't go and ramble on… I think teaching will definitely test …my ability to pass on the knowledge that I have gained and accumulated over the years to other students."	Transitional "…not even one group had gotten a successful cross, and that lab was very, very frustrating for me, and I had to constantly reassure them and tell them that that's how science is done. Failure is a part of the process. You have to learn from the failure; you can't be all upset. Let's see what you can take away from this."
Sarah	Traditional [discussing her biggest fear, that she won't be able to answer students' questions] "…because of that I won't be seen as a very knowledgeable source to the students. So my biggest fear would not be making myself seen as an effective teacher to my students."	Transitional So my whole goal this semester was to try to make connections between their everyday lives and concepts in biology to help them understand things a lot better. I made this big elaborate example …And all the students found the example really humorous, they really understood what the concepts were, they were able to relay back to me the information they got from the example…"
Knox	Traditional [discussing his biggest fear, when students ask questions and you don't really know the answer to it] "I try to avoid it as much as I can, but I've learned through my teaching experience that you have to kinda just roll it off, you can't treat it too highly, because you'll end up making yourself looking bad in front of the students…"	Traditional "I've gotten a little bit more comfortable talking to a large group of students. I've noticed that sometimes when I teach with my co-TA that I have to be the one who speaks up in front of the class when it gets kind of noisy. I don't know if I have a loud voice or if I just have this ability to make people stop talking but uh I've noticed that whenever I speak up, the students tend to settle down and listen to what I say."

At the same time, sharing control for learning meant that TAs recognized a shift in classroom authority. When asked to elaborate on the meaning and importance of "portraying a sense of authority," TAs' explanations ranged from teacher-centered ("being seen as knowledgeable by students") to learner-centered (describing the need to be confident and patient when using questions to guide students: "It's not that you don't know the answer, it's that you want students to learn"). Some TAs began to see their roles less as "keepers of knowledge" and more as facilitators, in Beth's words, "helping students to forge." For some TAs, such as Quanah, the role of facilitating revolved around guiding students using questions. For Beth and Samantha, facilitation also included mediating group dynamics to help their students to learn from each other more effectively. Beth's and Samantha's views of their teacher identities developed to support a key assumption in inquiry classrooms described by Winter and colleagues (2001), that "through interactions with their peers students may construct meaningful understandings of the subject matter...students learn by

constructing their own understandings." Additionally, inquiry-oriented TAs reported that they learned with and from their students: a major shift from their earlier information transmission identities. More research is needed to understand what prompts this shift in thinking to share responsibility for learning in the classroom.

While four of the five TAs began to construct inquiry-oriented teacher identities, in contrast, Knox did not make much movement toward an inquiry teacher identity (Table 4, 5). What happens when TAs don't "get" inquiry? In contrast to the other TAs, Knox did not believe his sense of being a teacher evolved during the semester, nor did he appear to incorporate learner-centered beliefs beyond developing a classroom atmosphere of approachability (Tables 2 and 3). Instead, Knox describes his conception of the instructor's role in an inquiry-based lab as providing ideas and examples to students (and see Table 2 and Table 5). Unlike the other four TAs, Knox never shifted his focus to thinking about student learning. One hypothesis that emerged from analysis is that without this perspective shift to reconceiving "good teaching" around student learning, instructors may remain fixed in teacher-centered approaches. For Knox, his focus on further developing teacher-centric behaviors reinforced his role as the information authority in the classroom. This conception of the instructor's role may undermine both the classroom culture needed for inquiry and students' motivation to develop their own experiments.

It should be noted that this study did not include direct classroom observations, so analysis does not extend to interpretations about TAs' enactment of teaching practices (but see Gormally, Sullivan, & Szeinbaum, 2016 and similar work). However, making beliefs explicit can reveal how teachers learn as well as their teacher identity, which can suggest the kinds of teaching practices they implement in their classroom (Luft & Roehrig, 2007). For example, in a teacher-centered classroom, the TA may determine the way in which students come to knowledge by establishing herself as the authority or "keeper of knowledge." Alternatively, in a learner-centered classroom, the TA may see learning as a collaborative process shared with students (Simmons et al., 1999). Understanding the frameworks of knowledge that beginning teachers bring to this process can help us to build more effective programs to support learner-centered teacher development (Luft & Roehrig, 2007; Simmons et al., 1999).

Implications for Pedagogical Development

What does it take to develop a learner-centered teacher identity? Prior to their first inquiry teaching experience, TAs' beliefs about teaching and learning were not aligned with a learner-centered paradigm. Yet findings from this study suggest that instructors new to learner-centered pedagogies can reconceive their teacher identity in a relatively short time. The first step down this path involves examining deeply held and often little explored beliefs about teaching and learning (Volkmann & Zgagacz, 2004), such as the idea that the "dissemination of information and the creation of understanding are the same thing" (Winter et al., 2001). Existing beliefs must be challenged and reconciled to align with tenets of constructivist teaching (Haney & McArthur, 2001). These understandings structure expectations for student and teacher roles, and they may constrain instructors' enactment of inquiry teaching practices. As a result of their own learning histories, many TAs and instructors view the teacher as directing students to be sure students learn what needs to be learned. In this study, findings revealed that one of the most challenging aspects of inquiry teaching for TAs to embrace was recognition of their role as a facilitator of group dynamics to support peer learning and, ultimately, further support for students to take control of their learning. The challenge of helping students work together successfully is a common issue in inquiry classrooms (Winter et al., 2001). Helping instructors new to inquiry to recognize their role in mediating group dynamics should be highlighted in training.

Reflection and support from a teaching community can play pivotal roles in shifting beliefs. In reviewing this manuscript, Samantha noted that her co-TAs were influential in "challenging my belief that I have to know everything." Reflection was a critical component of Lab prep, and each week TAs responded to reflection prompts in writing and/or discussion, for example, "How do you know when your students are learning and what is your role in that process?" As studies of secondary science teachers (Luft & Roehrig, 2007; Simmons et al., 1999) and TAs (Addy & Blanchard, 2010; Volkmann & Zgagacz, 2004) have shown, unless instructors' beliefs about the nature of science are challenged, their teacher identity will remain unchanged. Reconciling beliefs early in graduate training may be key for affecting change in university science education.

Finally, to better support TAs' developing identities as inquiry teachers, TA preparation instructors should also consider whether TAs are currently undergraduate or graduate students. The case studies presented here include both undergraduate (Beth, Knox, and Sarah) and graduate students (Quanah, Samantha). These two groups may approach teaching from different perspectives. For example, undergraduate TAs may be more familiar with their student population and course expectations but struggle to be seen as authorities while teaching their peers, as described by Beth. Graduate TAs are balancing three identities as students themselves in graduate courses, as

new teachers, and as burgeoning research scientists. Consequently, TAs' views toward teaching science as inquiry may be influenced by their particular trajectory in higher education. Faculty who work to support TA preparation, as well as other researchers, would be wise to consider perspective differences between undergraduate and graduate TAs.

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Appendix A

Written reflection prompts

Pre-semester:

1. Tell me about yourself and where you are from. Describe yourself and how you came to study biology.

Post-semester:

1. What have you learned about teaching this semester? Does this change how you'd define teaching and what's involved in teaching?
2. How do you think you've improved or changed as a teacher? (and: if you've watched your videotaped class session—did you see this reflected in that class—and how?)

Appendix B: Self-guided interviews

Pre- & Post- Semester Reality TV-style "Teaching Confessional"

During the first and last week of lab prep, you will videotape your very own reality TV-style "teaching confessional," following a guided list of questions. There are two purposes to this activity: (1) to reflect on your ideas about teaching and learning at the beginning and end of the semester; and (2) to generate subsequent conversation about teaching amongst introductory biology TAs, to build a teaching community. For the purposes of learning to teach, we are going to start the semester by thinking about why we are here teaching and our ideas about teaching and learning. We will end the semester by reflecting on how our ideas about teaching and learning have changed. I expect you will grow as teachers over the semester, and I think documenting that will be fun!

It may help you to have a better sense of what your self-guided interview might be like by considering StoryCorps, broadcast on NPR, to think of yourself as interviewing yourself about stories or episodes in your own life, or to consider reality TV-style "confessionals." Why StoryCorps-style or reality-TV "confessional"? These ideas are in line with the classroom atmosphere we are creating in introductory biology labs—appreciating the value of listening to others and helping students and ourselves to have voices in the classroom—and becoming reflective teachers, to keep improving. Stories about life remind us of our shared humanity, build connections between people, and teach the value of listening. Stories about our experiences thus far in biology can also be useful to consider as our starting point for this semester.

Pre-semester questions:

1. Introduce yourself. Describe how you became interested in studying science (e.g., pivotal experiences that led you to want to study science, and become a ___?)
2. Describe your experiences in learning biology as a student (this can include both good and bad experiences).
3. In your opinion, what factors affect how students learn and teachers teach?
4. What is your biggest fear about teaching?
5. What do you hope to learn through teaching?

Post-semester questions:

1. Describe your favorite moment in the classroom this semester.
2. Describe your worst or most challenging moment in the classroom this semester.
3. What have you learned this semester through the process of TA-ing?
4. How would you describe yourself as a teacher? What are your main strengths as a teacher? In what areas would you like to continue to improve as a teacher?
5. What are the characteristics or skills needed to be an effective TA in an inquiry-based lab? What would you share with new TAs to help them to develop these skills?

Appendix C

Interview Guide

1. I'd like to start by asking you to tell me about yourself, and how you became interested in studying biology. *Potential follow-up questions include:*
   - Were there pivotal moments that led you to want to become a ….?
   - What are your future career plans and do your plans include teaching?
   - What motivates you to want to teach?
   - Do you have prior teaching experience?

2. How has your experience teaching this semester differed from your own experiences in learning biology as a student? *Potential follow-up questions include:*
   - Can you describe what the learning environment was like?
   - How do you think you learn best?
   - How do you know when you've learned something?
   - How do you think your students learn best?
   - Describe your favorite teacher. Why was s/he your favorite teacher?
   - Before we move on to talking more specifically about teaching, is there anything you'd like to add about your experience in learning biology?

3. What are the most important skills a teacher needs to be successful in teaching? Do these skills differ for an inquiry class?

4. What is it like for you to be a TA at this point in your life? What aspects of your life and experience do you think influence how you teach?

5. What affects your credibility or authority as a teacher? *Potential follow-up questions include:*
   - How does who you are affect your credibility as a teacher?
   - Do you think your credibility has changed over the course of the semester?

6. What factors do you think affect how students learn and teachers teach in an inquiry-based lab?

7. What do you think your students have learned that they will take away beyond the lab classroom? What do you hope they take away?

8. We've been talking about your approach to teaching. I'd like to ask you some questions about the lab class that you videotaped this semester (*note: participants were not asked to view video clips during the interview)*. After watching your videotape, what do you feel went well in this particular lab?

9. What did you feel did not go well with the class? *Potential follow-up questions include:*
   - What is the reason you think these problems happened?
   - How would you modify your teaching next time to deal with these problems?

10. What do you think is necessary for successful group work and for students to learn in groups? *Potential follow-up questions include:*
    - Describe a group that worked well together in this class.
    - Describe a group that did not function well in this class.
    - How do the two groups differ?
    - Describe your interactions with both groups.

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Faculty-Student Partnerships in Assessment

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The purpose of the current comparative multiple-case study was to understand graduate students' perceptions of the collaborative construction of course assignments. Data were gathered from the graduate student interviews, class observations, and relevant student artifacts. With this collected data, six case studies were generated. The study revealed that being able to design assignments based on student perceived goals gave these participants a sense of control over their own learning. This in turn encouraged them to take responsibility for their own learning and motivated their involvement. However, some participants expressed that their previous experiences of being dependent on teachers to make decisions for them made it difficult to be fully involved in the assessment process. The current study also claims that student lack of self-confidence in their knowledge and power relations between students hindered some participants from giving feedback to their peers on the assignments. The study draws attentions to the need for a partnership between faculty and graduate students in assessment. In such partnership, the instructor and students jointly own assessment.

Adult learning theory and research indicate that adult students want more autonomy than younger students. Adult students have a deep need to be self-directing; therefore, they resent and resist situations in which they feel others are imposing their wills on them (Knowles, 1980; Knowles, Holton, & Swanson, 2005). Knowles (1995) argues that adults have a deep need to be perceived and treated by others as capable in taking responsibility for themselves. According to Knowles (1980), when adult students participate in making (or planning) a decision (or an activity), they feel committed to it. Cervero and Wilson (2006) also agree that adult student involvement in planning learning activities creates a sense of ownership, helps build motivation, results in more relevant educational experiences, and provides a democratic procedure that is valued by most adults. Adulthood should be understood from the perspective of continuum, and learners in college settings certainly fall somewhere on that continuum (Beaman, 1998). Therefore, those with innovative ideas about impacting higher education can learn much from the literature and theories of adult learning.

The principles of adult learning theories are challenged, however, when the moment arrives for the instructor to grade or evaluate adult learners. Traditionally instructors have been all powerful in the assessment process (Boud, 2007; Boud & Prosser, 1980; Falchikov, 2005; Leach, Neutze, & Zepke, 2001). Typically assessment comprises a number of acts: instructors defining tasks and instructing students in the performance of the tasks; students replicating the prescribed tasks; and instructors judging student's work, marking and grading, and conferring credentials (Leach et al., 2001). The instructor is central to the decision-making in the conduct of this process. According to Knowles (1980), traditional grading and assessment methods, in which assessment is a one-way process from staff to students, are inconsistent with adult's self-concept of self-directivity. Knowles goes further to argue that traditional assessment treats adults as children and shows them disrespect:

> The crowning instance of incongruity between traditional educational practice and the adult's self-concept of self-directivity is the act of a teacher giving a grade to a student. Nothing makes an adult feel more childlike than being judged by another adult; it is the ultimate sign of disrespect and dependency as the one who is being judged experiences it. (p. 49)

Unilateral control of assessment assumed by academic staff reinforces the power imbalance between instructors and students and is driven by the needs of the instructor rather than needs of students (Falchikov, 2005). Unilateral assessment is disempowering for students and forces students to be passive consumers of what is thrown at them (Boud, 2007; Falchikov, 2005). Students come to see themselves as powerless in their own education and see professors as having a majority of power to educate and to produce learning. Manor, Bloch-Schulman, Flannery, and Felten (2010) illustrate two problems that could occur when students perceive professors as having the majority of power to educate. First, the assumption that professors possess all the course-related knowledge and that students have none contributes to a misunderstanding that learning essentially is the transfer of knowledge from professor to students rather than a process that allows making meaning from knowledge. Second, the students' perceived powerlessness in their own education translates into a lack of their taking responsibility for their own education (Manor et al., 2010). Additionally, instructors' unilateral decisions passively affect students' motivation, interest, confidence, enthusiasm for learning, and ability to think independently (Kreisberg, 1992; Shor, 1992; Weimer, 2002), all of which harmfully impact the quality of learning.

It is argued, therefore, that assessment in adult settings needs to be carried out in a partnership between students and faculty (Beaman, 1998; Leach et al., 2001). Assessment of adult students needs to move to "a mutual undertaking" between the instructor and students (Knowles, 1980, p. 49) in which the assessment of learning is "jointly owned by both staff and students" (Boud & Prosser, 1980, p. 26). Leach and colleagues (2001) argue that "adult learners have a legitimate role in an assessment partnership" (p. 293). Consequently, students experience education as something they do, not as something done to them. Shor (1992) argues, "education is not something done by teachers to students for their own good but it is something students co-develop for themselves, led by a critical and democratic teacher" (p. 20). Freire (1993) also emphasizes the partnership between educators and students in a way that "they become jointly responsible for a process in which all grow" (p. 61). To accomplish such partnership, Freire explains, there should be a horizontal relationship between educators and students in which the role of the educator is "to create, together with students," the conditions of learning (p. 62).

Collaborative construction of course assignments is one approach to assessment partnerships. Involving students in creating course assignments embodies Kresiberg's (1992) notion of "power with" relations between faculty and students, in which they both "do" and "act" together and participate in decision-making. Giving students the opportunity to create their own assignments seems to provide the foundations for "diffusing authority along horizontal lines" (Giroux, 1988, p. 39). Involving students in creating their own assignments shifts students from the role of educational consumers to "co-creators of a common life" in the classroom (Hudd, 2003, p. 159). Additionally, Hudd found that faculty-student collaboration in creating assignments was an effective tool for promoting students' participation and their sense of ownership of the class. Collegial partnerships between faculty and students in creating assignments also enhance both student learning and personal satisfaction (Boles, 1999) and increase students' domain knowledge (Vreman-deOlde & Jong, 2004). However, enhancing student participation in creating assignments does not replace instructors' expertise and their role in facilitating learning. It is also important to note that co-creation can be threatening to students who are used to teachers dominating the classroom and thus may be resistant to deviating from this norm (Shor, 1992).

Research abounds with examples of the partnership with students in assessment. Many studies investigated peer assessment (e.g., Cho & MacArthur, 2010; Patton, 2012; Topping, 2009; Weaver & Esposto, 2012), self-assessment (e.g., Tan, 2009; Taras, 2010; White, 2009), and peer feedback (Fluckiger, Vigil, Pasco, & Danielson, 2010; Liu & Carless, 2006; Zheng, 2012). To date, research regarding to student partnership in constructing course assignments is limited. Previous studies that investigated faculty-student partnerships in creating course assignments focused on exploring the design of student-generated assignments (Vreman-deOlde & Jong, 2004), examining the impact of involving students in preparing class assignments on student learning (Boles, 1999; Vreman-deOlde & Jong, 2004), and investigating the instructor experience of co-creation of class assignments (Hudd, 2003). However, little is known about students' perceptions of the collaborative construction of course assignments.

The purpose of the current study was to understand graduate students' perceptions of the collaborative construction of course assignments. The study acknowledges the significance of student perspectives as an important source of information to inform, guide teaching and learning, and build capacity for educational change. The sharing of student perceptions helps increase awareness about the possibility of student involvement in assessment decisions. The current study presents an attempt to minimize the anti-democratic culture of higher education and maximize the democratic and participatory relationship between students and faculty in a graduate program.

Methodology

The qualitative comparative multiple-case study was used to understand students' perceptions of the collaborative construction of course assignments. The case study includes two variants, the single-case and multiple-case study. The unit of analysis (Yin, 2009) in a study can help determine whether a single-case or multiple-case study is appropriate. In the current study, the unit of analysis was EDTECH student participant. EDTECH was a 15-week graduate-level education course at a medium-sized university in the Southwest US. This course was designed to introduce prospective and in-service teachers to research tools that use computer applications. A set of graduate student participants who shared similarities was treated as separate cases. Data were gathered from the graduate student participant interviews, class observations, and relevant student artifacts. With this collected data, six case studies were generated.

This particular class was chosen for the study based on the course instructor's apparent commitment to student involvement in decision-making regarding assessment. Bogdan and Biklen (1992) discuss this approach to case studies in which researchers do not identify the "type" of person they want to interview and look for appropriate examples, but rather they already know a person or persons who inspire a line of inquiry and decide to pursue it. An intrinsic interest on the part

of the researcher is also a common reason for using the case study method (Merriam, 1998).

The Participants

The participants in the current study were six volunteer graduate students with the pseudonyms Tina, Sammy, Sara, Antony, Karl, and Sonia. After securing IRB approval for the study, a recruitment email was sent to all students. Nine students agreed to participate in the study and signed the informed consent forms. However, three students could not participate in the study because of their schedules. The six participants include five doctoral level students—self-identifying Caucasian female (2) and Mexican male (3)—and one graduate student in the education specialist program (self-identifying Caucasian female). The students' ages range from 38 to 55 years.

Data Sources

Interviews. In-depth interviews were conducted to deeply explore the participant's point of view, feelings and perspectives. According to Seidman (2006), in-depth interviewing is an open-ended interviewing method that is used to understand other people's experiences and their "subjective meaning" of their experiences (p. 10). Two in-depth interviews (approximately 60 minute each) were conducted with each participant at the beginning and at the end of the semester. The major stimulus questions within the interview protocol of the students included: What benefits did you get from being involved in creating your own assignments? What disadvantages or challenges? What meanings or messages did you get from involving students in creating your own assignments? A digital voice recorder was used to help collect accurate information from the interviewees.

Observations. Observations are considered essential in qualitative research. They provide the researcher with a rich understanding of the phenomenon being studied (McMillan, 2008). In the current study, the researcher observed naturally occurring practices and class activities in regards to the collaborative construction of course assignments. The class was observed for two and a half hours per week for one semester (15 weeks semester). An observation protocol was used in all observations. This observation protocol includes both the processes of co-constructing the course assignments and the physical manifestations of participants' responses to the learning experience.

Documents. The course syllabus was reviewed to give a better idea of the co-construction process and the course structure. Students' coursework such as assignments and presentations were also collected and analyzed in order to better understand students' responses to the learning experience.

Data Analysis

The data were analyzed using the cross case analysis (Yin, 2009). The students' interviews served as the primary data source. The interviews were transcribed to produce a narrative of each participant. Appropriate information from student coursework (information regarding students' responses to the learning experience and the quality of student work) and all information from the observation field notes were added to the interview narratives. The narratives were then subjected to an iterative analysis process until no additional themes were uncovered. The individual narratives for each participant were compared to the other participants to identify common themes. Comparative analysis was carried out using a matrix approach to allow comparison of similarities and differences across cases (Miles & Huberman, 1994).

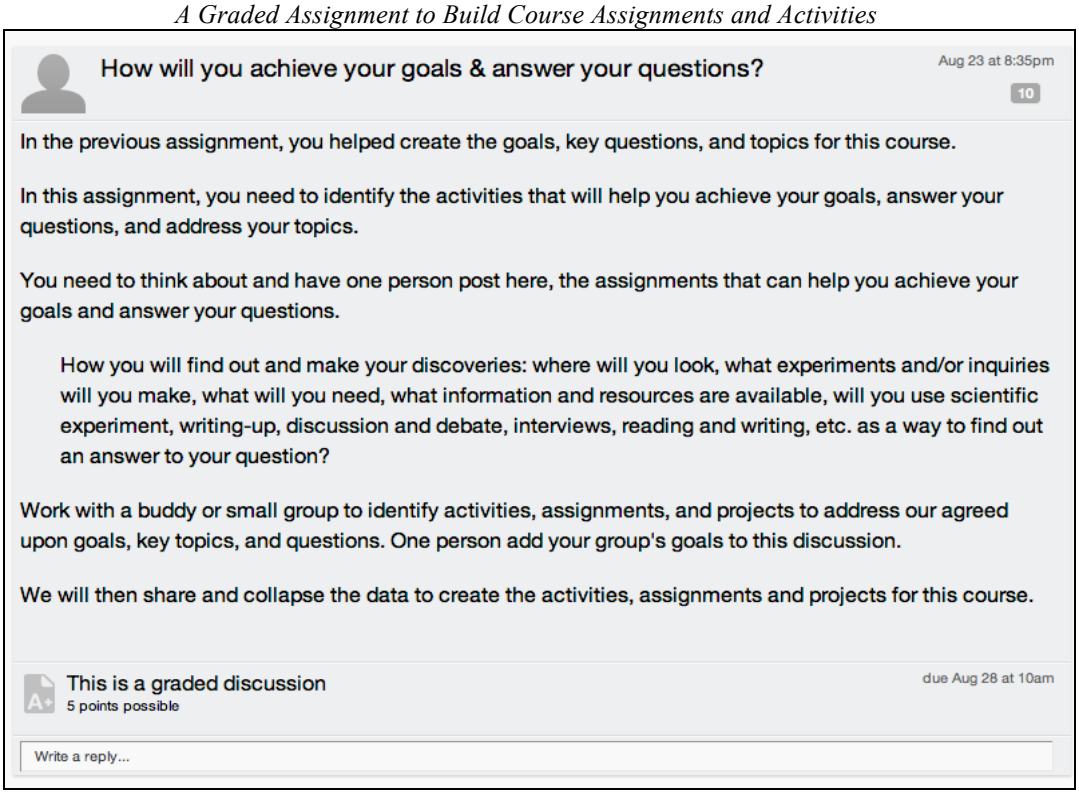
Findings

Generating Course Assignments

In the current study, the graduate students collaboratively created course assignments, developed criteria to judge their work, and made their own decisions about how they wanted to be assessed. In the first class meeting, the instructor explained to the students that they, collaboratively with her, would develop the course content and assessment. Afterward, the instructor distributed the course syllabus, which included the course description, learning theory and instructional methods, recommended readings, and the class policy. No learning objectives, topics, and assignments appeared on the syllabus, and students were told that their first task of the semester would be to design content for the course. Using small group techniques and negotiation as a whole class, the students came up with the course objectives and topics. The instructor and the graduate students spent two weeks collaboratively constructing the course content and assessment.

In order to help students in the process of building course assignments, the instructor designed specific instructions in the form of a graded assignment (see Figure 1). The students were asked to work in groups for 30 minutes to brainstorm ideas for assignments to address the agreed upon objectives and topics. The students then gathered as a whole class to discuss the ideas they came up with. The instructor and the students engaged in what the instructor called "collapsing the data", where they searched for common themes in students' ideas for assignments. Using "collapsing the

Figure 1
A Graded Assignment to Build Course Assignments and Activities



data", the instructor and the students identified four assignments that captured students' ideas: Reading Log, Doc Journey Timeline, Research Tools Evaluation, and Research Paper.

After the students and the instructor agreed upon the assignment topics, they negotiated how their performance could be assessed. In order to help students in the process of determining how their learning could be assessed, the instructor designed specific instructions in the form of a graded assignment (see Figure 2). Collaboratively, the students and the instructor created the performance criteria for assessing the Reading Log, Doc Student Timeline, and Research Tools Evaluation assignments. For the Research Paper assignment, some students expressed their desire to have peers to review their papers. During the class meeting, the instructor negotiated with students about whether they would like to grade each other's work or provide feedback for improvement without giving grades. The students chose to provide written feedback to each other based on a rubric provided by the author. The instructor invited students to choose two peers that they would want to review their papers. Based on the negotiation process, the instructor formatted instructions for the peer review assignment.

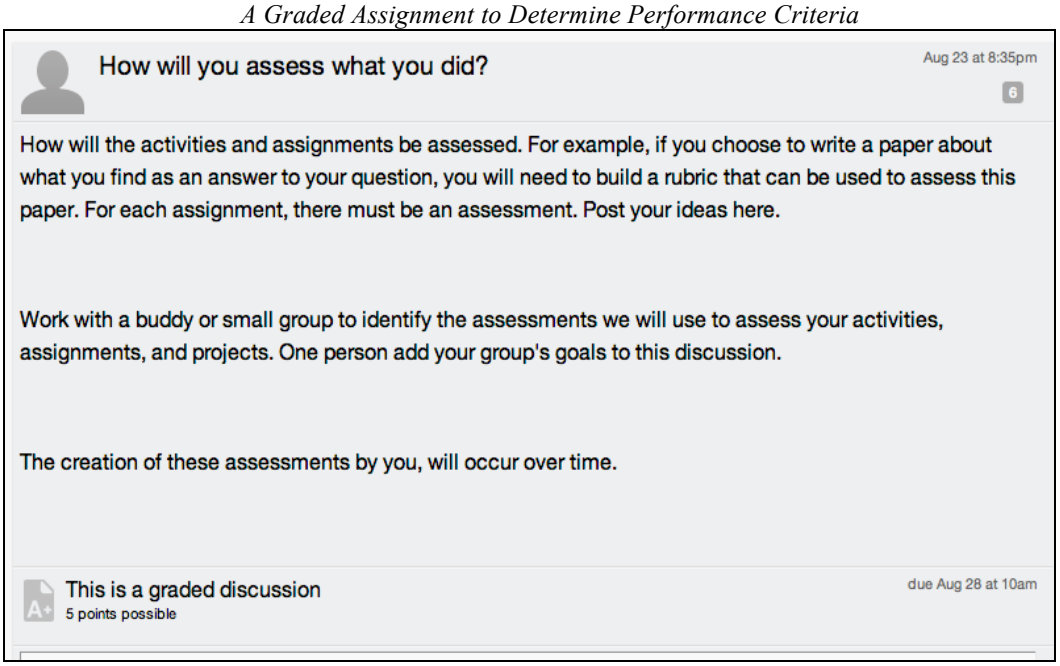
Before the students started working on the Research Paper assignment, the instructor provided scaffolds to help students build their own rubrics so their peers could use it in assessing their papers. Before the day that was scheduled to build the rubric, the instructor posted the article "Understanding Rubrics" by Heidi Andrade, in which the steps for building a rubric were clearly described in order to help students build a foundation. Additionally, during the class meeting, the instructor brought a packet of some gummy chocolate bears and asked students to build a rubric for good gummy chocolate bears. Then she invited students to build their own rubric for the criteria they would like their project to be graded based on. On the other hand, the instructor provided the students with a rubric that they could start with and change to meet their needs. Students were asked to use peer review feedback to improve their papers. They then submitted their final version for the instructor to review and grade.

Graduate Students' Perceptions

The study's findings identified five themes that captured the participating students' perceptions of the collaborative construction of course assignments. The following section discusses each of these themes.

Student control. Some participants determined that being involved in creating course assignments gave them a sense of control over the learning process. When

Figure 2
A Graded Assignment to Determine Performance Criteria



the instructor invited students to create course assignments, this allowed the participants to create assignments based on their perceived needs, which gave them a sense of control. As in these participants' experiences:

> [The collaborative construction of course assignments] gives us control and say over what needs to be done as goal (Tina).
>
> If you are setting goals for yourself and how you are going to achieve them, you have more control over your learning process because you know what is going on. You are more in control on what is happening (Sonia).
>
> Being able to come up with the assignments allows us to have some control of the class. I believe giving some control of the class to the students allows us to get more out of it (Sammy).

Being able to create assignments based on students' perceived needs encouraged Sara and Tina to take responsibility for the assignments and for their learning:

> I took responsibility for my own learning. I wrote chapter three (of the dissertation), the entire chapter three. I spent hours and hours doing it, even though I was not sure what I was doing! I totally completed chapter three because that was what I wanted (Sara).
>
> Being involved in creating the assignments gives us the buy-in, the responsibility. It makes you accountable for learning that assignment and for the class (Tina).

Tina expressed that students, after spending many years in the traditional educational system, fear having control in their education:

> All these years of schooling, years and years, from elementary schools to the graduate programs, we do not have that power in the classroom. When somebody is giving you that power I think you are fearful, you are afraid to take that part.

Motivation to learn. Some participants expressed that being able to create assignments based on their personal learning needs motivated them to learn. Involving the graduate students in assessment enabled some participants to personalize assessment to accommodate personal needs and interests. Personalizing assignments in terms of themes of high prior interest to students intrinsically motivated these graduate students to want to learn. Tina, Sara, and Sammy built an opposed to somebody says, "This is what you have to do in order to get a grade in the class," rather I created assignments that could help me to work on what I personally need,

to help me move toward my assignment that could help them with writing the methodology chapter of the dissertation. Antony, Karl, and Sonia developed an assignment that could help them with investigating technology tools for conducting research. This in turn provoked these graduate students to learn in depth. As stated by these participants:

> It allows me to design something I will be using in my dissertation. It makes me want to learn more about what I am studying because I am working on what I need to work on. It makes me strive to meet my needs (Sara).
>
> To be able to create the assignments, you could personalize it more to meet your needs and what you are researching and what you are doing, which is a motivating thing, like: I want to do this because it is something I am interested in. I am more motivated to learn when it is something I like to do, instead of just being told what to do (Sammy).
>
> We are contributing to what we need to learn in a specific way to grow and develop into researchers. It is meaningful to me. It is producing meaningful knowledge for me and for my work. That impacted my learning in this course. To pick and choose what works for you and talk with other people about it, even outside the class, it makes me want to learn more (Tina).
>
> When I decide to do the project, I go far more in depth and I learn more than other people tell me what to do because I like it. I will have patience in learning (Antony).

Instructor as facilitator. From their experience with the collaborative construction of course assignments, some participants perceived the important role of the instructor as a facilitator of student learning. Sammy and Antony expressed the importance of the instructor's involvement in the process of creating course assignments rather than being removed from the process. The instructor was involved in every step of the process of creating the course assignments to offer guidance, hints, explanation, critique, and encouragement. The instructor also did not repress her own ideas; rather, she allowed students complete control over the content and added her ideas and suggestions. As mentioned by Antony:

> [The instructor] told us to select whatever we wanted to do, but she guided us in some ways like: "Do you want to read something? Do you want a lecture? Why do not we have hands-on assignments? Do you think this increases your knowledge?" [The instructor] wanted to make sure that we had the readings, the lecture, and we have some activities. I like that because if she did not ask us to read, I did not like to read, so I would do whatever I want. […] Instructors need to guide but not be too much involved in it because obviously the course will be theirs not yours.

Sara and Sonia expressed the important role of the instructor as a facilitator who guides along the way without telling them what they should do:

> It will be great to go do whatever I want to do and what suits me and what I want to seek out, but I need someone in the road, someone who understands the outcomes expected in the product. I need the instructor to set *[sic]* back and help me get that product without telling me what to do, like guiding me to that end product (Sara).
>
> She is a facilitator more than she is telling us what we should be searching for. She is a facilitator more than a distributor of knowledge (Sonia).

Peer feedback. The instructor and students discussed whether the students would like to grade each other's work or provide feedback for improvement without giving grades to each other. The students decided that the peer review should entail providing written feedback. The instructor formatted instructions for the peer review assignment asking students to provide each other with feedback to improve their paper before submitting the paper to the instructor for grading. However, most of the participants did not provide their peers with feedback. They basically reviewed each other's papers based on the rubric criteria and checked whether their peers' papers met the criteria or not without providing feedback. Some participants were not happy with using the rubric for checking whether they met the rubric criteria or not; they felt that feedback would have been more useful, as noted in these participants' experiences:

> A peer review is a peer review where I get feedback on the content to improve my paper. It is not just using the rubric and grading the paper (Sara).
>
> I get feedback that is not really helpful. It is not critical, they say something like, "Yeah, it is a great paper!" Saying that will not benefit me! I do not need to hear that! I need to hear an honest critique to benefit my learning (Tina).

The study indicates two main reasons that hindered some participants from providing their peers with feedback. The first reason was students' lack of self-

confidence in their knowledge. Some participants expressed that they had less knowledge and experience with the subject than their peers, which created a challenge for them to provide constructive feedback to their peers, as in these participants' experiences:

> They are more advanced than me in the program. They have taken more classes, so they know more about what is needed in the methodology chapter than me. I am still not at their level. I did not have the knowledge to make their papers better. How can I tell them, 'You are missing this or missing that!'? (Antony).

> [Student X] is more advanced than I am. I really did not know where I could guide her as far as what to do next. I have less experience than her. Doing a dissertation and doing these things I am learning myself. Knowing what she is missing and giving her feedback was a big challenge for me (Sammy).

The second reason that obstructed some participants from providing feedback to their peers was power relations between students. Some participants felt that to assess their peers was to have power over them. As a result, they resisted critiquing their peers' papers and granted full points for their papers because they did not want to have power over them. As explained by Karl:

> They are friends of mine so it is hard to critique them. They are classmates in the same program I am going through. Who am I to critique them?! I am a student like them. I feel bad when I critique someone. I want everybody to succeed so I do not want to critique them. I gave them 4, 4, 4 [full points in each criterion of the rubric] because I want them to succeed.

Being "conditioned" that instructors have absolute power. Some participants expressed that the way they were taught in the past—being told what to do and learn—hindered their full involvement in building course assignments. They explained that it was hard for them to make decisions about course assignments because they were not used to making these decisions in education.

> I think because we are not used to making decisions in our education, it is hard to pass that and take that responsibility. It was hard for me at times. I was raised very much on 'sit and be quiet; do what the teacher says and do not talk back; raise your hand only if you have a correct answer.' (Tina).

> We are not used to building assignments. In the bachelor's degree, Master's, and Ph.D. program, we have the syllabus; we have assignments and activities to work on. We do not really collaborate too much on building assignments. We are used to the instructor just giving the syllabus. Then you want to break all of that and ask us to develop assignments?! It is hard. When [the instructor] asked us to design course assignments, I thought, 'Wow, do we need to put the assignments together, why should we?!' I do not know if I benefit from that. I do not think it really matters to have input in creating course assignments. It is nice, but I do not think I benefit from that (Karl).

Discussion and Implications

In the current study, involving graduate students in creating course assignments gave the participants a sense of control over their own learning. This claim corresponds with Hubb's (2003) study who found that students who collaborated in constructing their assignments felt "in control" over their learning. In the current study, being able to develop assignments based on their perceived needs and goals established the condition for the participants to feel in control of their learning. The shift of assessment from being the instructor's sole possession to something that was presented in response to the expressed interests and needs of students contributed to these graduate students' sense of control. This indicates that educators of graduate students need to be flexible and sensitive in responding to students' learning needs and the direction in which the students want to take the assessment.

Additionally, perceived control of the assessment process encouraged some participants to take responsibility for their own learning. This claim corresponds with Manor and colleague's (2010) assertion of the strong relationship between students' control over their learning and their sense of responsibility for their learning. Manor and colleagues argue, "Greater power means a greater ability to act and thus a greater sense of responsibility to do so. Similarly, less power (or worse, powerlessness) equates to less ability to act and less responsibility" (p. 10). This correlation between control and responsibility suggests that the traditional role, in which educators of graduate students have unilateral authority to make decisions for students, needs to change into a partnership. In this partnership, graduate students are encouraged to take some control of their education, including some control over their own assessment.

The study also illustrates that involving graduate students in developing course assignments motivated the participants to learn. Having the opportunity to develop course assignments allowed the participants to

determine assignment themes from their personal interests and needs, which facilitated deep learning. The participating graduate students were deeply motivated to learn what they perceived they needed to learn and what had personal value to them. Adult learning theory and research indicate that adults tend to be motivated toward learning that is important to their personal values and perspectives (Knowles, 1980; Knowles et al., 2005; Wlodkowski, 1999). In his book, *Enhancing Adult Motivation to Learn*, Wlodkowski (1999) asserts that adult students experience intrinsic motivation when they successfully learn something they want to learn and something they value. This indicates the significance of creating a space for graduate students to develop assignments for themselves based on their felt needs and interests for student motivation and engagement. However, this does not mean that graduate students have complete control over developing assessment. Students might not have enough or might not have the right kind of knowledge and skills to participate in the assessment of learning. Therefore, there should be shared control between the instructor and students.

Although the participants determined the importance of having some control over their learning for student motivation and engagement, they still needed the instructor as a facilitator to guide them to the approved end product: showing them how to do the work, but not to do the work for them. The participating graduate students expressed the importance of the instructor's intervention through the process of creating course assignments, rather than leaving them to their own devices. The instructor's guidance, however, did not undermine students from assuming responsibility in the pursuit of understanding and developing new knowledge. This urges educators willing to involve students in assessment decisions to maintain some authority. Educators need to remain authoritative without being authoritarian in guiding and facilitating students' learning. Educators of graduate students need to find a way to balance an instructor's guidance and student control. Faculty need to lead students with their expertise, but they also need to listen closely to students' perspectives and offer many spaces for students to explore their evolving ideas.

While the participants had experienced some benefits of peer review, they expressed dissatisfaction about the quality of peer feedback. The participants believed that if peer review was to be relevant, it should benefit subsequent learning processes. The participants expressed that the best way to achieve this would be to have peers provide each other with valuable feedback independent from the rubric. This finding is consistent with earlier studies (Ku & Lohr, 2003; Patton, 2012; Sluijsmans, Moerkerke, Van Merrienboer, & Dochy, 2001) that showed that many students expressed that peer assessment would be more beneficial to their learning if peers provided constructive feedback. On the whole, the peer review approach applied in the current study needs improvement. One improvement could be providing students with explanations and evidence that carrying out peer review brings benefits for them. If graduate students believed in the importance of a peer review to their own learning, they would do their best to seriously review other students' papers. As adult learners, graduate students need to know the reasons for participating in an activity. Adult students, as Grow (1991) argues, "may be unused to blindly doing what they are told without understanding why […] They do not jump through hoops just because somebody says to" (p. 138).

The current study claims that students were reluctant to give feedback on the assignments because of lack of self-confidence and trust in their knowledge and experience. This finding is different than previous research on student attitudes towards peer involvement in assessment. Previous research (Brammer & Rees, 2007; Liu & Carless, 2006; Vu & Dall'Alba, 2007) explained that students don't trust the evaluation of their peers, rather than not trusting themselves. Although the participants found the co-development of assignments to be beneficial, they still appeared to struggle to overcome habits developed from previous experiences in instructor-centered classes. Student dependency on the instructor to define tasks, judge students' work, and grade passively affected their self-confidence and trust in their capability to give feedback to their peers. Weimer (2002) and Shor (1992) argue that students' confidence in their capability to learn is adversely affected when teachers control the processes through and by which they learn. It is suggested by some researchers that development of learner autonomy has a direct connection to student motivation and confidence. According to Usuki (2002), learners who develop autonomy have greater self-confidence and trust in their capability to focus their learning potential to maximize their educational experience. Kimball (2007) also states that autonomy is a major factor in why people staying motivated towards activities that challenge them. This means that creating an environment in which learners develop autonomy is of great importance in order to raise students' motivation and confidence levels.

On the other hand, the current study claims that power relations between students obstructed some participants from providing feedback to their peers. Some participants felt that to assess their peers was to have power over them. As a result, they resisted critiquing their peers' work and granted full points for their papers. This finding is consistent with a study done by Liu and Carless (2006) who found that power relations between students were one of the main reasons for students' resistance to the peer assessment process. Brew (1999) argues that to assess is to have power over

a person, and sharing assessment with students leads to sharing of the teacher's power. Therefore, in the current study, some students felt discomfort with critiquing their peers because they disliked having power over their peers, resulting in over-marking their papers.

Lastly, the study found that students' familiarity with authoritative teaching, where they were used to being dependent on teachers to teach them and make decisions for them, made it difficult to be fully involved in the assessment process. As Shor (1992, 1996) and Brubaker (2012) note, students, after spending so many years in "traditional" educational settings, were hesitant to abandon the notion that the teacher was the absolute authority. They have been deeply conditioned by their previous schooling to perceive that the appropriate role of a learner was to follow the path set out by a teacher. The study urges educators to consider possible difficulties that students may experience due to their familiarity with an education system in which teachers have dominated the classroom. Educators need to help students move toward partnership relation rather than plunging them into the process in the first class. For example, it would be reasonable for the educator to provide one or two introductory classes on student-teacher partnerships to help them understand the rationale of these partnerships as well as the benefits they may get from them. Importantly, educators need to engage in critical reflection to understand the dynamics of power in the classroom and to uncover the hegemonies that drive undemocratic practices. As Brookfield (1995) argues, "Becoming alert to the oppressive dimensions of our practices (many of which reflect an unquestioned acceptance of values, norms, and practices defined for us by others) is often the first step in working more democratically and cooperatively with students" (p. 9). Educators need to be alert to the presence of power in the classrooms and its potential for misuse. This may help them to be more aware of the effects they are having on students.

Limitations and Future Study

There are some limitations in the present study, and the ideas for future research noted below may address these limitations. First, the context is a small graduate course which was designed for doctoral students. Doctoral students ought to be more open to this kind of initiative than the general population of adult learners. Future research may study the possibility of the collaborative construction of course assignments in large undergraduate level classes. Second, the participants in this study assign great meanings to the learning experience. However, it is not clear if involving students in creating course assignments impacted student performance and achievement in the course. Future research may consider the impact of the collaborative creation of the course assignments on student learning and achievement.

Closing Remarks

This graduate-level education course makes a small but powerful argument in higher education that educators can develop partnerships with students for the purpose of enhancing learning and developing independent responsible learners. It brings hope to find an instructor who welcomes students as partners in decision-making. I can imagine higher education in which opportunities for partnerships between faculty and graduate students in assessment are encouraged and supported. In such partnership, the instructor and students jointly own assessment. Not every student would be fully engaged in assessment in every course certainly, but he or she would encounter different kinds of involvement at different points in the learning process in ways that add up to a qualitatively different and more powerful educational experience. Yet, involving students in assessment as active and authoritative collaborators is a difficult task. However, doing so is an integral step for improving learning and teaching, and thus research in this area should continue.

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Active Learning Via Student Karaoke Videos

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We evaluated students' perceptions and reactions to an active learning Karaoke Video project in both a large (104 student) undergraduate class in Natural History of Georgia and a small graduate seminar in Fish Ecology. Undergraduate responses were evaluated with both questionnaires and triangulation interviews and graduate student responses evaluated with interviews alone. There was a slight majority of first and second year students (64%) in the undergraduate class. Students' majors/proposed majors were dominated by non-science categories, with 76% reporting non-science and 11% reporting science (13% no response). The overwhelming response of students to the 10 question Karaoke Video project questionnaire was positive ($p << 0.0001$), and 83% responded that the project aided in learning class material. Triangulation interview responses from undergraduate students supported questionnaire results, and graduate students also generally perceived the exercise as positive. Our results indicate that both undergraduate and graduate students responded positively to the Karaoke Video project and that these responses did not vary over several potential inter-student biases. This project was completed with the approval of the Institutional Review Board of the University of Georgia.

University education in the introductory biological sciences is driven mainly by passive education praxis, with a faculty member standing behind a podium lecturing and students sitting in place taking notes or perhaps just watching slides on a screen (Grossman & Watson, 2015; Orth 1995). Nonetheless, educational research has shown that active learning is a much more effective form of instruction, promoting increased understanding and retention (McKeachie Pintrich, Lin, & Smith, 1987), in addition to increased engagement of critical thinking and synthetic faculties (Freeman et al., 2014; Prince, 2004). Bloom's educational taxonomy (Krathwohl, 2002) suggests that students learn best when instruction includes activities that invoke higher order processes such as analysis, application, evaluation, and most importantly, the actual creation of new material (i.e., active learning). Nonetheless, there is scant published material on active learning approaches for introductory-level university biological science classes, especially those designed for non-science majors.

Active learning exercises do exist for both third- and fourth-year specialized classes in the biological sciences and for graduate classes. These typically involve laboratory exercises or computer simulations in which students perform thought experiments or use games in order to explore the effects of different solutions or attain a desired outcome (e.g., competition and coexistence between species, stable populations in the face of exploitation and environmental variation, and effects of varying harvesting strategies on yield). These exercises sometimes have structural proscriptions that limit the creativity of the student, although this is not a requirement for all exercises. Nonetheless, non-science majors may never take science classes that involve active learning activities, especially given they may only take one or two science classes in their entire college career.

In this paper we describe a Karaoke Video active learning project that engages students on higher cognitive levels (Krathwohl, 2002), and we evaluate both undergraduate and graduate student responses to the project via a questionnaire (undergraduate only) and triangulation interviews. The use of music to impart information has multiple positive effects on student motivation in a variety of science and non-science classes and at a variety of educational levels (see Grossman & Watson, 2015 and references within; Iverson & James, 2011). In this study, we evaluated students' perceptions and reactions to the Karaoke Video project via a ten question, Likert-based questionnaire, and we used demographic data to test the null hypotheses that rank in school, musical ability/experience, and correct or incorrect reporting of their highest exam score did not affect the frequencies of responses to questions. In addition, we examined whether these variables affected students' expressed preferences for their favorite activity within the project (e.g., writing lyrics, writing music, singing, researching material, and technical production). Finally, although the specifics of our article are directed towards biological science classes, it is likely that these techniques may be successfully employed by instructors in diverse disciplines.

Methods

This study meets the guidelines, and was conducted under the approval, of the Institutional Review Board of the University of Georgia. It was conducted in both the senior author's undergraduate Natural History of Georgia class and Fish Ecology graduate seminar at the University of Georgia. The natural history class is a first-year university course designed for non-science majors, although it is open to

all students. The class meets the university Environmental Literacy requirement for all students and a life science requirement for most colleges within the University of Georgia. The fish ecology graduate seminar covers a variety of aspects of fish ecology in a blended-learning format. Three students in the graduate seminar completed the assignment and consented to be in the study. Final enrollment in the natural history class was 104 students, and 85 consented to participate in the study. In the graduate seminar, the karaoke video was an individual project that counted for 33% of the total grade, whereas in the natural history class it was a four-person group project representing 12% of the total grade.

For both classes, a description of the Karaoke Video exercise was included in the syllabus which was made available on an electronic classroom management platform the first day of classes (week 1 of a 15-week semester). The platform used by the university was an interim system and hence the dates listed are approximate. In both classes the karaoke rubric was given out in the 12th week of class, and the videos themselves were due at the end of the 14th week of class. Final videos with names removed were shown in week 15, the last week of both classes.

We manipulated group structure in the undergraduate class by assigning one student who had earned an A on the course's first exam to each group, although some groups had more than one A student. We made no other efforts to standardize groups, and we believed that randomly assigning the remaining students to groups was the most tractable manner of equalizing inter-group differences in musical, academic and technical ability. This prevented students from forming groups based on social relationships that likely were correlated with ability. In both classes, students were introduced to the exercise via a similar rubric (rubric for Natural History of Georgia is Appendix) and instructions in class. One class session was devoted to group work on the video, and students were informed via both electronic and lecture media that the instructor also was available to help with the project during work hours. To facilitate videos on species, students were provided with 102 video clips of animals: tiger swallowtail butterflies, fireflies, black rat snakes, eastern chipmunk, eastern gray squirrel, copperhead snake, southern dusky salamander, and fiddler crabs. Students also were permitted to use videos and music obtained from the internet or other sources (Appendix).

Questionnaire

We presented students from the natural history class with a questionnaire containing a mixture of 16 questions dealing with basic demographic information and perceptions of the Karaoke Project. The questionnaire was administered during class but prior to exposure to the videos of other students. The questionnaire included the following demographic information: 1) year in school, 2) general major (science or non-science), 3) specific major (life sciences, business/engineering, journalism/political science, family and consumer science, and education), 4) level of musical experience (advanced [song writing, performing], good [sing and memorize songs], (c) average [listen to music regularly can sing a few songs], weak [don't sing or memorize songs] and non-existent). For ease of interpretation and statistical rigor, we combined advanced and good (high musical ability) response categories and weak and non-existent categories (low musical ability). Students also were asked to identify their highest exam score (A, B, C, D, F) out of three exams and their class attendance score (8 haphazardly taken roll checks, 7-8, 5-6, 3-4, 1-2, 0). Finally, students were asked to identify the type of video: class concept (mimicry, interspecific competition, predation, etc.), a habitat type, or a plant or animal species. Because the questionnaire was signed we could compare aspects of demographic information (highest grade, attendance score) with actual data. The questionnaire contained nine additional questions regarding the Karaoke Project (Table 1). Possible answers to these questions involved the following choices from a Likert scale: completely true, somewhat true, somewhat false, and completely false. For ease of interpretation and statistical analyses, we classified answers of completely and somewhat true as positive responses and somewhat false and completely false as negative responses. This did not obscure patterns in the data, and the full answers are shown in Table 1. Questions were posed in both positive and negative modes, and for statistical analyses we reversed the classification of negative mode questions. For example, Question Four was: "I prefer an additional exam rather than the video assignment," and students who replied "somewhat false" and "completely false" were scored as having responded positively to the karaoke project (i.e., they did not prefer having an exam in place of the Karaoke Video project). The questionnaire was validated via review by researchers and graduate students. Because there were so few graduate students in the fish ecology seminar, we assessed their perceptions of the karaoke project via triangulation interviews alone.

Triangulation

Questionnaire results also were validated via triangulation with post-class interviews. For the natural history class, seventeen students originally agreed to participate in triangulation interviews, but only four actually participated, even after repeated reminders and the incentive of a chance at a gift card. Triangulation

Table 1
Student Perceptions of the Karaoke Video Project

Question	Completely true %	Somewhat true %	Somewhat false %	Completely false %
1. Making the karaoke video enriched my experience in class.	18	57	20	5
2. I didn't understand the purpose of the video assignment.	7	25	27	41
3. The video helped me learn material.	31	52	15	2
4. I prefer an additional exam rather than the video assignment.	13	9	17	61
5. My group functioned well and work was evenly distributed.	61	31	6	2
6. Making the video was a waste of my time.	6	12	33	49
7. My video experience would have been more positive if the groups were supervised by a TA or instructor.	5	14	25	56
8. Having a group project enhanced my experience in class.	34	44	13	9

Note. Total sample size is 85 students, answers are percentages

interviews were conducted two months after the end of the semester. There were only three students in the graduate seminar; all consented to join the study and were interviewed. The junior author had no previous contact with undergrads and limited contact with graduate students; hence, he conducted triangulation interviews via telephone. Interviews were transcribed by hand and checked against recordings for accuracy. We asked seven questions: 1) How was your learning affected by the Karaoke Video project?, 2) Were there specific aspects of making the video that aided your learning?, 3) What do you think the purpose of the video assignment was?, 4) Should anything be changed about the video project?, 5) How was working in a group beneficial to your learning experience, and how was it detrimental?, 6) Do you have any other comments on the Karaoke Video project?, and 7) How did seeing your video in class make you feel?

Statistical Analyses

We tested a variety of hypotheses using pooled student questionnaire response data (i.e. total number of positive responses out of nine total). We used parametric statistical tests that are robust to deviations from normality. First, we used a t-test to evaluate the hypothesis that students reported significantly more positive responses to questions about the Karaoke Video project than negative answers (Table 1). Second, we used the same statistic to test the null hypothesis that there were no differences in the number of positive responses by students who correctly reported their highest exam score and students who reported a higher exam score than actually earned. Third, we used a t-test to test for differences in positive responses between first- and second-year students and students in their third year or higher. Fourth, t-tests were used to evaluate whether students with different characteristics (i.e., first and second year vs. third year and above; students who correctly reported their highest exam score vs. those who reported a higher score) differed significantly in their preferences for different aspects of the karaoke project (i.e., writing lyrics, writing music, singing, researching material, or technical production). Finally, given that students had three levels of musical ability/experience, we used ANOVA to test the null hypothesis that students with high, average, and low musical abilities did not answer questions with different frequencies. Statistical calculations were performed using R.

Results

Examples of Video Texts

We selected example texts based on their ability to represent the concepts of the exercise. The three examples are representative of the videos in general but are slightly better than the "average" video, although the level of performance in general was very high. We corrected grammatical errors, but minor scientific errors remain in the lyrics. Anonymous examples of student videos may be viewed at www.youtube.com/watch?v=jHihqV7alMg .

Class concept video. Mimicry: "Here's a song about mimicry; Mullerian, Batesian, Wasmanian, and Aggressive—whoa, let's jump right in. Mullerian, we're together to survive; we look alike; if you eat us, you will die. This is all so crazy, predators learn to stay away. Johan Muller studied butterflies in Brazil; he saw convergence in some species, such as the Viceroy and the Monarch queen; they evolved to look alike; neither of them want to die, so they live side by side. I'm a Batesian mimic; I'm scaring them away; they won't mess with me today. I've evolved to look like I resemble a toxic guy. Aposomatic is how I get by; my colors gonna keep 'em away. Yeah, I'm not gonna die today. Yeah, I'll live to see another day. On to Wasmanian mimicry; it's the third kind that we learned. The mimic hides from predators by living with the model. A good example of this mimicry is the salticid spiders living in ant colonies. The spider's actually a predator; the ants are their source of prey. Small brown trout looking for a good meal, sees a worm, and he gets it. That's when the turtle chomped down on his head; it was aggressive mimicry. Turns out it was just a trick, wasn't a worm; it was his tongue. I'm a Batesian mimic; I'm scaring them away; they won't mess with me today. I've evolved to look like I resemble a toxic guy. Aposomatic is how I get by; my colors gonna keep 'em away. Yeah, I'm not gonna die today. Yeah, I'll live to see another day. There are different kinds of mimics, kinds of mimics. Batesian, Mullerian, Mullerian, Wasmanian, and Aggressive, Aggressive. They all help organisms to survive. I'm a Batesian mimic; I'm scaring them away, they won't mess with me today. I've evolved to look like I resemble a toxic guy. Aposomatic is how I get by; my colors gonna keep 'em away. Yeah, I'm not gonna die today. Yeah, I'll live to see another day."

Species video. Gray Squirrel**:** "As my name suggests, usually I'm gray, but sometimes in urban habitats I have a brownish tint. Ten inches is my height, and my tail is just as long. My residence is up in trees, which they call a drey, and when I head to the ground, I can do so facing down; all I have to do is flip my back claws around. I'm not a fan of summer heat, and I don't need to hibernate. My predators mostly fly, but cats and dogs will chase. I'd be good at any sport since I'm so fast and agile, Eastern Grey Squirrel, I'm in the Northeast temperate forests, scattering and hoarding, dispersing nuts and seeds, munching on berries and buds. I call the Sqiuirdae (sic) family mine, you will find me flicking my tail which helps me communicate; catch me if you can! Breeding twice a year from December to February and May to June, unless it's in the northern latitudes. The males will duel for the female's favors, but she may also mate with other squirrels, so these squirrels ain't loyal. I can live in the wild for up to 12 years but in a captive environment that number jumps to 20. Eastern Gray Squirrel, I'm in the Northeast temperate forests scattering and hoarding, dispersing nuts and seeds, munching on berries and buds. I call the Sqiuirdae (sic) family mine. You will find me flicking my tail, which helps me communicate; catch me if you can! All across the North American East, in temperate forests lives this beast; woodlands dense with trees and nuts are where they're happiest to keep their furry butts. Think hardwoods, ones with mast, like oaks and hickories for habitat that lasts. The need to feed is satisfied with seeds, berries, flowers, bark, and buds, as well as the occasional fungus, bulb, and bug. Scatter hoarding is the name, for they're saving food for later game. They hide their food in little caches, scattered about in random patches. Eastern Gray Squirrel, I'm in the Northeast temperate forests scattering and hoarding, dispersing nuts and seeds, munching on berries and buds. I call the Sqiuirdae (sic) family mine. You will find me flicking my tail, which helps me communicate; catch me if you can!"

Habitat video. Coastal Plain forests**: "**I'm in love with the eco. I'm in love with the eco. The Georgia coast got a lot, though, disappearing due to people. Starting off with the moist slope where the sweet magnolia is home. Most popular ornamental, 12 varieties on the globe. Sweet magnolia does not live solo, to survive needs well-drained soil. Found where the plain is coastal, moisture is what's focal. Pocosins the next eco. They contain acidic soil; oligotrophic is what we call this eco, can be found at high sea level. Between streams is where they go, perched water levels reside below. Carnivorous plants call this home. Pocosins often drained by people. I'm in love with the eco. I'm in love with the eco. The Georgia coast got a lot though. Disappearing due to people. Sandhill, that's my favorite eco, where loblolly pines hold the throne. Widely cultivated for the pulp. Longleaf pine quick to inferno, preventative fires for protection. Uplands massively affected by people. Severely reduced longleaf pine zone, 98 million acres are gone. Habitat for the snake that is indigo, title of longest snake is what it holds. Signing out with the Bayhead eco. Broadleaf evergreens call this home. Sweetbay

magnolias it is commonly known. Used in parks because it's ornamental. Borders of the swamp is where red bays assemble. Its purposes are not medicinal; used in cooking because it's tasteful. Species under attack by a beetle, to the red bay it is lethal. Invasive species that is oriental, the sale of wood is deceitful, because it causes the spread of the beetle."

Questionnaire Responses

The study group was composed of 64 percent (N = 54) first and second year students, whereas 36 percent (N = 31) were in their third year or higher (remainder, no report). Students' majors or proposed majors were heavily slanted to non-science topics, with 89 (N = 76) percent reporting non-science and 11 (N = 9) percent reporting a science major. More specifically, majors were distributed as follows: Life Sciences 10% (N = 8), Business/Engineering 46% (N = 39), Journalism/Policy 25% (N = 21), Family/Consumer Science 4% (N = 3), and Education 15% (N = 13). The musical experience of students varied, with 33 percent (N = 28) reporting high musical skills/experience (song writing, performing, singing, and memorize songs), 48 percent (N = 41) reporting average musical skills/experience (listen to music regularly, can sing a few songs), and 19 percent (N = 16) reporting low musical skills/experience (don't sing or memorize songs or experience non-existent).

The overwhelming response of students to the Karaoke Video project was positive, with 75% of participants agreeing that the video project enriched their class experience and 83% responding that the project aided in learning class material (Table 1). Students also reported that their groups functioned well (92%), even without supervision by an instructor or teaching assistant, and that participating in a group project enhanced their class experience (78). Surprisingly, 22 percent of students expressed a preference for an extra exam over the video project (Table 1). Overall, positive student responses to questions were significantly more common than negative responses ($t = 14.49$, d.f. = 14, $p << 0.0001$).

Table 2
Analyses Testing the Hypothesis that Musical Ability Affected Student Perceptions of the Karaoke Video Project

	Positive Response			Negative Response		
Question	High/good musical Ability %	Average Musical Ability %	Low/Non Existent Musical Ability %	High/good musical Ability, %	Average Musical Ability %	Low/Non-Existent Musical Ability %
1. Making the karaoke video enriched my experience in class.	79	71	81	21	29	19
2. I didn't understand the purpose of the video assignment.	36	32	25	64	68	75
3. The video helped me learn material.	89	76	88	11	24	12
4. I prefer an additional exam rather than the video assignment.	14	27	25	86	73	75
5. My group functioned well, and work was evenly distributed.	89	93	94	11	7	6
6. Making the video was a waste of my time.	18	20	12	82	80	88
7. My video experience would have been more positive if the groups were supervised by a TA or instructor.	18	17	25	82	83	75
8. Having a group project enhanced my experience in class.	75	76	75	25	24	25

Note. Student groups were high musical ability, good musical ability (n = 28), average musical ability (n = 41), low musical ability (n= 16). Data are percentages.

Table 3
Student Responses Regarding Their Favorite Aspect of The Karaoke Video Making Process for the Study Group and the Group Partitioned by Various Characteristics

Comparison	n	Writing Music %	Writing Lyrics %	Singing Lyrics %	Researching Material %	Technical production %
Study Group	85	11	35	18	14	22
High (A/B) course grade	81	10	37	17	14	22
Low (C or lower) course grade	4	25	0	25	25	25
First/second year	54	7	43	14	16	20
Third year or higher	31	15	45	10	10	20
High attendance	82	11	35	17	13	23
Low attendance	3	0	33	33	33	0
High/good musical ability	28	7	36	39	7	11
Average musical ability	41	10	29	7	20	34
Low musical ability	16	19	50	6	13	12
Correctly reported highest exam grade	46	13	33	15	17	22
Incorrectly reported highest exam grade	35	8	34	23	9	26

Note. Students who received a course grade of A and B versus those who received a C or below, students who were in their first or second years at university versus those in their third year or higher, etc. Data are percentages and n = 85.

Students' musical abilities or experience did not strongly affect their responses to the video project, because positive responses did not differ significantly among the three levels of musical experience (Table 2, ANOVA F = 0.53, p = 0.60, positive responses). Nor were there significant differences in students' preferences for an aspect of the karaoke project (e.g., writing lyrics, writing music, singing, researching material or technical production, ANOVA F = 0.004, p = 0.99, Table 3). The same was true for students who correctly reported their highest test score on the questionnaire versus those who reported a higher score (Table 4, t = -0.85, d.f. = 10, p = 0.40, for positive responses), and these two groups also did not display significant differences in their preferences for different aspects of the karaoke project (Table 3, t = 0.10, p = 0.92.). Finally, students' year in school also did not significantly affect their positive responses to questions (Table 5, t = -0.55, d.f. = 14, p = 0.59).

Triangulation Interviews

The following are complete sets of responses for the four undergraduates and three graduate students who completed interviews:

1) How was your learning affected by the Karaoke Video project?

Undergrad 1: Karaoke Video project was our final, so I guess what it did was it asked the class to take a specific concept and go in depth about that concept a little bit more, but it did create a little more stress because it was the final project. I thought the project was an interesting take on learning new material, but at the same time it was almost like something I'd be asked to do in high school.

Table 4
Analyses Testing the Hypothesis That Students Who Correctly Reported Their Highest Test Score Did Not Differ in Their Responses to the Karaoke Video Questionnaire Than Students Who Correctly Reported Their Highest Test Score

	Positive Response		Negative Response	
Question	Grade Correctly Reported %	Grade Incorrectly Reported %	Grade Correctly Reported %	Grade Incorrectly Reported %
1. Making the karaoke video enriched my experience in class.	76	71	24	29
2. I didn't understand the purpose of the video assignment.	33	31	67	69
3. The video helped me learn material.	78	86	22	14
4. I prefer an additional exam rather than the video assignment.	28	14	72	86
5. My group functioned well and work was evenly distributed.	91	91	9	9
6. Making the video was a waste of my time.	20	14	80	86
7. My video experience would have been more positive if the groups were supervised by a TA or instructor.	15	23	85	77
8. Having a group project enhanced my experience in class.	74	83	26	17

Undergrad 2: Sure, I learned a lot about owls and other things. I think some of the other group's videos were pretty good. The groups whose videos were based on concepts were more effective than videos that were based on an animal in particular.

Undergrad 3: I would say it was positively affected with regards to the specific topic that we did our project on. The video helped me really learn and commit to memory specific facts and stuff about our topic, which was bobcats. The video really helped me remember specific things about the bobcat and actually know the material instead of cramming it in the day before a test.

Undergrad 4: I think that I got to be a lot more in depth on a particular subject as opposed to the class which covered a lot of broad material which makes it hard to learn a lot about a particular subject that you're interested in. So I feel like I benefitted from learning as much as I could about a particular subject.

Graduate student 1: The video helped reiterate the basics of the ecology of the fish species I used in my video, but it was information I already knew, so the effect wasn't too profound. I think the effect of the exercise would have been different if I had to do a video on material I didn't already know; then I could see how the exercise could be helpful in learning new material, but since I already knew the basics of the fish's ecology I don't think I really learned any differently.

Graduate student 2: The information and material I used for the karaoke project was already part of my previous research, so I wasn't learning material fresh. I just incorporated what I had already learned previously.

Graduate student 3: Well, I'm not musically inclined, so I was nervous making the video, but once I got past my nerves and anxiousness about the project I could see how making the videos helps you retain material. I mean, in my video I used material I already knew, but I could still see how the process helps.

2) Were there specific aspects of making the video that aided your learning?

Table 5
Analyses Testing the Hypothesis That Students in Their First or Second Year of School Did Not Differ in Their Responses To The Karaoke Video Questionnaire Than Students in Their Third Year, Fourth or Fifth Year

	Positive Response		Negative Response	
Question	1st & 2nd year %	3rd year+ %	1st & 2nd year %	3rd year+ %
1. Making the karaoke video enriched my experience in class.	74	77	26	23
2. I didn't understand the purpose of the video assignment.	33	29	67	71
3. The video helped me learn material.	81	84	19	16
4. I prefer an additional exam rather than the video assignment.	24	19	76	81
5. My group functioned well and work was evenly distributed.	91	94	9	6
6. Making the video was a waste of my time.	19	16	81	84
7. My video experience would have been more positive if the groups were supervised by a TA or instructor.	20	16	80	84
8. Having a group project enhanced my experience in class.	81	73	19	27

Undergrad 1: Learning the material to make the lyrics made me think about what I learned, and then putting what I learned into words and into a song made me think about the material more.

Undergrad 2: I think the most helpful aspect of the project for learning was doing the research and writing the lyrics.

Undergrad 3: Writing the lyrics probably helped me the most just because that was my main part of the video; I wrote all the lyrics. I also helped sing, but just writing the lyrics helped me learn the most because you're looking at the notes and trying to figure out what will work with what tune or rhyme, and you're just reviewing your notes without thinking about it.

Undergrad 4: I think having to make the actual videos made me spend a lot of time with the lyrics we wrote, and I had to double-check a couple of times to make sure we were getting the information right, so I think the repetition was what was most beneficial.

Graduate student 1: Creating the lyrics.

Graduate student 2: I learned the basics of audio editing and video editing, and I enjoyed that process. I enjoyed getting a glimpse of that kind of software. I think any time that you incorporate new information into a project where you not only read it but also identify main points and items about the material, I think that really helps you learn the material better.

3) What do you think the purpose of the video assignment was?

Undergrad 1: The video was a new way of testing students on what they got out of the class, what their favorite part of the class was, and then taking that and turning it into something that everyone could appreciate.

Undergrad 2: I think the purpose of the assignment was to take the knowledge we had learned throughout the semester and have it culminate in one project where students were allowed to take something that they were interested in and learn

more about it and then to use those videos and allow other students to learn as well.

Undergrad 3: In addition to learning a specific topic from the class, I think it was to have students think about the positive effects that putting information to song form can have on helping you learn material.

Undergrad 4: I think the purpose was for us to think in a different way than we normally do when we learn new material and to strengthen critical thinking of the class. I also think the assignment gave us the opportunity to learn about something in the class that we're kind of interested in.

Graduate student 1: To help us think outside the box and to help us come up with ways to learn and remember fish ecology.

Graduate student 2: I think the assignment was an experiment in trying to teach material in a different and new way, and I think it would be a good project for future teachers.

4) Should anything be changed about the video project?

Undergrad 1: Nothing much, maybe a little more guidance on what the videos should be like. We had seen Dr. Grossman's videos, but until the day we saw everyone's videos we had no idea what to expect as far as a good vs. a bad video. Maybe if he showed us an example of the type of video he wants that would help.

Undergrad 2: No response.

Undergrad 3: Not really but maybe instead of having it as a big project you could have it as a couple of small assignments where students just make the lyrics instead of doing the whole video.

Undergrad 4: I think it would be helpful if Dr. Grossman were to be more involved in us making the project because it was hard to make the video without a lot of guidance from him.

Graduate student 1: Even though I liked being able to pick our own topic, I think we should be assigned a subject we don't know as much about.

Graduate student 2: I thought the exercise was decent. I think the exercise would be more effective as far as a learning technique if we had been required to research material I didn't already know, but it was convenient to be able to use information I already had.

5) How was working in a group beneficial to your learning experience, and how was it detrimental?

Undergrad 1: Normally I'm not one for group work, but in this case group work was definitely helpful because I'm not much of a creative person, and being able to bounce ideas off people who were more creative than I was definitely helped to get content into a form that was useful to other people.

Undergrad 2: If I would have been able to pick my group that would have been more beneficial, but because the groups were randomly assigned I didn't know the two guys I was working with, and one person never showed up or contacted me. One of the guys in our group would always argue at the meetings or try to get us off track, which kept us from being productive. It ended up being just me and this other guy where I did the research and wrote the lyrics and he handled all the technical aspects. So I felt that I got the wrong end of the deal in the sense that I didn't know the two guys in my group wouldn't contribute and I was stuck with them.

Undergrad 3: I'd say it was neutral. It didn't really positively or negatively affect me; it was just that group projects can sometimes be a pain, but it didn't cause me to be worse off. I guess it was more beneficial because if you were working by yourself, a lot of people wouldn't want to sing in their own music video, so having other people there takes a lot of weight off your shoulders when it comes to the singing aspect.

Undergrad 4: Personally my group was really awesome and everyone worked well together, so the group worked well for me. But I've had bad group experiences, and I know people in the class that had bad group experiences with the karaoke project, but I also think that when you divide the work with people that you don't know, some members of the group just tend to get more work done than others. So maybe Dr. Grossman could consider letting us have a say in who was in our group; that would help everyone.

6) Do you have any other comments on the Karaoke Video project?

Undergrad 1: I know before I turned the video in I was thinking I would have rather taken a paper final, but once I finally did the video and we presented the video I felt pretty good about what I had done.

Undergrad 2: I think it was very unique. It was something I didn't expect to be in a college level course, but I think it was good because it was better than having to study for a test or write a paper because it allowed us to use our creativeness and make something that the professor could use later on. I feel like since I've been in college I've never had an assignment like this, so that may be why I associate the assignment more with high school. I do think it's good to throw away the idea giving only tests and papers and allow students to use their more creative side.

Undergrad 3: No, I don't think so.

Undergrad 4: I liked it, and I think that it helped my grade to have the project as the final because I'm not good at taking tests, but I'm good at learning information through projects so I liked it.

Graduate Student 1: I thought it was fun, but I thought for a graduate class it felt a lot like busy work. The assignment took a lot of time, and at the time I didn't have much time to spare. It was a fun and interesting activity, and I could see how it would be helpful for an undergraduate class, but I think it's too much of a busy task for a grad class.

7. How did seeing your video in class make you feel? [Names were removed from videos before they were shown in class.]

Undergrad 1**:** I'm not much of an optimistic person, so I was like, man, this video isn't as good as other people's, because other peoples are way better, but as the other videos played you realized that they were all meant to be fun and convey some sort of information to the audience.

Undergrad 2: Seeing my video was fine. Our names weren't on the video, so no one really knew it was me, but other people could have been embarrassed. There was one guy who was really good at singing, and everyone was clapping afterwards, so that was kind of funny.

Undergrad 3: I didn't really care; everybody is kind of in the same boat, so it's not a big deal. I could see how some people could get embarrassed, but it's not like there's a picture of your face up there with the video.

Undergrad 4: It was fine. I thought it was interesting to see other people's videos. I didn't know that some people had done the same topic, so it was interesting to see how some people had interpreted their topic differently.

Responses to triangulation interview questions raised additional specifics about the project and also confirmed the strong positive student responses documented by the questionnaire. Students clearly understood the innovative nature of the project, and their comments indicate that they did use higher-order cognitive processes (analyzing, applying, synthesizing, and creating) in construction of the video.

Discussion

Student responses to the Karaoke Video project were strongly positive for both undergraduate and graduate classes, and the project clearly created positive class atmospheres and invoked higher-level cognitive processes. For the natural history class, particularly salient findings were the lack of significant differences between students with different 1) levels of musical experience, 2) rank in school, and 3) accuracy in grade reporting (i.e., differential bias in self-reporting). Such findings are noteworthy because there are few active learning exercises for large, undergraduate introductory natural history, zoology, or ecology classes that typically possess heterogeneous student populations. This is particularly true for classes designed for non-science majors that meet undergraduate general education or other requirements. Nonetheless, questionnaires indicated that a small percentage of students (8%) in the natural history class did not have a positive group experience, and this opinion was echoed by one student's triangulation interview. Students were assigned to groups randomly, with the proviso that each group had one student who earned an A on the first exam, to decrease the variability in groups that would inevitably have been present if students had been allowed to choose their own group members. Self-selection in groups likely would have resulted in groups based on social relationships or intellectual ability rather than groups that were representative of the spectrum of relationships/abilities present in the class. Consequently, we believe random selection of group members was the best method for obtaining the most representative groups, because it should have minimized the differential intellectual, musical, and technological abilities within groups, in addition to helping students gain experience in working with new

people. Students also would have benefitted by being shown sample videos, but given that this was our first attempt at the project, we had no examples; this will be remedied in future classes. A few students also gave mixed responses regarding the "intellectual" level of the project, stating that it reminded them of high school (undergraduates) or undergraduate activities (graduate students), but these comments usually were combined with statements indicating that significant analytical, synthetic, and creative efforts were being expended in completion of the project. Finally, graduate students commented that they wanted to research something other than their thesis topic, and in future classes we will restrict the project to new topics alone. Nonetheless, graduate students were free to choose any relevant topic they wished; hence, their dissatisfaction was a consequence of their own decision to focus on material they already knew. This probably was a strategy to minimize the effort needed to meet class requirements. A minor shortcoming of the Karaoke Video exercise is that it was impossible to have students do more than one video; hence, although they clearly found the experience valuable, the information gained by creating the video represented only a small portion of the total class content.

In completing the Karaoke Video project, students used multiple faculties on the high end of Bloom's taxonomy of knowledge (Krathwohl, 2002), including gathering, applying, analyzing, evaluating, and creating information for a three to four minute video that captured the most important aspects of a habitat, a species' biology, or an ecological or evolutionary concept. Thus, there should be greater retention of the knowledge obtained via the project. Evaluation of the actual effect of the project on learning and retention was beyond our resources; indeed, even with adequate funding it would be difficult because of the individualized nature of the projects (few students made videos on the same topic). This would require developing myriad pre- and post-exposure quizzes, and creation of a realistic control also would be difficult. In addition to engaging higher level intellectual faculties, based on their affects, students clearly enjoyed watching the videos during the final class session. The fact that students knew that their videos would be shown in class may well have served as a partial censor, ensuring the appropriateness of the material.

Not all students liked the Karaoke Video project, and we were surprised by the substantial number of undergraduates (22%) who would have preferred an exam in its place. The karaoke project clearly took these students out of their comfort zone and perhaps required more work than they were willing to expend in class. Undoubtedly, the innovative nature of active learning assignments may confuse and even anger some students unfamiliar with this pedagogical approach. In addition, although responses were overwhelmingly positive, the data were self-reported and may have included an element of bias. Questionnaires were not anonymous; otherwise, it would have been impossible to test for effects such as year in school or self-reporting bias. Nonetheless, the lack of significant differences between students who correctly and incorrectly reported their highest test score suggests that potential self-reporting biases were not strong. In addition, self-reporting is most biased when dealing with personal health issues or negative behaviors such as cheating, smoking/drug use, or food consumption (Huang, Almeida, & Roberts, 2012; Nath, 2007) and probably less biased when dealing with class projects like the karaoke video.

The Karaoke Video project was not without logistical complications, the most substantial being the difficulty of obtaining videos of animals behaving naturally. All of the videos provided to students depicted animals; nonetheless, because of logistical constraints it was necessary to shoot them the summer before class using a student assistant. Due to the unpredictability of weather and wild animals, it would have been very difficult for an instructor or TA to obtain quality video during the semester. Regardless, students were able to obtain video from the internet and lecture slides (text and image slides and video links), although typically this involved video on concepts or habitats. We are not sure that any student shot their own animal video, despite the ubiquity of video cameras on cellular phones. Additionally, few students responded to my requests for triangulation interviews, which occurred two months after the conclusion of the semester. Perhaps too much time had elapsed and at that point students were concerned with issues in other classes. Nonetheless, all of these problems can be solved with good planning and financial resources; in no way do they suggest that the exercise is too difficult for an instructor to undertake.

An additional benefit of the Karaoke Video project was that it involved music, which has been shown to be a positive motivational force for students in both science and non-science classes (Crowther, 2012; Crowther & Davis 2013; Governor, Hall, & Jackson, 2013; Grossman & Watson, 2015: Iverson & James, 2011). The senior author has previously written and performed in music videos depicting conceptual, habitat, and species information for earlier Natural History of Georgia classes, and these videos improved student perceptions towards many aspects of class as well as aiding in their learning (Grossman & Watson, 2015). It is possible that the strong positive reactions to the instructor's music videos were affected by the fact that students enjoyed seeing and hearing their instructor play an instrument and sing. In part, this was an

impetus for developing student-based, active learning music videos.

Our conclusions regarding the positive effects of active learning are supported by a recent meta-analysis of over 200 studies comparing active to passive learning modes in undergraduate STEM classes (including biology). Freeman and colleagues (2014) found that active learning increased performance on exams and concept inventories by one-half a standard deviation and decreased failure rates by 55%. These effects were substantial across class sizes from large (> 110) through medium (50-110) to average (< 50), but not surprisingly they were most pronounced at class sizes smaller than 50 (Freeman et al., 2014). Freeman and colleagues (2014) tested for various aspects of study bias including non-equivalence of instructors and subjects and found these potential biases had no effect on their findings. In closing, we would urge instructors teaching large introductory biological sciences or resource management courses to consider using the karaoke project as an active learning exercise. Besides its incorporation of higher-order cognitive faculties, it is a project that is likely to be enjoyed by most students regardless of discipline or academic rank.

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Appendix
Karaoke Video Rubric

The purpose of the karaoke video assignment is to give you a creative outlet for learning and presenting class materials. The topic of the video may be on a particular habitat type, a concept such as predation or habitat selection, or a species. The video should be between 3-4 minutes long, and it will be graded on creativity and accuracy. Specifically, the 60 possible points will be divided as follows: scientific accuracy – 25 points, creativity – 20 points, technical quality– 15 points. The video should consist of images relevant to the subject with text superimposed on the bottom of the screen, or you may just have a few images with the remainder of the video being the written lyrics of the song. Regardless, the video should be constructed so the class can sing the lyrics. The sound track should consist of whatever music you choose (or you can sing acapella) with the group singing the lyrics. You may create your own video or use video already on eLC or Youtube that you download, but it must be relevant to the topic. Here is a discussion of how to download Youtube videos:
www.digitaltrends.com/computing/how-to-download-youtube-videos/ . However, be careful about downloading free programs: sometimes they come with "Trojan programs" such as browser hijackers. Because your video is for educational purposes, you do not have to worry about copyright issues, but if you decide to use it out of class, it will be subject to copyright violations if someone else holds the copyright. Most smartphones have video capability as well as a built-in microphone, as do most laptops. Most laptop/netbook computers also have video editing software such as Windows Movie Maker. If you need help, contact the professor. The final video should look like one of the class music videos which are on eLC. The only original portions of the video you will be required to provide are the lyrics and the singing of the lyrics on the video. Not everyone in the group has to sing, but don't put it all on one member. Because this is a group project, everyone in the group will provide an anonymous rating of the contributions of every individual in the group. A useful reference on making short videos is www.slowmation.com/ .

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Connection and Commitment: How Sense of Belonging and Classroom Community Influence Degree Persistence for African American Undergraduate Women

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In this study, six African American female college students were interviewed to explore perceptions about their college learning environment and the beliefs they have about their own competence and value with regard to others in the college community. Focus group and individual interviews were conducted over the course of the academic year to examine insights about classroom dynamics and peer interactions. Findings revealed that their decision to persist at the college was based on faculty being accessible, approachable, and providing authentic instruction. While this was encouraging, undergraduate women of color still described challenges such as experiencing microaggressions from professors and classmates and feeling a need to "represent their race" when asked to provide commentary on specific course topics. The results show that African American college women have experiences that are unique and faculty must be aware of the need to create a safe space in which these students can engage and participate fully.

Sense of belonging is a concept that has existed in the fields of education and psychology for several decades. In general terms, sense of belonging denotes a feeling of relatedness or connection to others. Although specific definitions of sense of school belonging vary, most researchers maintain that school belonging refers to a student's "sense of being accepted, valued, included, and encouraged by others in the academic classroom setting and of feeling oneself to be an important part of the life and activity of the class" (Goodenow, 1993, p.25).

Traditionally, sense of school belonging refers to a student's experience of the full school community, which includes the classroom setting and the interactions that take place therein. While the research base on classroom community in the elementary and secondary grades is extensive (Fredricks, Blumenfeld & Paris, 2004), there has been little research conducted on classroom-level student experiences within the college community. Even fewer studies have been devoted to African American student populations, and even less research exists that is qualitative in nature.

Research shows that African American students enrolled at Predominantly White Institutions (PWIs) have experiences vastly different from their African American counterparts attending historically African American colleges and universities (Guiffrida, 2005; Johnson, et al., 2007). African American students have reported harassment, hostile classroom interactions, feelings of disidentification, exclusion, and low self-esteem (Green & Glasson, 2009; Hope, Chavous, Jagers, & Sellers, 2013). As expected, these negative encounters can have serious long-term effects on a minority student's motivation and desire to complete their degree.

Theoretical Framework

According to the National Center for Educational Statistics, only 59% of full-time, first year students persist to graduation within six years (U.S. Department of Education, 2013). For African American students, only 38% persist within the same time frame. While studying institutional variables is important, equal attention should be given to the micro-interactions that students have with professors and peers that influence a sense of belonging to the larger campus community.

Persistence refers to the continual pursuit of the completion of a college degree (Astin, 1984; Tinto, 1987). Tinto's four-factor model of college retention and persistence includes the student's family background, high school experiences, campus social interactions, and personal attitudes as predictors of African American student satisfaction with college. Of particular interest in the proposed study are the campus social interactions that women of color experience in the classroom setting. Therefore, the purpose of the present study is to examine how (and if) African American female college students experience a sense of belonging in the classroom setting, in particular paying close attention to how faculty and classmates influence pathways to persistence for this group of students.

Related Literature

Sense of school belonging has a long-standing empirical foundation. Belongingness has been studied in K-12 settings (Finn & Zimmer, 2012; Goodenow, 1993), at the postsecondary level (Kay, Summers, & Svinicki, 2011; Morrow & Ackerman, 2012; Pittman & Richmond, 2007) and also at the faculty ranks (Kelly &

McCann, 2014). Students who report higher levels of belongingness in their educational environment have overall better psychological outcomes than students who demonstrate a lower sense of belonging (O'Keeffe, 2013). In postsecondary settings, belongingness has been related to self-esteem (Hope, et al., 2013), positive racial identity (Johnson et al., 2007), major selection and satisfaction, (Green & Glasson, 2009) and increased persistence to degree (Hausmann, Schofield, & Woods, 2007) for African American undergraduates. Those students with a strong connection to their campus community even have better health outcomes (Hale, Hannum, & Espelage, 2005; Walton & Cohen, 2011).

Finn and Zimmer (2012) postulated an identification-participation model of school engagement that is applicable to this study. The model has three components: identification with the school to a minimal extent, a sense of belonging to the school, and a belief that students are welcomed, respected and valued by others. In this theory, identification with the school is a precursor to belonging, which subsequently positively affects student achievement. While academic achievement is not a concept that will be officially measured in the proposed study, African American undergraduate women's performance in their classes is a consideration in the research. Specifically, it is important to note if female students express a connection to their instructors and peers in various courses based on how "well" they are doing and how those interactions influence their perceptions of belongingness.

Role of Faculty and Peers

When examining sense of belonging in the classroom setting, two major players emerge: faculty and classmates. Faculty set the tone for students' interactions and model respect and valuing (Gayle, Cortez, & Preiss, 2013; Wilson & Gore, 2013). The extant literature shows that students with high levels of belonging speak to having had positive experiences with faculty who exhibit a caring disposition, use active learning techniques, and create safe spaces for expression and debate. As Fredricks and colleagues (2004) noted, belonging is an affective type of engagement that encompasses how students feel about themselves and others in the learning environment. As the facilitator, guide, and moderator of the course, faculty are uniquely positioned to create classroom settings where students feel connected to each other as well as the subject matter.

Research shows a strong relationship between instructor characteristics and student sense of belonging. Kay and colleagues (2011) found that professors' beliefs about classroom community building were directly related to student perceptions of belongingness. In their study, instructors were asked about ways in which they facilitated a sense of respect and belonging among their students. Findings of note included a high priority placed on communicating clear expectations, providing multiple opportunities for students to collaborate, and "communing with the information" (p.237). The major limitation of this study is that student perspectives were not included.

While the research base on college student belonging has uncovered important information, there remains a significant gap in our understanding of minority student belongingness; specifically, most studies on this topic are quantitative in nature. There are few qualitative studies that give a narrative voice to the African American student experience of classroom community and fewer that approach it from the vantage point of African American undergraduate women. This study adds to the research base by framing the complex nature of belongingness with the actual words and feelings expressed by African American female college students.

When students from all dimensions of contemporary life come together in the learning process, they can be hesitant to let down their guard. Research shows that learning is maximized when students feel a sense of belonging in the educational environment (Fredricks et al., 2004; Osterman, 2000). When students share a sense of psychological membership with classmates and instructors, they are willing to take risks and challenge themselves with a greater focus on intrinsic and mastery goal achievement. In this respect, the reward for such behavior is greater confidence in one's ability, higher academic performance, and positive peer relationships.

With a greater emphasis on collaborative learning and constructivism, students are expected to engage with others more now than in years past (Fosnot, 2013). Students take their cues from peers, and this togetherness can lead to feelings of support and encouragement or isolation and separation. Evidence suggests that the experiences African American college students have with their peers may be the biggest predictor of belongingness overall (Booker, 2008; Freeman, Anderman, & Jenson, 2007; Hausmann et al., 2007). When students feel valued, respected, and welcomed by their classmates and peers, they report experiencing a stronger bond to the greater campus community. They feel safe enough to share experiences, engage in thoughtful discussions, and offer support to others. Peers can also help buffer the effects of a negative classroom relationship with a faculty member (Sidelinger, Bolen, Frisby, & McMullen, 2011).

African American Undergraduate Women

Research on the curricular experiences of African American college students at Predominantly White Institutions (PWIs) is well documented (Fleming, 1985;

Flowers, 2003; Pascarella, Pierson, Wolniak, & Terenzini, 2004; Schwitzer, Griffin, Ancis, & Thomas, 1999; Thomas, Walters, Horn & Kennedy, 2013). Unlike their counterparts at Historically Black Colleges and Universities (HBCUs), African American students at PWIs report feelings of loneliness, shame, disrespect, fear, and disillusionment with their college experiences. These feelings grow into low levels of belongingness, which can ultimately impact their ability to persist to graduation (Tinto, 1987).

African American women may be especially prone to experiences of dissatisfaction as they are dealing with both gender and racial stereotypes that can affect their tenure in the classroom setting (Harper, Carini, Bridges, & Hayek, 2004; McClellan, 2012). African American female college students report experiencing feelings of renunciation and rejection due to being a binary minority; in other words, they must contend with the microaggressions (Solorzano, Ceja, & Yosso, 2000) that can come from their identity as both a woman and a racial minority. In classes where they are a numerical minority, there can be a sense of frustration when dealing with feelings of invisibility, inferiority, and assumptions about their cultural background.

Method

Research Questions

The present study used a qualitative approach to explore African American female college students' sense of school belonging by way of classroom interactions with faculty members and classmates. The present study examined the following research questions:

1. How do African American female college students describe their relationships with faculty members and peers in the classroom setting?
2. How do these interactions affect their sense of belongingness and persistence to complete a college degree?

Context

This study was conducted at a public institution in a Southern coastal city with long-standing racial and class divisions. The undergraduate student body stands at just over 10,500 enrollees, with the majority being female (62%). The college has 550 full-time tenured, tenure-track, or fixed appointment faculty, of whom only 13% are faculty of color and 44% are women. African American students comprise 7% of the undergraduate population.

Recruitment

Student participants were recruited through the campus office charged with providing outreach and support services to multicultural populations of students. Because the focus of the study was on persistence, it was important to recruit non-freshman participants. As stated previously, the purpose of this study was to explore how African American women experienced the classroom setting via faculty and peer interactions. A secondary area of interest was how, and if, those exchanges affected their decision to remain at the college. For these reasons, first-year students were not included in the recruitment efforts as they had not yet made the decision to return to the college after their first year. An e-mail was sent to prospective interviewees and then students with an interest in participating were asked to contact the author to schedule an interview.

Participants

Participants were six African American upperclass female undergraduates at the institution. The majors represented in the sample included psychology, professional studies, early childhood education (2), vocal performance and theater, and arts management. Of the six participants, all but one was a native of the state, with two having been long-term residents of the city prior to attending the institution. Half of the participants identified that the college currently attended was their first choice. There was one non-traditional aged student in the sample (age 35), who was also enrolled part-time. While grade point average was not obtained through official institutional records, students were asked to provide a self-reported grade both overall and in their selected majors. Five out of the six participants reported A's in their major subject areas, while four of the six students reported an A, A-, or B+ grade point average overall. One participant was a former student of the researcher. Please see Table 1 for a list of student pseudonyms and additional characteristics.

Data Collection

As previously mentioned, the majority of the research on student belonging in college student populations has been deductive in nature. This study used a qualitative approach to examine how African American female undergraduates described their sense of belonging to others in the academic setting. Admittedly, there can be disadvantages to using an interpretist design. Specifically, the small sample size and inductive approach reduces the ability to generalize the findings to other settings. However, in the current

Table 1
Student Participant

Student	Classification	Major
Alana	Junior	Professional Studies
Connie	Senior	Early Childhood Education
Jody	Senior	Arts Management
Kim	Sophomore	Psychology
Shelby	Senior	Theater/Vocal Performance
Tina	Senior	Early Childhood Education

study, there is a distinct benefit to allowing the voices of these women to be heard both individually and collectively. For many students of color, and women in particular, having a chance to vocalize their feelings without recrimination is an important consideration. Whereas these data cannot be used to test a theory or applied to other populations, they can shed light on the lived experiences of this group of students.

Two forms of data collection were employed in this study: focus group interviews and individual interviews. The purpose of the focus groups was to allow the participants to discuss their classroom experiences as women of color at a PWI. During this time, students explored issues of belongingness, faculty interaction, and peer support (see the Appendix for an abbreviated list of focus group interview questions). The focus groups also offered students a chance to hear the thoughts of their peers and comment on like experiences and dissimilar feelings (Hollander, 2004). The focus group interview lasted approximately 75 minutes.

To follow up on ideas expressed in the focus groups, individual interviews were also utilized. Individual interview questions emphasized peer relationships, faculty availability, classroom dynamics, civility and respect (see the Appendix for an abbreviated list of individual interview questions). Each individual interview lasted an average of 40 minutes. Participants were given an opportunity to add, delete, or modify any of their previously expressed thoughts from the focus group. Students were not compensated for their time, although refreshments were provided during the focus group interview.

Data Analysis

With student permission, all interviews were audiotaped. During these interviews the researcher penned analytic field notes as well (Kruger, 2000; Maxwell, 2005). All interview data were transcribed within 48 hours of the session. Transcripts were returned to participants with a request to add, delete, or modify those data in an effort to maintain the accuracy of their perspectives. Once the transcripts were returned, a multi-stage approach to coding was utilized. In this first phase of analysis all confirmed interview transcripts were reviewed, and tentative ideas were captured in analytic notes. In the second phase of analysis a set of codes were developed from emergent categories in the student data (Creswell, 2013). Broad codes (e.g., "lack of office hours") were then reduced to more specific ideas that better described students' thoughts (e.g., "instructor availability"). In the final phase of analysis, themes that surfaced throughout the codes were named. Careful consideration was given to dissenting opinions and data outside the patterns which appeared (Onwuegbuzie, Dickinson, Leech & Zoran, 2009).

Role of Researcher, Trustworthiness and Ethical Considerations

As qualitative research is interpretivist in nature, it is critical that my position in the research study be clear and evenhanded. I am an African American female faculty member at the institution in which the study was conducted. This duality of roles influenced the planning, implementation, and dissemination of this study. As a woman of color who teaches and works with African American women undergraduates, I have biases about this topic and the effect negative classroom experiences can bring to bear on the education of African American college students. It was critical that I took steps to confirm that my findings could withstand the scrutiny of thorough empirical inquiry.

To ensure the highest degree of credibility and rigor in this study, several methods of trustworthiness were employed. The study was vetted and approved by the Institutional Review Board at the present college. This process carefully monitored the types of questions asked, recruitment procedures, and the proposed methods of analysis. Multiple data collection methods were adopted in an attempt to deepen the understanding about this subject and elicit various perspectives. As previously mentioned, all participants were offered the chance to review their transcript prior to data analysis. This form of member-checking allowed the analysis of the data to proceed from a place of accuracy of the participants' perspectives. Additionally, another faculty

member associated with the project reviewed the findings for bias and clarity. Finally, themes were compared to the extant literature base which will be highlighted in the discussion of the study's results.

Findings

The data from the student interviews are presented by thematic categories with illustrative quotations to highlight pertinent information. In both the focus groups and individual interviews, students expressed their opinions on classroom interactions with faculty and peers that can be classified within four themes: (a) Accessibility and Approachability, (b) Authentic Instruction, (c) Spokesperson Pressure, and (d) Microaggressions.

Accessibility and Approachability

Students agreed that the professors with the greatest impact on their choice to remain at the institution were relatable, engaging, and connected with them both inside and outside of the classroom. The respondents all recounted stories of how a particular professor could make them feel a sense of belonging simply by showing interest in them and their well-being. Tina shared with the group:

> Her [Education professor] class was challenging but she was just really into us as a class… not just as students but also outside of school. I remember I told her a story about my niece and she followed up…even though it's not a part of the curriculum or what she has to teach me. I just told her a story and she said a few weeks later, 'Well, how is your niece doing?'… That's really important to care about the student as an individual.

Students expressed similar viewpoints, describing faculty who took a broader view of teaching and did not relegate teaching to only the classroom, but were accessible outside of class for office hours, had virtual chats, and had an "open door policy." Students recognized that, if they had difficulty, the professors who were willing to extend additional time inside and outside of class were often the ones considered "favorites" and "highly recommended." Conversely, students had stories of faculty who did not extend themselves and made students feel shame and doubt if they needed supplemental instruction or support. Jody explained:

> I remember one time I was sick and I couldn't go to class, so I missed the homework assignment, but I could get an excuse because I was legit sick. I went to office hours to explain that to them. I missed class and I know it is very important and so I wanted to see what they did [in class]. They [Business professor] completely shut me down and said, 'Oh well, I don't teach during office hours'…whatever.

As a result of this encounter, the student decided to withdraw from that section of the course, took another professor's section, and then ultimately withdrew from the major entirely.

Authentic Instruction

Women undergraduates noted that the professors who were enthusiastic about the content varied their instruction, and used "real-world" examples made the most significant impact on their decision to remain at the university. Across all courses, from required general education classes to courses in the major, the nod went to professors who took time to use students' backgrounds and experiences to both present new information and assess their understanding of it. Alana described:

> This was a history course, he [History professor] presented it in a way that wasn't traditional in that the topic of the course was tied to the culinary history of food in [city] and just in general. It tied together a lot of important aspects of overall history and then it focused in on local history…then something that appealed to me, appealed to everyone, is the culinary part of it, the food part was very interesting…very relatable and made it practical and made it make sense for us, even for the students who are not from the area. They had an opportunity to be exposed to other parts of the city.

Other students echoed this sentiment with stories of professors who would use everyday examples and apply it to the content. This type of interaction made students feel comfortable and willing "to take a chance" in some subject areas admittedly out of their depth. Kim shared, "I've never taken a stats class before so I was really nervous about it…He [Statistics professor] ended up being an amazing professor…I learned a lot and I still remember some things. He would ask what we liked and personal things about us and apply it to what we were learning."

For many students, faculty of color provided safe spaces to express diverse opinions, which supported their feelings of belongingness in the class. One of the college's African American studies professor was considered by the students to be a favorite because of his ability to infuse class meetings with both conventional and novel instructional approaches as

evidenced by Jody's response:" "I like how the class is…it's equal parts lecture and discussion…he's [Ethnic Studies professor] making you think about what you're learning whereas in the past you just take in information and then spit it back out on the test….but he actually wants you to think about it." In this case, the professor's willingness to make content relatable, use diverse teaching styles, and encourage reflective thinking were appreciated by the students. Shelby felt her major advisor, an African American fixed appointment faculty member, was especially able to show her how to "play the game." Shelby commented:

> What I love about her [Theatre professor] and enjoy so much is how authentic she is…she is true to herself to the core…she can easily fall into line and just play the part while she's here to get along…but she's true to herself…and that's what makes everyone around her feel free to be true to themselves as well.

Spokesperson Pressure

While the previous two examples demonstrated the importance of positive interactions with faculty of color, students also mentioned how some White professors were also prepared to cover tough topics such as class, race, gender, and disability. These faculty members were not hesitant to push students outside of their comfort zones and require critical thinking on sensitive and weighty topics. Jody shared:

> She [Art History professor] was very open, and she's probably one of the first Caucasian professors I've had to 'go there'…she says things I guess I think an African American professor would say…you get what I'm saying? So, that's why I liked her and her class. Some of them [White professors] go there…some of the other ones for some of the other classes…I feel like I have to represent my whole race because it's either me or one other [African American] person.

The aforementioned statement about representation underscores the third theme of spokesperson pressure. Every female student described uneasiness, frustration, and weariness at being "the only one" and feeling a need to represent their group. Shelby said:

> Especially in the music department, it's a male dominant department…so being one of the few African American students in the department…especially when I first came here…I felt invisible but at the same time, very present…a raisin in a bowl of rice…seriously that's how I felt, I felt they were oblivious to my experience and how intimidating it can feel…in a male dominant discipline, White male at that.

Students wanted to maintain their individuality and be seen as their own persons, but they carried the burden of being seen as the representative of their race (Steele & Aronson, 1995). Participants felt this was not only an issue with faculty, but with classmates as well. Jody recounted:

> He [Music professor] wanted us to listen to a sample of music, then he asked, 'what do you think about the music?'…So you have a bunch of these White kids in there, and he asked them what they think about rap music…and they say, 'oh, it's promoting drugs and it's promoting gang violence…' and I'm just sitting there like, what?…you get looked upon like you have to stand up for your whole race…if you don't do that, you have all of these misperceptions that they [White students] float out there…at the same time how can I be one person representing my whole race?

Two participants, who are members of an early childhood education cohort, discussed a common experience they had in which a White male professor called on them to share their opinion about a civil rights hero. Tina asked Connie, "Do you remember last semester when we were talking about Rosa Parks? The history [class]… he called on us…he was like, 'what's your opinion?'" Students believed they were unduly asked to share perspectives only when the topic matter was about African Americans especially as it pertained to poverty, crime, music, or civil rights. In this way, they often felt marginalized to the fringes of class discussions.

Microaggressions

Connie spoke about a time when she was personally offended about the type of language used during a class discussion. She shared:

> One time I had a professor…I was taking art history and she was describing this painting and there was a Black woman in the background…I don't know if this was a bad word, but she referred to her as an ugly *nigress* or something like that, and I was offended by it and like no one else [classmates] really thought about it.

When asked if these types of interactions and "call outs" affected their decision to persist at the college, students all agreed that it weighed on their minds and affected how they perceived certain faculty and peers, but not to the degree that it would cause them to

transfer or withdraw. If anything, they chose to stay in spite of the less than welcoming contact they received.

When asked about their peer group and how they communicated with classmates, the women in the study were careful not to qualify all White students as oppositional; however, almost all participants had stories where they experienced microaggressions, or subtle disparaging comments, that sought to undermine their performance in certain classes. Shelby replied:

> What I experienced here [in the college's music department] was not getting parts…they would say, you don't fit the 'physicality' that we want…or basically they're not ready to see an African American female and a White male in a love relationship on stage…in the music department…for a long time, I sort of believed that.

Participants described how students in some classes could be very naïve and sheltered about people of color and make comments that could be perceived as rude and off-putting. Jody mentioned:

> We were in class discussing marriage and family and at the next table there is a group of white kids talking about babies… one says, 'Yeah, if I have a baby I'm going to give it a Black name!'…. I think, 'Well, what is a Black name then?' No one, including the teacher, said a word.

Students wanted both faculty and classmates to be more open and inviting of their participation in class and not just during special times of the year or when the conversation is only about race. Alana said, "It can be really easy to get discouraged in this type of environment. Because the types of students that are here don't always mirror your background. They aren't always as accepting as your own group. That impacts it a lot." The women in the study felt there were so many misconceptions about women of color that open dialogue should be encouraged, not dismissed. Shelby offered, "Instead of assuming something or just drawing blind conclusions, ask me…I'm here…I don't mind talking to you…I'm not the big bad wolf…I don't bite…I like to believe I am approachable and open enough for people to just ask me."

Discussion

The results of this study show that African American undergraduate women have classroom experiences that are dissimilar from other demographics of students. Through in-depth focus groups and individual interviews, data were obtained to show how faculty and peers can both facilitate and become obstacles to a sense of belonging in the classroom setting. Tinto's (1987) theory of student departure contends that both academic (i.e., faculty interactions) and social (i.e., peer interactions) integration are significant factors that influence a student's willingness to persist and graduate from the institution.

What can faculty do to heighten classroom belongingness and provide all students with an engaging and supportive learning experience? The findings of the present study speak to how faculty who were accessible, seemed approachable, and were authentic in their interactions became important reasons as to why these undergraduate women persisted. Faculty who took time to establish relationships both inside and outside the classroom were considered exceptional professors and made students want to participate and engage while in the classroom setting. These professors made the subject matter relatable, provided useful examples, and showed they wanted to students to do well in the class. Those types of interactions are similar to what has been found in the work of Bain (2004) and others (Case, 2013; McKeachie & Svinicki, 2013; Rychly & Graves, 2012) who argue that faculty must create a safe place for the expression of ideas and perspectives, maintain a sense of positivity in their interactions, and treat students uniquely and not with a broad brush of uniformity (Guiffrida, 2005).

While students reported having some professors who were likable and treated them with respect and consideration, they also discussed feelings of isolation, separation, and fatigue from race representation. Students frequently mentioned loneliness while in their courses and not wanting to always have to defend their race or correct some misperception from faculty and/or students. The constant weight of being "other" and not being fully integrated into the life of the course was difficult for students. Research shows that faculty who take a culturally responsive view of teaching and learning (Gay, 2010) are willing to teach from the perspective of all students and not interact with students of color only when the lesson requires it. Faculty must also be aware of how both slight, biting comments and questions students pose in front of each other can have a deleterious effect on student performance. When students feel on edge, guarded, and defensive, learning is minimized (Dunlosky, Rawson, March, Nathan, & Willingham, 2013). The undergraduate women in this study wished to be active participants and wanted to have frank and open discussions with both faculty and peers, but the environment must be primed for it. In this case, faculty have to be prepared to reflect on how their beliefs and background affect the classroom setting and all the players therein.

Peer group behavior influences how all students get along and work together in the learning environment. As Astin (1984) and Tinto (1987) both noted,

involvement is key. Without feeling like a part of the greater learning community, students of color can be shortchanged. They can feel excluded, which negatively affects their performance in the course and subsequently influences degree completion. It is useful to note that achievement, in the sense of grade point average, was not a focus of this study. Rather, the goal was to ascertain how interpersonal exchanges can affect the psychological membership minority women experience in the classroom setting. All of the student participants said they chose to stay at the institution *in spite of* how they might have been treated by other students and faculty. Some mentioned considering transferring to another school, while others were resigned to "stick it out." In the face of these data, it could be argued that there was some other tangible or intangible factor that promoted their desire to persist to degree. One senior participant who was born and raised in the same city as the college simply said it was "easier" to stay there so she could maintain her close-knit family relationships. Another senior noted that her African American friends from high school were experiencing similar forms of isolationism and prejudice at their respective colleges, so it "wouldn't be better there anyway."

While the themes that emerged were present throughout the group, there were some threads that were more prominent in some of the women participants. For example, the majority of the sample were seniors who could reflect on their four-year experience with a measure of introspection that was not as discernible in the sophomore and junior participants. They could provide a deeper landscape of the college having matured over time, while the sophomore and junior women did not have the same longitudinal view. In the case of the sophomore, this finding could be due to less time enrolled at the institution, or because of the part-time nature of her enrollment as was the case with the junior, non-traditional student.

While the motivation of this study was solely on in-class interactions, there is evidence to suggest that African American students create counter-spaces in an effort to regain composure and a sense of identity in response to the microaggressions they experience on a regular basis (Solorzano et al., 2000). In fact, in the course of this research study the participants expressed gratitude at the opportunity to share their thoughts with others who had experienced similar incidences. While we want all students to feel a sense of community and shared purpose at their institutions, it is clear that these women of color still desired a place where they could speak and disclose in a free exchange.

At an institutional level, faculty and administration can use the findings from this study to engage instructional staff in the importance of classroom community and a sense of belonging. It is important that senior staff and administration raise awareness that diverse populations of students will have experiences that are unique and noteworthy to the instructional process. Dedicated time for diversity training, monetary compensation for professional development, and partnering with other institutions are ways that campuses can begin to address some of the impediments to belongingness that students of color may have. As the ultimate goal is to move all students to degree completion in a timely manner, fostering classroom respect, valuing, and engagement is key to this objective.

Limitations

While the use of a qualitative approach was deemed most applicable for the study, this type of inquiry is not without some limitations. First, the sample of students in the present study was small, so the generalizability of findings is narrow. However, there is utility in engaging African American women in discussions about their classroom experiences at Predominantly White Institutions (PWIs). The more faculty and support staff know about the variety of experiences this population faces, the more we can target our practices to increase minority persistence to degree.

Another limitation of the study is in the types of data collected. Individual interviews and focus group interviews were the methodology selected. What people say in interviews can be different from what they actual do in a particular setting. Incorporation of classroom observations, use of journaling throughout the semester, and faculty interviews would be useful additions to the study. Observing what takes place in the classroom environment and discussing these findings with faculty could provide an additional layer of contextual information to our understanding of minority college student experiences.

Future Directions

This study examined the classroom experiences of African American women undergraduates at a PWI; however, there are other populations of students for whom the issue of belongingness is relevant. Data show one-third of African American males who begin college at a public institution will obtain a degree within six years (Harper & Harris, 2012). Some of the identical curricular issues that trouble African American women are present in their same-race, opposite-sex counterparts. Using an anti-deficit framework, Harper (2010) has shed light on how some African American male undergraduates persist in the face of disengagement, isolation, and microaggressions by classmates and instructors. The men in Harper's study found that an effective response is to not internalize

damaging stereotypes, but to proactively seek ways to improve their academic performance. One of these methods is through regular and sustained interactions with faculty, which has strong empirical support in the literature. Other approaches included becoming active in campus groups that were personally and professionally meaningful. Finally, African American males who persisted to graduate extolled the benefits of mentoring other students of color in an effort to strengthen their bond to the institution. In all of these ways, it is clear that the African American male college students in Harper's study chose to become connected, either via the classroom setting or through selected peer group affiliations. This finding harkens back to Tinto and Astin's work on college persistence and the importance of academic and social integration during the undergraduate experience. While there is an absence of male students in the present sample, there is now a stronger understanding about persistence for African American women and how classroom interactions can support or hinder their sense of belonging. In the future, research can explore other specific factors that influence women of color to persist, which could be parallel to those of their opposite-sex, same-race counterparts.

Additionally, in the current study, there were no female students represented from the STEM fields, which has a culture all of its own that can affect student perceptions and degree persistence (Johnson, 2012; Steele, James, & Barnett, 2002). Research shows that undergraduate women in the sciences report incidences of loneliness and a lack of connection with faculty and peers at a higher rate than women in other disciplines. In the present study, the participants spoke primarily of how their classroom experiences were influenced by race. Because the college setting of this study is predominantly female, with women out enrolling men by 2 to 1, the salience of gender to the women in this sample may not have been as critical as race. Future studies can explore the relationship between possessing a binary minority status and sense of belongingness for college women of color.

A final area of research consideration rests in the preparation of faculty and staff when dealing with diverse populations of students. Faculty should confront biases and assumptions about minority student ability, be cautious when attributing characteristics to students based on preconceived notions, and ensure that overt forms of power and subversion do not go unchecked in the classroom (Stambaugh & Ford, 2015). Instructors must be aware that students' academic performance and subsequent persistence to degree are a delicate mixture of affective, behavioral, and cognitive factors. Faculty may not be able to affect previous learning experiences or current study habits, but they do exert great influence on the connections students make with them and their classmates. Future research can address all of these ideas and also give faculty an opportunity to weigh in on how they establish a sense of community in their courses via specific instructional strategies, relational dynamics, and engaged practice.

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Appendix

Sample Focus Group Interview Questions

- Give me three words to describe the faculty at [name of institution].
- What can a professor do to make you feel a sense of belonging in their class?
- Talk with me about issues of diversity and multiculturalism in your favorite/least favorite classes.

Sample Individual Interview Questions

- Describe the students at [name of institution] in three words.
- What kinds of classroom interactions do you want with your peers?
- If given the chance to go back into time, would you still have attended [name of institution]? Why or why not?

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Use of Open Educational Resources: How, Why and Why Not?

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Open Educational Resources (OER) and OpenCourseWare (OCW) target barriers of education and learning by sharing knowledge for free to benefit self-learners, educators, and students. This study aims to investigate the use of OER both as a supplementary resource for a traditional course and as a resource for self-learners. First, the attitudes and perceptions of undergraduate students toward using a General Physics Laboratory OER and about how those resources contributed to the outcomes of the course were determined. Second, public usage of resources was assessed by analyzing OER access statistics. Resources were designed to encourage students to review experiments before laboratory sessions. Results indicated that students who used the OER experienced benefits to their learning processes. In line with their aim, the resources facilitated preparedness for the course. More than half of the respondents deemed supplementary resources unnecessary. On the other hand, self-motivated learners found, reviewed, and benefited from the resources.

Rapid developments in technology and its influences on society have brought both opportunities and challenges to education. Educational institutions are continuously seeking more effective ways to share knowledge online with students, educators, and graduates (Johnstone & Poulin, 2002). Nevertheless, most of these resources are not easily accessible or available for public use (OECD, 2007). In response, Open Educational Resources (OER) or OpenCourseWare (OCW) has emerged as a movement that aims to eliminate the barriers to sharing knowledge for free and making it reachable for everyone (Caswell, Henson, Jensen & Wiley, 2008; Duval & Wiley, 2010; OECD, 2007). Despite a small difference between OCW and OER, the terms are mostly used interchangeably. Both OCW and OER offer free educational materials to all learners, but while OCW is a collection of materials organized as courses, OER can consist of any size and type of materials. In other words, each OCW is an OER, but not every OER is an OCW (Terrell & Caudill, 2011).

OER targets the free availability to everyone of the entire sum of human knowledge in any place at any time (Matkin, 2005). OCW promotes life-long learning by sharing educational resources online for self-learners. It improves quality of education by guiding teachers as well as providing complementary resources for students and is defined as a digital collection of educational materials designed as a course (OCW Consortium, 2013a). Creating and sharing free and accessible knowledge is not only important for educational institutions, but also supports global goals that extend beyond schools. High quality education seems to be key for maintaining peace, establishing sustainable social and economic developments, and encouraging intercultural dialogue, all spheres where OER is believed to have strategic influence (UNESCO, 2013). In 2002, UNESCO organized the First Global OER Forum to investigate the possibility of universal access to high quality education (UNESCO, 2013) and the impact of OCW on higher education in developing countries (Johnstone, 2005). The Massachusetts Institute of Technology (MIT) OCW project and similar projects of other US universities were presented and discussed throughout the forum, and the premise of OER was one of many outcomes (Johnstone, 2005). As a result of the exponential growth of free and accessible information, the OER movement is becoming more common around the world (Rhoads, Berdan, & Toven-Lindsey, 2013). OER materials are regularly published with an open, Creative Commons license, which allows users to duplicate, edit, and reuse materials in alignment with defined educational purposes. Another distinctive feature of these materials is educational intent, even though they might have not been published with that aim originally (White & Manton, 2011).

The Organization for Economic Co-operation and Development (OECD), foreseeing OER as a major educational tool, listed reasons for sharing knowledge for free from the perspectives of stakeholders. Institutions are prone to information sharing, as it is in line with academic tradition, leads to tax leverage, may result in quality improvement, and elevates public relations. Moreover, faculty and researchers are eager to share since it complies with academic values and may increase publicity and reputation (OECD, 2007). Despite the digital divide in terms of technology and Internet availability, the OCW movement has still managed to succeed in helping faculty members to enhance teaching environments (Kasraie, 2012). Smith and colleagues reported barriers for adoption of OCW as economic issues at the institutional level, intellectual property rights problems, faculty members' attitudes towards sharing, and adequate technological reach (Smith & Casserly, 2006). Later, copyright issues emerged as the greatest concern of OER, along with

sustainability (Hylen, Van Damme, Mulder, & D'Antoni, 2012). Incentives of OER have been listed as increased institutional branding, student appreciation, and faculty motivation (Smith & Casserly, 2006). Respondents of a survey at the Delft University of Technology (TUD) pointed out that they accessed OCW to gather information about studying at TUD, second only to increasing their expertise (Dopper, 2011). The OCW Consortium Europe surveyed higher education institutions to identify best practices for implementing OER/OCW and identified the factors facilitating initiatives as faculty members' positive attitudes and institutional factors such as encouragement, policy-making, resources, and incentives. Lack of support, negative attitudes of faculty, intellectual property challenges, and difficulty accessing high quality open resources for reuse have also been listed as barriers (Tovar & Zamora, 2012).

In a study conducted in order to identify reasons that contribute to or prevent the use of OCW by the public, researchers found that their population sample reported incentives such as self-directed learning, convenience, and quality, while disincentives were lack of support, certification, content, and resources (Arendth & Shelton, 2009). Additional potential benefits of open resources include usage as supplementary materials to enable or improve understanding (Smith & Casserly, 2006). MIT students' main motivations for using OCW were to preview a course before enrollment, to supplement on-campus courses, and to review past courses (Matkin, 2005). Similarly, users of the Tufts University OCW visited the site for personal learning, supporting an in-class course, making enrollment decisions, and keeping knowledge up-to-date (Tufts University, 2011). Parallel to that, researchers have concluded that open resources are also being used to support traditional teaching (Tovar & Zamora, 2012). For the 28 countries that responded to the 2011 OECD questionnaire, the most relevant advantages for using OER were listed as the opportunity for open and flexible learning environments and increased quality and efficiency of learning materials (Hylen et al., 2012). A user feedback report was recently released that noted the following ways of using OCW: to help studying for a course, to supplement teaching materials, to benefit specific projects, to update skills or knowledge, and to fulfill personal interests (OCW Consortium, 2013b).

METU OpenCourseWare

After an Internet connection was established in Turkey in 1993, many faculty members started to share course materials on personal web sites (Wolcott & Cagiltay, 2000). However, these were only individual attempts. There was no nationwide OCW initiative in Turkey until 2007, when the Turkish Academy of Sciences (TUBA) organized the kick-off for a nation-wide OCW project with delegates from 24 universities and research institutes. After the meeting, TUBA initiated a national OCW consortium (TUBA, 2013). Even though 61 universities endorsed the project, only eight completed institutional OCW sites. Among these universities, Middle East Technical University (METU) has sustained the largest system. The METU OCW project officially started on April 16, 2008 (Kursun, Cagiltay & Can, 2014). Since then, the Instructional Technology Support Office (ITS), one of the administrative units of METU, has provided assistance to academic staff publishing courses as OCW. Instructors who are willing to share their course materials contact ITS, and resources are prepared. The scope of course contents depends on the instructor's enthusiasm for sharing and diverges from the syllabus and weekly schedule to include enriched educational materials such as lecture videos or notes, assignments, and other resources. Instructors provide notes and assignments, while lectures are recorded by ITS. After the approval of the instructor, courses are brought into public use. All educational resources presented are licensed with the Creative Commons Attribution-Non Commercial-ShareAlike License. As of December 2014, METU OCW had 107 courses from 31 departments and 5 faculties. The METU OCW has been visited by 289,876 individual visitors, accessing 395,415 pages since launch. According to a Google Analytics report, 17,711 visits were made between March 1 and March 31, 2014, by 13,959 individual users accessing 80,422 pages. Although some materials are in Turkish, most are in English, the official instructional language of METU. Therefore, the METU OCW is usable not only by students in Turkey, but also from other countries. An analysis of viewers showed that almost half of the visitors accessed the site from outside of Turkey. During the same period in March 2014, the METU OCW had 1,207 visitors from the USA, 894 from India, 429 from the Philippines, 373 from Indonesia, 257 from the UK, 248 from Pakistan, 157 from Malaysia, 134 from Germany, and 123 from Egypt.

General Physics Laboratory Experiments as OER

General Physics Laboratory is a part of the General Physics courses at METU, which are two-semester courses and mandatory for the majority of undergraduate students. In addition, two courses are offered for specific departments with appropriate coverage changes. Each semester, students attend laboratory sessions and conduct five experiments. The different courses also have five experiments, and there are two introductory experiments for each course.

For maximum effectiveness of laboratory intervention, student preparedness is a key factor. To encourage students to review experiments before laboratory sessions, the Department of Physics and ITS collaborated to design and develop video recordings of all 12 experiments. Teaching assistants conducted each experiment in front of the camera, voiceover was recorded, and recordings were edited. Registered students of General Physics courses were informed about the video experiments by their teaching assistants and flyers distributed in the laboratories. Usage was not a requirement of the course but suggested as a voluntary supplement. In 2014, 62,000 activities of guest users were logged for those resources.

Research on OER and OCW has focused on the benefits and challenges of using the resources as well as preparing them. However, the perspective of end-users has received little attention. Moreover, when it has been considered, those studies have focused on the overall effects of OCW rather than the actual effects of a specific course. This study aims to determine the attitudes of undergraduate students toward using a General Physics Laboratory OER and how those students perceive the contribution of the resources on the outcomes of the course. Suggestions from students for improvement are also introduced. Although the General Physics Laboratory resources were designed as supplementary materials, they are also open to self-learners. Therefore, a second aim of this study is to assess public usage of these resources.

Methods

This two-stage study was designed to observe local and global usage of a General Physics Laboratory OER hosted by METU OCW. For the local usage and effect of the resources, a survey was administered to METU students; YouTube statistics were analyzed for global usage.

Survey Participants

This study was conducted in the spring semester of the 2012–2013 academic year. A total of 710 (296 female and 411 male) undergraduate students enrolled in a General Physics course replied to a paper-based survey. Nearly all (97.7%) of the participants were freshmen, since General Physics is required in the first-year curriculum (see Table 1). The majority (74.5%) of the participants were from the School of Engineering (Table 2).

Data Collection and Analysis

Data for local usage analysis were collected at the end of the semester via a printed survey developed by the researchers. The survey consisted of 18 questions: 8 to obtain descriptive information about students and 10 to understand how students used the system and its benefits. Fifteen questions were multiple choice and analyzed by SPSS software; three were open-ended and qualitative data analysis was applied to create themes.

To observe the global usage of OER, statistics were collected by the researchers from YouTube, the platform hosting the experiment videos. Lifetime statistics began January 25, 2013 (the day of creation). Video performance as well as audience engagement, geographic locations, discovery methods, traffic sources, devices, and retention data were analyzed.

Table 1
Class Distribution of Participants

Year	Frequency	Percent	Cumulative Percent
1st	694	97.7	97.7
2nd	9	1.3	99.0
3rd	5	0.7	99.7
4th	2	0.3	100.0
Total	710	100.0	

Table 2
Distribution of Participants

School	Frequency	Percent	Cumulative Percent
Education	68	9.6	9.6
Engineering	529	74.5	84.1
Art and Science	113	15.9	100.0
Total	710	100.0	

Table 3
Participant Responses to Sources of Information About OCW

Source of Information	Frequency	Percent
Teaching Assistants	263	37.0
Flyers	165	23.2
Peers	141	19.9
Instructor	49	6.9
Other	28	3.9
Media	9	1.3

Table 4
Reasons for OER Use

Reasons of Usage	Frequency	Percent	Valid Percent
Readiness for experiments	244	34.4	90.4
Both readiness and review	14	2.0	5.2
Review of experiments	9	1.3	3.3
Other	3	0.4	1.1
Total	270	38.0	100.0

Table 5
Distribution of Contribution of OER Responses

Contribution of OER	Frequency	Percent
Assisted with effective experiments	155	21.8
Enabled comprehension	151	21.3
Reduced the time required	117	16.5
Reduced number of questions	75	10.6
Improved grade	41	5.8
Other	3	0.4

Results

Results of the study are presented in two parts: survey results and usage statistics.

Survey Results

OCW awareness and source of awareness. Participants were asked whether they were aware of the General Physics Laboratory OER videos published on the METU OCW portal. From a list including flyers, peers, teaching assistants, instructors, media, and other, participants were asked to select sources of information about OER; multiple selections were allowed (see Table 3).

Over 76% of participants were aware of the OCW, listing teaching assistants, flyers, and peers as their most frequent sources of information. Instructor was one of the least frequent sources. Moreover, 23 participants noted other sources of information, reporting that they discovered the resources by themselves via online search, on social network sites, or while surfing the OCW portal.

Frequency and purpose of OER usage. Students were asked about their usage of the General Physics Laboratory OER. Students who affirmed using the resources were asked about their frequency and purpose of usage. The frequency question also indicated when students preferred to access the OER. Among 706 (99.4%) participants, 287 (40.4%) stated that they had used the OER, while 419 (59.0%) had not. Out of that group, 110 (41%) used the OER for each laboratory session, 134 (50%) used the resources for some sessions, and 24 (9%) used the resources a few times. The majority of participants (82.1%) preferred using the resources before laboratory sessions, while 7.1% used them both before and after, and 1.8% used resources

only after sessions. Parallel to these findings, among 270 participants who responded to the question, the dominant reason for use (90.4%) was to be prepared for experiments (see Table 4).

Contribution of OER. The perception of participants about the contribution of the OER to their learning processes was also examined. They were asked to specify its contribution by selecting from a list of benefits: assisted in conducting effective experiments, reduced the time required to conduct experiments, enabled comprehension of experiments, reduced number of questions for teaching assistant, and improved grade. Multiple selections were allowed. Out of 272 respondents, nearly every participant (91.9%) affirmed the positive contribution of the OER. The most frequently selected contributions were on conducting experiments effectively (21.8%) and easing comprehension (21.3%). Reducing experiment length was mentioned by 16.5% of responders, and relatively smaller groups, 10.6% and 5.8%, respectively, believed that the OER reduced questions asked of teaching assistants or improved grades (see Table 5).

Advantages of OER. In response to an open-ended question, 109 participants provided advantages of OER. The most common theme mentioned was preparedness for experiments (see Table 6). The second most underlined advantage was the facilitative effect of OER on comprehension. Moreover, resources were observed to reduce the time required to complete laboratory activities and increase the effectiveness of those activities. A few students also mentioned increased ability to memorize information and improved grades.

Reasons for OER not being effective. One open-ended question investigated why students thought that the OER was not effective, and only 16 participants responded. The most common topic, mentioned by six participants, was about the content of the video materials. Those students thought that the materials were superficial, focusing on how to conduct the experiments without addressing the aim or providing enough information. Furthermore, the narration of the experiments was described as fast, fuzzy, ineffective, and insignificant. Other students mentioned that since the experiments were conducted in the laboratory and the teaching assistants reviewed the experiments beforehand, resources such as reports and quizzes were unnecessary. Three students explained that since the experiments were not complex, they did not need supplementary materials.

Table 6
Frequency of Mentioned Advantages of OER

Advantage of OER	Frequency
Enabled preparedness for experiments	64
Enabled comprehension	39
Reduced the time required	21
Increased effectiveness	17
Enabled safer experiments	3
Improved grade	2
Increased ability to remember	1

Table 7
Distribution of Reasons Not to Use the OER

Reasons for Disuse	Frequency	Percent
Lack of need	103	14.5
Not being informed	88	12.4
Shortness of time	45	6.3
Satisfactory resources	19	2.7
Indifference to course	13	1.8
Unattractiveness	13	1.8
Other	4	0.6
Use of other resources	2	0.3
Did not come to mind	1	0.1

Table 8
Video Duration of Experiments

ID	Name of the experiment	Duration (min)
I1	Measuring Instruments	03:03
I2	Measurements, Errors, and Graphs	02:03
1	Uniform Motion with Constant Velocity	02:22
2	Linear Motion with Constant Acceleration and Motion in a Plane	02:06
3	Atwood's Machine	01:38
4	Collisions and Conservation of Linear Momentum	05:09
5	Rotational Motion	02:31
6	Ohm's Law, Series and Parallel Combination of Resistors	06:53
7	Equipotential and Electric Field Lines	02:51
8	Constructing an Ammeter and a Voltmeter	06:08
9	Charging and Discharging a Capacitor	02:49
10	Force on a Current Carrying Conductor	05:52

Table 9
Video Performance Statistics

ID	Number of views	Estimated minutes watched	Number of subscribers
I1	755	991	0
I2	2,779	1,938	11
1	1,587	1,807	3
2	1,589	1,656	7
3	821	890	1
4	2,010	4,210	2
5	668	897	2
6	5,005	8,493	11
7	1,968	3,145	5
8	1,332	1,882	2
9	3,485	4,458	6
10	458	1,125	0

Table 10
Average View Durations of OER Videos

ID	Average view duration (min)
I1	01:18
I2	00:41
1	01:08
2	01:02
3	01:04
4	02:05
5	01:20
6	01:41
7	01:35
8	01:24
9	01:16
10	02:27

Table 11
Economic Development Distribution of Top 10 Countries According to Average View Duration

Economic development level	Number of countries
Least developed	4
Developing	50
In transition	7
Developed	15
Not known	1

Note. Palestine was not included in the country classifications

Reasons not to use the OER. The participants who reported not using the resources were asked to note why, and 288 of 419 participants responded to the open-ended question. The most common response was mentioned by 103 participants: lack of need for the resources. Supporting that response, satisfactory course resources such as books, laboratory manuals, and teaching staff, as well as the use of other resources, were also mentioned. Other reasons included not being informed, shortness of time, and unattractiveness of the OER (see Table 7).

Improvement suggestions. Suggestions from students for improvement to the OER were investigated by an open-ended question, and 43 participants responded. The main theme was content. Participants stated that content needed to include more details such as the goals and results of experiments, more resources to explain laboratory reports and calculations, and more examples of quizzes. In addition, interactive resources for tasks such as report preparation could be helpful. Furthermore, enhancement of audio and visual quality were suggested. Finally, participants noted that the order of the experiments in the OER portal should be rearranged in parallel to the laboratory curriculum and the resources should be kept up-to-date.

YouTube Statistics Results

The 12 experiment videos were published on YouTube for public use both as a playlist and as independent videos. They ranged in duration from 01:38 to 06:53 (see Table 8).

Video performance. The total number of views, estimated minutes watched[1], and number of subscribers earned after watching each video defined its performance. Experiment 6 was the most popular experiment, and Experiment 10 was the least popular (see Table 9). Given the small numbers of subscribers (1,867 at the point of data collection), audiences preferred individual visits, but Experiments I2 and 6 had the highest influence on subscriptions.

Audience retention. This section reveals average total view duration and viewer geographic locations. Audience retention is reported as "an overall measure of your video's ability to retain its audience.[2]" According to average view durations, more than half of only four videos were viewed. Viewers of Experiment 1 watched 82% of the video on average, or 1:08. Viewers watched more than half of Experiments 3, 5, and 7 on average, though less than a quarter of Experiments 6 and 8—the longest videos at over six minutes. Data about viewer geographic location was used to determine the economic development, income, and region of the audience. For analysis, countries were sorted by average percentage viewed, and after compiling the top 10 countries for each experiment, a list of 79 countries was generated. The average percentage viewed was highest from developing countries compared to other development levels[3] (see Table 11) and primarily from upper-middle and high income countries[4] (see Table 12). Interestingly, Experiment 8 attracted more low and lower-middle income countries (7 out of 10) than other videos. In contrast, all countries analyzed for Experiment 2 were of upper-middle or high income.

Audience engagement. An audience may present feelings about a video by clicking thumbs up or thumbs down buttons, leaving comments, or adding it to a list of favorites. For the OER videos, audience engagement was low but positive (see Table 13). Only Experiment 9 received dislikes, while Experiment 6 received the highest number of likes and the only share. Experiments 4, 7, and 8 were each added to favorites once.

[1] "This shows the estimated amount of time that a viewer has watched a video. This way you have a better sense of what content viewers actually watch, over those that they click on and then abandon." https://support.google.com/youtube/answer/1714329

[2] https://support.google.com/youtube/answer/1715160

[3] World Economic Situation and Prospects 2014, UN, http://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

[4] Country and Lending Groups, World Bank, http://data.worldbank.org/about/country-and-lending-groups#IDA

Table 12
Income Distribution of Top 10 Countries According to Average View Duration

Income	Number of countries
Low	10
Lower-middle	14
Upper-middle	29
High	25
Not known[5]	1

Table 13
Audience Engagement Statistics

ID	Likes	Dislikes	Comments	Shares	Favorites added	Favorites removed
I1	4	0	0	0	0	0
I2	5	0	0	0	0	0
1	1	0	0	0	1	1
2	1	0	0	0	0	0
3	1	0	0	0	0	0
4	4	0	0	0	1	0
5	2	0	0	0	0	0
6	10	0	1[5]	1	0	0
7	4	0	0	0	1	0
8	1	0	0	0	1	0
9	4	4	0	0	0	0
10	2	0	0	0	0	0

Table 14
Average View Duration Statistic by Device

ID	Computer	Mobile Phone	Tablet
I1	1:18	1:05	1:33
I2	0:40	0:48	0:54
1	1:06	1:16	1:28
2	1:00	1:22	1:07
3	1:04	1:02	1:23
4	2:01	2:31	2:15
5	1:18	1:37	1:33
6	1:41	1:37	1:41
7	1:35	1:49	1:29
8	1:24	1:24	1:30
9	1:16	1:21	1:14
10	2:25	2:48	2:26

[5] Comment was spam and removed by the administrator.

Audience geographies. The geographic locations of the audience were sorted according to total views, and the top five countries were analyzed. Turkey, India, and the United States were among the top locations for all videos. The other countries, in descending order of appearances in the top five, were Canada, the Philippines, the United Kingdom, Malaysia, Egypt, Nepal, South Africa, Indonesia, and Saudi Arabia. Although the top five countries varied according to number of views, when average view durations were compared, nine of the videos were watched longest in Turkey. Experiments 2 and 3 were watched longer in India, whereas Experiment I2 was watched longest in the Philippines and Egypt. Moreover, Canada tied with Turkey in average view duration for Experiment 8.

Sources of discovery. The top two traffic sources for the audience were YouTube searches and external links such as Google, Yahoo, or Facebook. In addition, YouTube playlists, direct connections,[6] and embedded players appeared in the top three sources of discovery. Although direct connection was not the most common source of discovery, those who used that source watched videos longer.

Audience devices. The three most common devices used by the audience were analyzed: computers, mobile phones, and tablets. Computers had the highest share for all videos with over 75% of views. However, audiences who used mobile devices tended to watch videos longer than computer users (see Table 14). Only Experiment 6 was viewed equally long on computers as on mobile devices.

Discussion and Conclusion

OpenCourseWare (OCW) and Open Educational Resources (OER) have emerged to address life-long learning by sharing knowledge for free and by making educational materials more accessible. OCW/OER targets public use as well as educators and students. This study aimed to clarify the viewpoint of students on the educational contributions of OCW/OER.

In order to provide educational materials to help students prepare for sessions, General Physics Laboratory experiments were recorded and published online. Students who attended sessions were administered a printed questionnaire to capture how materials were used, their benefits, and suggestions for improvement. With the help of teaching assistants, flyers, and peers, the majority of the students heard about the OCW; however, more than half of the students did not use the resources. Likewise, students of FGV Online, a Brazilian school, reported peers as a source of information, accompanied by online search (OCW Consortium, 2013b), implying that a larger proportion of Brazilian students found resources by searching compared to METU students.

The primary reason for not using the resources was lack of need. Students believed that available course materials and the guidance of teaching assistants were satisfactory for expected success. It could be said that need is crucial for the use of OER. If learners need resources, they search for and find them. In addition, some students mentioned that they were not informed about the OCW, ran short on time, or found the resources unattractive. Awareness of OCW has been highlighted by the OCW Consortium as a reason for not using materials as well (OCW Consortium, 2013b). Similarly, lack of time has also been mentioned in the literature (Hylen, n.d.).

An overwhelming majority of students who adopted the OCW used the resources before sessions either for each experiment or for some of them. Parallel to both the scheduling of use and purpose of the materials, students mentioned that they used the OCW to be ready for experiments. This usage trend is similar to the findings of FGV Online, in which students benefited from OCW for quick review of subjects (OCW Consortium, 2013b). Moreover, participants believed that the OCW had a positive effect on their learning processes. The main contributions and advantages included increasing the effectiveness of experiments, facilitating comprehension, and reducing time required to conduct experiments. A few students mentioned improvements in grades.

The primary criticism of the OCW was the content. Students expected detailed and comprehensive content, including information on reporting, examples of quizzes, and interactive materials. However, the content of the video materials was framed by the coordinators of the General Physics Laboratory, and expected observations and laboratory reports were deliberately omitted in order to prevent replication of results without experimentation or careful observation. Enhancing the materials in terms of audio and video quality was among the top suggestions provided by the students. These findings correspond to the findings of the OCW Consortium, which has highlighted the need for various types of materials (OCW Consortium, 2013b).

According to YouTube statistics, the duration of a video should be less than five minutes, after which average view duration drops drastically. However, depending on content matter, videos may need to be longer. Capturing attention with fun facts or interaction

[6] Views from unknown referrers on mobile apps and direct traffic on the YouTube video and channel pages. Possible origins of direct traffic include email and instant messaging clients or pasting an URL into a browser.

around each second minute would be a useful tactic. Furthermore, as mobile devices are being used by more learners to reach resources, platforms should be adaptive and feature low quality or standard definition options for devices with limited data packages. YouTube statistics also show that the curriculum of a country can affect audience geographies. The most watched video was on Ohm's Law, a common topic for almost all countries. Moreover, low income or less developed counties did not benefit from the OER as much as other countries, possibly due to lack of hardware and Internet connections.

To summarize, students who used the OER as complementary material to a traditional course observed the benefits and contributions to their learning processes. In the light of student responses, one can conclude that OER facilitates preparedness for a course. The materials in question aim to help students review experiments before sessions, and they are prone to accomplishing their goal. However, to increase the benefits of OER, providing only video recordings seems insufficient; other course materials should also be presented. That expectation is well suited for OCW, which involves the organization of high quality educational materials into courses. Therefore, it is important to enrich available educational materials with high quality media. As technology advances, the expectations of users escalate. Providing high quality audio and visual representations may also impress those students who mention unattractiveness as a reason for not using an OER. In the case of those students who did not use the OER, the main problem was the belief that the materials were not needed. Such beliefs result in disregarding materials, and not being motivated is a valid concern that needs to be defeated, not only for open educational environments, but for any learning environment. Especially for supplementary materials, learners should either feel the need or be obliged to access them. To persuade students to use and increase the adoption of OCW/OER, benefits could be made more observable, as suggested by Rogers (1995).

Limitations and Future Study

For future research, this study could be replicated after the implementation of participant suggestions in order to examine potential changes in the attitudes of students. Moreover, observations provided by educators would be valuable, and instructors' and teaching assistants' comments about the effects of using OER on students' performance could be obtained. Since the OER in question was developed to complement a course, participants of this study were students enrolled in that course. Though reaching the target population would be troublesome, to understand the full contributions of OER, self-learners and other students who utilize materials for educational purposes could be considered as potential participants. Their evaluations may reveal other aspects that need to be improved.

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Reflection for Learning: Teaching Reflective Practice at the Beginning of University Study

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Reflective practice is a key skill in many professions and is considered an essential attribute of healthcare practitioners. Healthcare students are often expected to develop reflection skills through their assignments, and this is frequently expected to occur with little explicit instruction, practice or guidance about how to reflect. Currently, there is limited guidance in the literature on how teachers can help students develop these reflective skills effectively. In this study, we describe a process for embedding reflective skills into a transition program for new healthcare students about to enter university. By allowing students to explore reflection through a method of self-discovery supported by peer discussion, we found that students were likely to recognise and value reflection as a learning tool (a concept we term "reflection for learning"). Additionally, these students were more likely to continue to practice reflection in their studies than students who had not participated in the training. In summary, this paper demonstrates that students are able to make meaningful deductions about reflective practice and their own learning through use of a basic framework in which to self-reflect, from the very start of their tertiary studies.

Healthcare educators have to teach their students to function in a complex and ever-changing environment, fostering a culture of continuing professional education in order to allow appropriate identification of multifaceted clinical problems. One of the essential attributes of successful healthcare professionals is the ability to reflect on experiences in order to improve their own professional practice. Reflective practice has increasingly become part of the accreditation requirements for nursing practitioners. It has been suggested that this increased focus on reflective practice in healthcare accreditation may reflect a convergence of four theories (Mann, Gordon, & MacLeod, 2009): firstly, that critical reflection on experience helps identify educational needs (Boud, Keogh, & Walker, 1985); secondly, that it is important to understand one's personal beliefs, attitudes, and values in the context of professional practice (Epstein, 1999); thirdly, that continually learning to build knowledge leads to better understanding (Boud et al., 1985; Schön, 1983, 2001); and finally, that reflective practice helps professionals to become more self-aware and therefore better able to monitor their own practice (Bandura, 1986). Consequently, reflective practice allows healthcare professionals to engage in a process of lifelong learning.

The goal of reflective practice is self-discovery and growth, as well as the expansion of one's knowledge. Models of reflective practice (Boud et al., 1985; Dewey, 1933; Hatton & Smith, 1995; Mezirow, 1991; Moon, 1999; Schön, 1983, 2001) highlight that purposely revisiting events with the need to learn from these situations will better enable a person to prepare for, and successfully deal with, future events of a similar nature. Research has shown that the ability to link knowledge and practice together results in deeper learning, improves learning in a clinical setting, and promotes a more positive learning experience for students (Braine, 2009; Burton, 2000; Dewey, 1933; Leung & Kember, 2003; Mc Carthy, Cassidy, & Tuohy, 2013; Moon, 1999; Sobral, 2000, 2001).

In practice, reflection can occur either during the moment of practice ("reflection-in-action"), or retrospectively ("reflection-on-action"). In a recent systematic review of reflective practice pedagogy (Mann et al., 2009), there was significant support for the iterative process of reflection as first described by Schön (1983, 2001) and Boud and colleagues (1985). This process involves the initiation of reflection in response to a complex or surprising event, followed by reflection-in-action and reflection-on-action. It is often also important to evaluate and understand the emotional aspects of the experience (Boud et al., 1985). This is particularly valuable in healthcare settings, as it enables practitioners to incorporate empathy into their patient care (Gustafsson & Fagerberg, 2004).

Journaling, as a form of reflection-on-action, has previously been identified as an effective teaching strategy to encourage students to reflect on their experiences (Epp, 2008; Stevens & Cooper, 2009). It has been suggested that encouraging students to use self-reflective journals can provide an avenue to address the gap between theory and practice (Hancock, 1999; Landeen, Byrne, & Brown, 1995). Additionally, writing about experiences can enable students to recognize explicitly the knowledge that is implicit in their actions (Schön, 2001), helping to inform future reflection-in-action. Written reflections are also useful in improving communication, critical thinking, and observational skills (Guthrie & Jones, 2012), all of which are essential transferrable skills for university graduates from all disciplines.

Studies have also shown that reflective practice relies upon mentoring and support (Gustafsson & Fagerberg, 2004; Hallett, 1997; Mc Carthy et al., 2013; Pearson & Heywood, 2004; Teekman, 2000) and is more effective in small group situations (Mann et al., 2009; Platzer, Blake, & Ashford, 2000). Consequently, intentional and facilitated discussions of reflective experiences with peers and staff often encourage students to better reflect on their own thoughts and understanding (Guthrie & Jones, 2012).

While the ability to practice self-reflection is often considered important in graduates, there is currently a limited amount of information to guide educators in the development of effective reflective practice in their students (Mann et al., 2009). Additionally, reflective skills take time to develop as they are complex and cognitively demanding (Mc Carthy et al., 2013). Consequently healthcare educators need to be equipped with a variety of tools and strategies to facilitate reflective practice teaching (Epp, 2008; Mc Carthy et al., 2013). As a result of the scarcity of information about reflective skill development currently available to educators, an exploratory approach to understanding appropriate reflective practice teaching pedagogy is considered appropriate (Mann et al., 2009).

Methods

The Transition 2 University (T2U) Program

At our university, Learning Skills Advisers play a key role in academic skill development by working with teaching staff to integrate development of transferable skills into the curriculum. Students enter the university with a wide variety of life experiences and differing skill levels, challenging teaching staff to create curricula that develop transferable skills but which also provide additional learning for higher-achieving students. In our cohort of transitioning students the variation in skill level is particularly pronounced, as students enter into nursing degrees through a variety of pathways.

In order to help develop the transferrable skills of our transitioning students and consequently improve their academic achievement at university, staff from the School of Biosciences together with a team from the University Library designed a week-long transition course: the Transition 2 University (T2U) program. This innovative program integrated the teaching of content knowledge with authentic mastery experiences to effectively develop transferable skills (Ford et al., 2015). T2U was split into two parts with morning sessions covering a variety of transferable skills while the afternoon sessions addressed content knowledge (for full details of the design of the T2U program see Ford et al., 2015). We were previously able to demonstrate that the transferable skills sessions were effective in building perceived self-efficacy in students and that this increased level of perceived self-efficacy persisted until at least the end of the first semester (Ford et al., 2015). In this paper we now expand our research by examining an innovative experiential teaching strategy used during the T2U program to develop the transferable skill of reflective practice.

Research Design

This paper describes a mixed-method research design incorporating both qualitative and quantitative data. In this study we analyze students' qualitative responses to pre-determined open-ended questions and examine data from a quantitative survey at the end of semester. All research described in this article was approved by the University's Human Research Ethics Committee.

Student Cohort

The T2U program was delivered across three of the University's campuses. While attendance was optional, all new nursing students were encouraged to apply to participate, irrespective of their entry pathway into their nursing degree. Limited resources meant that 120 places were offered. In total, 117 students registered and participated in the program, with 58% of students self-identifying as mature-aged.

Self-Discovery Teaching Approach

As reflection skills require practice to develop, we wanted to start teaching this skill as early as possible in the course. As a result, we incorporated opportunities for reflective practice from the very start of the students' study. We also decided that it would be most useful for students to learn about reflection through a method of self-discovery in which the students attempted reflections prior to being taught reflective practice theory. In consideration of data that show the benefits of journaling and discussion in developing reflective thinking skills (Epp, 2008; Guthrie & Jones, 2012; Stevens & Cooper, 2009), we decided that students would be encouraged to complete a reflective journal after each day of the program. Students were provided with reflective questions that provided semi-structured prompts for reflective thinking (see Table 1) together with an example of what the completed activity might look like.

The reflective journal template encouraged students to describe and evaluate their experiences through a series of reflective prompt questions rather than through a specific framework (such as the Gibbs Reflective Cycle, Gibbs, 1988). The reflective prompts

Table 1
Reflective Journal Prompt Questions Provided to Students at the Start of the Transition 2 University Program

Daily Journal Prompt Questions
What happened? *Discuss the situation (what activity were you doing?), the task (what specifically were you working on?), the action (what action did you take?), and the result (what was the outcome?)*
How did this event make you feel?
What went well?
What could you have done better?
What have you learnt from this?
How will this information be useful in the future?

in the template were informed by Rolfe's minimal model of iterative reflective practice ("what," "so what," and "now what") (Rolfe, Freshwater, & Jasper, 2001). This was expressly done as it was felt that this would allow students to focus on their experiences rather than worrying about something that might be seen as academic content. We wanted students to become aware of the strength of using reflection in a wide range of situations rather than as a process that should be conducted only when difficult or negative situations arise. Consequently, we explicitly asked them to identify positive experiences ("What went well?"), as well as identifying areas for improvement ("What could you have done better?").

Time was provided at the start of each morning's session to discuss what the students felt they had learned from the previous day, as well as anything they found difficult. Students were expressly told that their reflections were private, and would remain so unless they chose to share them with anyone. Those students willing to share their reflections did so at the start of the following day's workshops. These sharing sessions were conducted in a peer environment with points for further discussion highlighted by the staff member. As mentioned previously, research suggests that small group situations and effective mentoring and support better facilitate reflective practice learning experiences. Consequently, the workshop was designed so that there would be a staff-member-to-student ratio of no more than 1:25. Furthermore, the room was set up to promote peer learning by aligning the tables into small groups of 3-6 students. Discussions of students' reflections in each day's workshops demonstrated that the journaling activity encouraged students to make connections between personal experiences and the theory taught in class. The journals also helped students to identify their own learning needs, which in turn encouraged students to actively seek answers to their own questions.

At the end of the transition program, the Learning Skills Adviser at each campus facilitated an interactive workshop about reflective practice. At the start of the session, students were asked to discuss the following question in groups: "Why have you been doing reflections every night this week?" After peer discussion, the groups wrote their answer on a handout provided by the facilitator (see Appendix A). It is important to note that when students were asked this question, they had not been explicitly taught anything about reflective practice or its importance in nursing practice. This activity was followed by an interactive discussion about reflective practice theory and its practical application to the nursing profession. This discussion covered the following three topics: 1) "What is reflective practice?", 2) "Why is reflection important?", and 3) "What are the key attributes and elements of reflective thinking?" At the end of the workshop students were asked to write a paragraph-long reflection about the T2U program on a second handout (see Appendix B). The questions served to prompt students' self-determined understanding of reflection and the reflective process. Both the written responses were collected by the facilitators of the class and used for further research.

Qualitative Thematic Analysis of Student Reflections

We analyzed students' written responses to the two reflective questions described earlier. The first question ("Why have you been doing reflections every night this week?"; see Appendix A) was answered in pairs or individually, and a total of 57 responses were collected

for analysis. The second question ("Write a paragraph-long reflection about the Transition to University program"; see Appendix B) was completed individually, and a total of 78 responses were collected.

We wanted to analyze whether our teaching practice evoked reflective skill development as a consequence. Skill development was therefore the principal phenomenon investigated. We applied a thematic analysis approach to assess the content of the reflective questions. All participants' responses to the first reflective question were read in order to obtain a general understanding of the main concepts identified in each submission. Each reflective response was then analyzed to extract significant statements that directly pertain to a particular concept, and these concepts were organized into theme clusters. These theme clusters are therefore considered as expressions of the latent content of the reflective responses (Graneheim & Lundman, 2004). The participants' responses to the second reflective question were analyzed to examine the extent of reflective thinking. This was done by examining the incidence of features such as description, self-analysis, self-awareness, emotional awareness, self-learning, and strategies or implications for the future in the reflective responses.

Credibility of the research findings was established through agreement among co-researchers (Graneheim & Lundman, 2004). Before data analysis both researchers bracketed their assumptions and preconceptions regarding the phenomenon under investigation. Both authors independently classified the theme clusters according to the steps described above. Following these two independent analyses, the two researchers met to reach a consensus by comparing the data and arriving at a mutually agreed upon set of themes. Quotes from the reflective responses are also included to further enhance the credibility of the research findings (Graneheim & Lundman, 2004).

Quantitative Data Analysis

This paper also describes the analysis of quantitative data obtained from questionnaires administered to all students attending a lecture in a compulsory unit of the undergraduate nursing course at the end of the teaching semester. The 3-page questionnaires addressed several aspects that had been covered during T2U (see Ford et al., 2015), but three questions specifically targeted reflective practice (see Appendix C). A total of 94 responses were received (38 from students who attended T2U and 56 from students who did not).

Data from feedback questionnaires were analyzed using the computer statistical program GraphPad and Microsoft® Office Excel® 2010. A Likert scale was used to classify responses as follows: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly Agree = 5. Results are presented as mean ± standard error of the mean. We determined statistical significance by conducting unpaired t-tests between responses from students who attended T2U and students who did not attend T2U. A p-value of less than 0.05 was considered significant.

Results

Development of Reflective Practice Skills Through Self-Discovery

As mentioned earlier, students were asked to discuss the purpose of the reflective activity each day and prepare a written response to the question, "Why have you been doing reflections every night this week?" (see Appendix A). A thematic analysis of the students' written responses was performed, and several themes were identified (see Table 2). It is important to note that a number of reflective answers included multiple themes. Examples of significant statements for each theme cluster are presented in Table 3.

Table 2
Key Themes Identified in Student Reflections About the Purpose of the Daily Reflective Journal Activity (n=57)

Theme identified	Number of responses	Percentage of total number of responses
Consolidation of knowledge gained each day	52	91.2%
Identification of strengths and weaknesses	34	59.6%
Thinking about and improving learning	25	43.9%
Thinking about and understanding feelings	23	40.4%
Learning from experiences or mistakes	15	26.3%
Forms part of clinical reflective practice	14	24.6%
Recording or describing daily activities	13	22.8%
Learning about myself	7	12.3%
Preparation for future study	6	10.5%

Note: Most reflections covered multiple themes.

Table 3
Selected Examples of Significant Statements for Each Theme Cluster Identified in Students Reflections About the Purpose of the Daily Reflective Journal Activity

Theme identified	Example significant statements for each theme cluster
Consolidation of knowledge gained each day	"Because I can consolidate what I already know" "To make us think about what we learnt during the day – consolidation" "To look back on the day and see what we have learnt" "To consolidate what has been learned during the day time"
Identification of strengths and weaknesses	"Gives a chance to understand my strengths and weakness" "To learn where I am doing well and where I need to improve" "To determine areas we need to improve and areas that are comfortable" "This is a helpful method to recognise my weakness and have a think about it so I can improve it" "To realise if we have any weaknesses around referencing/ researching etc. [and] to smile about the areas that felt easy to learn and/or enjoyable"
Thinking about and improving learning	"So that at the end of each day you take some time to really think about the classes that you had that day" "Think about learning experience and evaluate what has been learnt" "Reflections are good because it allows you to think about what you have learnt, why you have learnt it" "To think about what we have learnt, gives us the opportunity to ensure we understood all topics that were covered"
Thinking about and understanding feelings	"It provides an opportunity to release worry from a stressful day" "A way of getting our thoughts and feelings expressed. It's highlighted the ups, downs, fears, insecurities, excitement" "To understand [my] fear about starting uni" "To get feelings down on the paper"
Learning from experiences or mistakes	"To learn from our experiences and mistakes and use this to put into practice during our course" "I learn through previous mistakes, and gain confidence through previous success" "To avoid making similar mistakes"
Forms part of clinical reflective practice	"Because we will need this skill as part of our clinical placement later in the year" "To practice as we do it during placements and once we start working" "To get into the habit of doing this skill on a regular basis throughout the nursing degree, especially in Clinical Practice" "To practice reflective thinking on situations that arise during your working life. You may come across circumstances during your working life that you may need to debrief to yourself"
Recording or describing daily activities	"It works as a summary of things you studied" "Reflections are noting down what we went through on each day" "To write down what I have done in T2U that day" "To have a clear picture or details of what [was] done on each day"
Learning about myself	"Take a critical look at myself and the way I learn" "To think about what works for my learning style and what doesn't" "It highlights positive and negative experiences which enables a self-critique. In this way I can surmise how I can get the most out of my university experience and improve my learning" "So I can reflect and learn what I need to be a better student"
Preparation for future study	"To see how what we learnt can help us in the future when we start our studies" "It has helped me realize that the stuff I have learnt will help me when I study" "To have a bit of insight into what to expect before uni begins, to help be prepared and just feel more comfortable" "To make us think of how [the skills] will be useful in the future"

A second written response (see Appendix B) was collected from students after discussing the theory behind reflective practice. Submissions provided for this activity were interesting as they showed that many students were beginning to write reflections that highlighted a range of aspects of description, self-analysis and evaluation, learning, and implications. These skills, however, were largely at a very early stage. While students were clearly reflecting on information and experiences they had been exposed to over the week, the depth of the reflections indicated they were still largely novices. This was not unexpected, however, as skill development involves repetition and feedback in order to occur.

Many of the submissions included opinions about the program such as, "I found the T2U program extremely helpful," though these were often not then clearly justified. The majority of students (54%) included a description of what had happened during the program, for example "each day for a week we were presented with information and strategies for developing university-level skills". Fewer students included aspects of evaluation (38%) or self-analysis (46%) in their reflections. Example statements for these aspects are, "Learning how to reference properly is probably the most important bit of knowledge learnt" [evaluation], and, "I have learnt that I could manage my concentration levels better by not working as many hours out of school time" [self-analysis]. Students often also focused on how they felt during the program (29%, for example "I found it frustrating at times"), demonstrating emotional awareness. A few students produced reflections which showed that they had reflected at a deep level both on the content of the program and their own development over the week. In the following quoted submission, we have identified within brackets some different aspects of reflection shown by the student.

> My T2U week was broken into mornings with library staff working on study skills and then afternoons with lecturers and workshops [description of events]. I found the study skills extremely useful [evaluation], and the introduction to uni life helpful to override feelings of being overwhelmed and underprepared [self-analysis, emotional awareness]. My confidence isn't that strong, realistically, although I usually have a front to hide behind [self-awareness]. My confidence and 'how to' skills are definitely now a priority [evaluation] when I can now see that I am capable [self-learning], it's just about breaking issues/assignments down into baby steps [strategies/implications].

Evaluation of the Longer-Term Effectiveness of the Reflective Practice Teaching Strategy

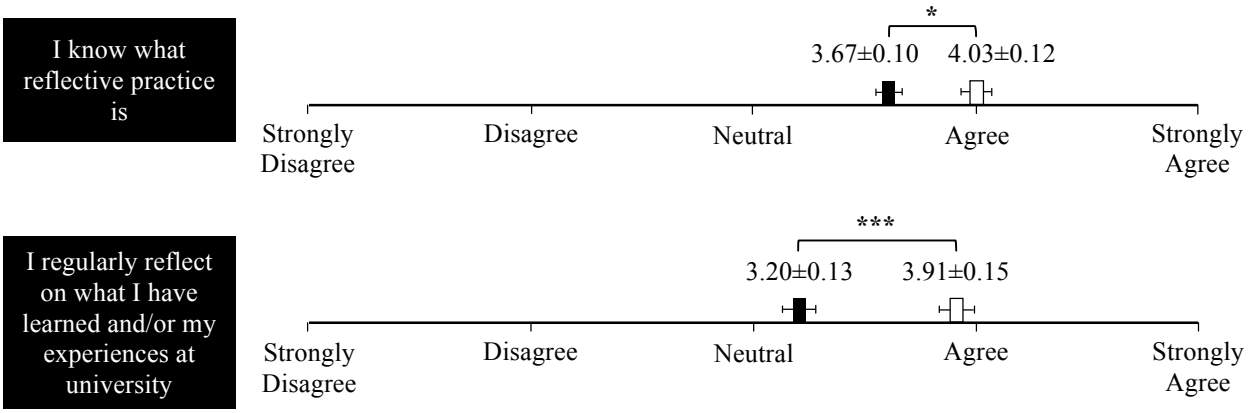
We also wanted to assess whether students continued to practice reflective thinking later during their first semester, after completion of the T2U program. All students enrolled in first-year nursing are taught about reflective practice through lectures and assigned activities within the first two weeks of their course. As a result it was important for us to determine whether there was a difference between the reflective habits of students who had completed T2U in comparison with those who had not participated in the program. This was done using an anonymous questionnaire administered at the end of the students' first semester. Three questions were specifically related to reflective practice (see Appendix C), and these were analyzed using a Likert scale (see Figure 1).

Attending the T2U program appears to have improved students' self-reported understanding of reflective practice, as well as their use of reflective thinking in their learning. In response to the statement, "I know what reflective practice is," students who attended T2U were more confident that they understood the concept of reflective practice (4.03±0.12) than those students who had not attended T2U (3.67±0.10, $p<0.05$). When asked to respond to the statement, "I regularly reflect on what I have learned and/or my experiences at university," students who attended T2U were much more likely to give answers suggesting that they use reflective practice in their studies than students who had not attended the program (3.91±0.15 vs. 3.20±0.13 respectively, $p<0.001$). Students who had participated in T2U were also asked to respond to the statement, "I feel more confident about reflection and reflective practice after having completed T2U." Of the 28 responses, 71% were positive (Agree: 13; Strongly Agree: 7) with an overall mean of 3.86 ± 0.18.

Discussion

This paper demonstrates that students are capable of making meaningful and profound discoveries about the uses of reflective practice through exposure to the experience without explicit prior instruction, and many come to value the practice because of the benefits they discover. This is best seen in the themes students identified when asked why they had been completing a reflective journal each night. The three most common themes identified were consolidation of knowledge, identification of strengths and weaknesses, and thinking about and improving learning. It is interesting to note that many students independently identified that reflection helped them to contextualize the skills they had been learning and to appreciate their progress. Encouraging

Figure 1
Students' Understanding of Reflective Practice



Note. Attending the Transition 2 University (T2U) program appears to have improved students' understanding of reflective practice, as well as their use of reflective thinking in their learning later in semester. Results are presented as mean ± standard error of the mean. A Likert scale was used to classify responses as follows: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly Agree = 5. The white bars represent responses from students who attended the T2U program (n=34-36) and the black bars represent responses from students who did not attend the T2U program (n=54-55). * $p<0.05$ (unpaired t-test) and *** $p<0.001$ (unpaired t-test).

reflection on the students' learning assisted students in auditing themselves with regard to the skills required for success, making relevant changes to aid in their own skill improvement. This is important, as it is common in healthcare training for reflection tasks to be mostly confined to practical activities or placement rather than academic learning. Our results suggest that students can also obtain significant value from the practice of reflection on their academic studies (a concept we now term "reflection for learning").

Educational literature advocates for higher education institutions to help students foster their own personal epistemology. One way to foster students' understanding of their own learning is to help them develop their higher-order thinking skills. Reflective practice can be considered a higher-order thinking skill as it incorporates aspects of analysis and evaluation. Interestingly, our experiential learning approach appears to have increased the students' likelihood of continuing conscious reflection for learning later in semester. Furthermore, students were motivated to reflect on their learning without staff giving any instructions to continue this practice later in semester. This suggests the students decided to continue reflecting on their studies because of the benefits they discovered for their learning, demonstrating an increased ability to apply self-regulation in their study approaches. For the purposes of this paper, we consider self-regulation to involve the ability to set goals and work to monitor, regulate, and control learning, as well as maintain motivation and engage in behaviors that lead to academic success (Lopez, Nandagopal, Shavelson, Szu, & Penn, 2013; Pintrich, 2004; Wolters & Taylor, 2012). Self-regulation involves the use of strategies that are considered metacognitive (Gourgey, 1998), and research shows that self-regulation is associated with increased learning and deeper understanding, overall achievement, and problem-solving (Azevedo, Moos, Johnson, & Chauncy, 2010; Plant, Ericsson, Hill, & Asberg, 2005; Sandi-Urena, Cooper, & Stevens, 2012; Schraw, Crippen, & Hartley, 2006).

This study also shows that instruction alone is not sufficient to develop reflective skills immediately. Reflections from students were still largely at a beginner level, with only a few students reflecting at a deeper level by incorporating aspects of evaluation, self-analysis, and self-awareness. This is important as teachers need to remember that students do not instantly become expert in an area after they have been taught a skill for the first time. Rather, teachers need to allow the students to

develop skills within their zone of proximal development (Vygotsky, 1978), providing learning experiences that are scaffolded to gradually build skills to allow students to move from novice to expert.

Some limitations to our study should, however, be noted. The information used to examine students' understanding of reflection and likelihood to practice reflection for learning was self-reported. Consequently, a degree of response bias is likely as results are based on the students' ability to self-assess their skill confidence. It has, however, been shown that students' ability to self-assess improves in situations that are not based on massed learning (Dunning, Heath, & Suls, 2004), as well as in situations where reflective practice is involved (Mann et al., 2009). T2U was designed to be conducted in small group situations and involved persistent reflective activities throughout the program. Furthermore, self-assessment is considered more accurate if there is an appropriate delay between learning the skill and conducting the self-testing exercise (Dunning et al., 2004). The follow-up questionnaires were administered approximately 11 weeks after the final day of T2U. Students, therefore, had a chance to practice their reflective skills throughout the semester and consequently have practical experience to assess their skills. We therefore believe that the self-reported data regarding reflective practice in the questionnaires are a reasonable reflection of students' skill confidence. It would also have been interesting to see students' clinical placement reflections, learning portfolios, and assessment grades to further investigate the depth of reflective learning which had taken place. However, the researchers did not have access to those sources for this cohort of students due to privacy restrictions.

It is important to note that while this paper demonstrates our experiences in nursing, we believe the innovative teaching approach is also applicable across many other disciplines. Reflective practice is considered a key skill in many professions as it allows professionals to improve their practice by allowing them to become more self-aware, identify further educational needs, and monitor their own professional practice. For example, reflective practice is considered a foundational skill for teachers, a variety of health professionals, and staff in managerial roles. Teachers often use this skill to reflect on different teaching strategies and past classroom experience to improve their future teaching, while healthcare practitioners use reflection to improve patient care by evaluating past clinical actions. Managers apply reflective practice skills to review workplace strategies and identify areas for improvement. Teaching practices that develop this complex skill can therefore be considered inter-disciplinary in nature.

Conclusion

We have shown that students are able to make meaningful deductions about reflective practice through use of a basic framework in which to self-reflect without explicit prior instruction. Importantly, we have demonstrated that students develop an understanding of the value of reflecting on their own learning without explicit instruction and that this metacognitive practice (termed "reflection for learning") was sustained until at least the end of the semester. We therefore propose that a self-discovery approach to allow students to realize the benefits of reflective practice is effective in developing reflective practice skills and engaging higher-order metacognitive strategies in order to promote self-regulated learning.

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Appendix A

On the final day of the program, students were asked to consider why they had completed reflective activities every night, using the handout below.

Handout 1 - Reflecting on your experiences

Respond to the following question in groups:

Why have you been doing reflections every night this week?

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Appendix B

After explicit instruction about reflective practice, students were asked to respond individually to the reflective prompt below.

Handout 2 - Reflecting on your experiences

Write a paragraph-long reflection about the Transition to University program.
Try to capture the following: a brief description of what you actually did during the week, an identification of the most important thing you learnt during the week, and a reflection on how you think this program will influence you in the future.

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Appendix C

The questionnaire used at the end of semester investigated various features of the T2U program (see Ford et al., 2015). The three questions that specifically addressed reflective practice are shown below.

Please respond to the following statements regarding your university studies:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I regularly reflect on what I have learned and/or my experiences at university					
I know what reflective practice is					

Please respond to the following statements regarding the T2U program:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel more confident about reflection and reflective practice after having completed T2U					

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Weaving Intergenerational Engagement into ESL Instruction: Case Study of a University-Based Program in Hong Kong

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This article aims to address the practical question of whether there is educational value to embedding second-language (L2) learning experiences in intergenerational contexts. In particular, a case study was conducted of a novel, university-based ESL program in Hong Kong in which a group of older adult volunteers with a high level of English language proficiency skills engaged a group of college students with beginner to mid-level English language skills for an intensive three-month period of English language instruction, language practice, and intergenerational relationship building activities. The intergenerational context was reflected in the curricular activities designed to stimulate intergenerational (teacher-learner) sharing of real-life interests, stories, experiences, and perspectives. According to data from open-ended questions and IELTS-based English proficiency tests, the college students exhibited improved ESL skills and enhanced motivation to practice and extend their learning, while the older adult volunteers earned a valued teaching credential, improved their teaching abilities, and gained confidence and motivation for expanding their social linkages in the community. Implications for framing intergenerational encounters in ways that enhance meaningful ESL learning in real world contexts are considered.

This article describes a case study of a distinct model for enlisting older adult volunteers as instructors in a college-based ESL class and positioning their engagement with the students in ways that enrich the ESL learning milieu and generate successful and highly motivated English learners. The IG-ESL ("Intergenerational-English as a Second Language") program was implemented during the summer of 2013 at the Hong Kong Polytechnic University. There were two groups of participants: eight adult volunteers, all 55 years of age and older and recruited from the University's Institute of Active Ageing (IAA) membership, and nine college students recruited from several universities in Hong Kong. They met for 12 weekly two-hour intergenerational language learning and practicing sessions.

For the college students, a group with English language skills ranging from beginner to intermediate level, the primary objective was to strengthen and expand their ESL skills. Under this objective was the goal of creating an ESL-oriented intergenerational learning environment that stimulates student interest and practice with regard to using English language in real world contexts.

For the older adult volunteers, all of whom had a high self-perceived level of English language proficiency, the primary objective was to help them develop professional skills in teaching English as a second language. A secondary objective was to provide them with opportunities to meet and share life experiences with the students, thereby expanding their interests and abilities for engaging youth in community settings.

The intergenerational component is conceptualized as introducing a qualitatively distinct set of opportunities for enhancing ESL language learning motivation and creating a stimuli-rich second language learning milieu (Lai & Kaplan, 2013a). Throughout the program, the older adult participants shared their socio-historical knowledge gained from lifelong experience while at the same time encouraging the students to influence the course of these exchanges in ways that address real-life issues of interest to them. From an ecological perspective on second language development (van Lier, 2004) or one which emphasizes direct perception and affordances (Gibson, 1979), such intergenerational encounters make further semiotic (i.e., meaning-making) action more possible. To elaborate, meaningful information—in this case, real-life stories based on the older adults' lifelong experience—could be (1) readily made available in the proximal environment, (2) directly perceived by the students, and (3) actively acted on for finding new meaning from language. Grounded in this theoretical framework of perception-in-action, the intergenerational approach to English instruction can be understood as a vehicle for transforming older adults' lifelong experiences into "meaningful potential" in the environment that can be simultaneously woven into the students' ESL learning potential or "ability" (see van Lier, 2004, p. 96).

This orientation is consistent with the way Cordella and colleagues (2012) described the role played by older adults proficient in Chinese, German, Spanish, and English who joined an Australian program that matched them with high school students interested in learning these languages. The adult volunteers functioned as "important catalysts for language maintenance" (p. 80). They did not have any previous training in second language instruction, yet they were

effective in getting students actively engaged for their language production, giving them ongoing feedback, and assisting them to talk further and more meaningfully (Cordella et al., 2012; Just, 2012).

These findings are consistent with research on intergenerational programs in other school and community settings which highlight the profound impact that older adult volunteers have on students' literacy skills. For example, Meyer and colleagues (2002) and Macdonald (2006) describe intergenerational senior-as-tutor programs that were found to have positive impacts on student expository reading (i.e., comprehension on textual instructions) and general literacy skills. Another theme in this stream of research emphasizes the importance of the emergent intergenerational relationships in the process of learning and gaining competence in a second language. In Dipardo and Schnack's (2004) study of an intergenerational reading and writing program which paired older adult volunteers with eighth-graders whose native language was not English, they emphasized how the trust and rapport established between the adult volunteers and the students helped set the stage for increasingly challenging English language conversations drawing upon shared experience and co-constructed meanings: "Their participation illustrates the interweaving of emotion and cognition in engaged literacy and underscores the need to create opportunities for literacy learning that are at once interpersonally warm and critically astute" (p. 15).

The IG-ESL pilot project described in this article was conducted with the goal of gaining further insight into the pedagogical value of embedding second-language (L2) teaching and learning experiences in intergenerational contexts. The IG-ESL curriculum provided an ideal platform for such an investigation insofar as the activities were designed to stimulate rich intergenerational dialogue, touching on a wide range of conversation topics and using diverse media platforms. Program implications are explored for enhancing ESL education and providing older adults with additional opportunities for meaningful civic engagement.

This pilot project draws from theoretical notions and novel programming described in the intergenerational studies as well as the applied linguistics literatures. The reference to an "intergenerational studies" literature alludes to a broader body of scholarly inquiry focused on intergenerational research, practice methods, and policy initiatives. One hub for exploring this interdisciplinary body of literature is the *Journal of Intergenerational Relationships*, which was established by Haworth Press in 2003 and is now published by Taylor and Francis.

The Hong Kong Context

The IG-ESL pilot program was located in Hong Kong, a metropolitan city situated in the South coast of China with a population of closely 7.5 million people. Hong Kong was colonized under British rule for 99 years before returning to China in 1997. Under the governance of the British Empire, English language has become an official language. Since the handover of Hong Kong to China, both English and Chinese have become the two languages that share the same official and statutory status. English language is the main medium of instruction in all eight of the major universities in Hong Kong.

The population of Hong Kong is unique in terms of long life expectancy (on average, women live until 86.7 and men till 80), high IQ (at 107, it ranks #1 in the world), and a relatively high level of educational achievement (Basten, Yip, & Chui, 2013; Lynn & Meisenberg, 2010). As a consequence, Hong Kong has a sizable population of older intellects from the retirement sector who are knowledgeable, well versed in English language and more flexible in availability than the working population. In seeing the advantages of working with this indigenous human resource, the program developers framed the IG-ESL program to be delivered via the intensive commitment and involvement of older adult volunteers.

Program Planning and Implementation

Positioning the Curriculum

The IG-ESL program is positioned as a non-traditional ESL program. Traditional programming of ESL at the higher education level operates on three tracks: remedial, academic and discipline-specific. Remedial ESL courses require students with limited English language proficiency (LEP) to take some English foundation programs on a non-credit basis before entering specific courses of study. The second type involves English instruction for academic purposes (EAP). These courses tend to be credit bearing and designed to prepare students linguistically to adapt to overall academic demands. In the third category, the emphasis is on providing students with the English language skills required for discipline-specific courses.

The IG-ESL program does not fit in any of the above categories. Rather, it is positioned to help fill some of the gaps in between these categories of ESL instruction. The general emphasis is on providing college students with a structured adjunct program with the general goal of helping them develop, practice, and improve their English language skills for their personal purposes, whether tied to academic, career development, or daily life pursuits.

There was no formal academic credit provided by the students' universities, though they did receive, as did the older adult volunteers: 4.5 continuing education unit (CEU) credits provided by Pennsylvania State University (as part of its intergenerational studies outreach program).

Recruiting and Training Participants

To find older adults with good proficiency in English and an interest in volunteering and serving college youth, project team members (i.e., the authors plus one project assistant) met with several organizations that provide services for older adults. Eventually a partnership was established with Hong Kong Polytechnic University's Institute of Active Aging (IAA), a non-profit and self-financing organization which aims to promote active aging and well-being for older adults. An IG-ESL program recruitment flyer was sent to IAA's approximately 900 members. Twenty-one responded, and after follow-up phone conversations and meetings, the nine respondents deemed to have the highest levels of English language proficiency and interest in working with the students were invited to join the program. Eventually, eight of them signed up for the program; the ninth older adult did not sign up due to a change in availability.

College-aged students in several universities were informed about the program through flyers, newspaper adverts, and targeted messages sent via campus and student listserves. Eventually a group of nine students from three different universities – Chinese University of Hong Kong, Hang Seng Management College, and BNU/HKBU United International College – signed up for the program on a volunteer basis.

Before the program began, the older adults filled in a "Talent Bank Form" in which they provided information about their previous occupation(s) before retiring, educational level, hobbies, and perceived level of proficiency in English language (i.e., low, medium or high). All of the older adult volunteers were educated at university level with a perceived level of English proficiency at a high level (although none were native speakers). Their pre-retirement careers were as follows: social worker, nurse, government worker, teacher, and company director. From the pre- project questionnaires filled out by the students, it was determined that their English language skills ranged from beginner to intermediate level. The students' academic backgrounds spanned the fields of management, business administration, nursing, medicine, and international relations.

To prepare the older adults for the ESL educator/co-teacher role that they were expected to play in the program, they met with the program director for two-hour professional development sessions before each of the 12 intergenerational program sessions. These training sessions were designed to provide them with ideas and strategies for engaging the students in English language conversation, introduce them to some of the theories that have influenced the ESL field as well as the development of the IG-ESL curriculum, and run through the details of the IG-ESL program activities. All of the teaching and learning materials were based on an instructional and curriculum guidebook devised by Lai and Kaplan (2013b).

The Curriculum

The IG-ESL curriculum consists of six activities, with the program framed into 12 two-hour weekly sessions. Table 1 below provides the titles and brief outlines for each activity.

For each activity, the program director actively stimulated intergenerational (teacher-learner) sharing of real-life interests, stories, experiences, and perspectives. For example, he would encourage both generations to exchange views, to elaborate with examples, or to debate over a social issue. Sometimes, he would arrange all participants to sit in a circle to present, consolidate, or clarify what had been discussed. Such intergenerational encounters were viewed as providing useful contexts for promoting second-language development and practice.

As noted in Lai and Kaplan (2013b), the IG-ESL curriculum was designed to:

- provide students with opportunities to (further) develop and practice all four linguistic skills (i.e., listening, writing, reading and speaking),
- focus on themes or topics that have the potential to stimulate discovery about common needs and interests across generations,
- provide intergenerational engagement opportunities utilizing multiple media (video, websites, face-to-face conversations, etc.), and
- actively engage all participants in curriculum development; students and older adult volunteers provide input and work collaboratively to help determine the foci of readings, discussions, and activities.

Methods

Several methods were used to determine IG-ESL program impact on: students' reading, writing, listening and oral skills development; student motivation to engage in real world ESL practice; and older adult volunteers' ESL teaching and intergenerational engagement skills and styles. This included pre- and post-program proficiency tests (used to assess program impact on students' English language skills), post

Table 1
Brief Layout of the IG-ESL Curriculum

Activity Titles	Intended Outputs
1. Back to the Future	Role-playing Autobiographical presentation
2. Intergenerational Hunt	Oral presentation Reflective journal writing Subtitle-making
3. Intergenerational Power [Press]	A co-authored letter for publication in a newspaper
4. Intergenerational Advert I	An advert script
5. Intergenerational Advert II	A ready-to-shoot script
6. Intergenerational Advert III	A one minute long advert to promote an intergenerational idea

program questionnaires and periodic group interviews with students and senior volunteers (used to obtain participant feedback on individual activities as well as the overall program), and video recordings of program sessions and planning meetings with staff and senior volunteers (to track intergenerational patterns of discourse and language learning activity). Journals were kept by staff members and students as an additional source of information about program activities and participants' behaviors and perceptions of the program.

A small sample size of nine college students, including six who completed the entire program and three who dropped out before the halfway mark, took a series of IELTS-based English language tests to assess listening, speaking, reading, and writing before and after the program. IELTS has been widely used as an English language assessment tool for testing university-level students (Feast, 2002). The scope of the assessments, corresponding formats, and grading criteria are illustrated in Table 2, below.

Pre- and post- program English language test scores were determined for the participant and dropout groups. Considering the small sample size, only percentage differences in the pre- to post- program scores are reported for both groups (in Table 3).

To supplement the quantitative data, qualitative data was generated from video- and audio-taped observations of the training and program sessions and two detailed and reflective journals, one kept by an assistant researcher who was a non-participant and the other by the first author who also served as primary program facilitator for all sessions. At the end of the program, all participants were given an open-ended structured questionnaire with general questions developed by the authors about their overall program experience as well as specific questions about the educational and perceived relationship-building value of individual activities.

The project research team employed Corbin and Strauss's (2008) coding procedures for naturalistic, ethnographic purposes of investigation. The project co-directors (authors) examined all collected data, established a coding system that reflected thematic content related to program objectives, independently coded portions of participants' quotes (obtained from the open-ended questions), resolved differences in coding decisions, and placed quotes in relevant response categories.

Data coding decisions were subsequently reviewed in light of observational field notes and after-class journals kept by the principal investigator and a research assistant. The response categories were modified to include relevant observation-based excerpts that fit into major response categories. In this procedure, triangulation of codes and themes was verified in multiple data sources.

Throughout this article, quotes are presented which are illustrative of the major response themes and reflective of the degree to which the program achieved its primary objectives.

Results

Program Impact on Students

Students' English language skills development. As noted in Table 3 below, the six students who completed the entire program demonstrated pre- to

Table 2
Battery of English Proficiency Tests Given to College Students Before and After the IG-ESL Program

Proficiency Test	Testing Domains	Format	Grading Criteria
Test 1	Reading	Read a passage and answer 13 multiple choice (MC) questions in 20 minutes	Percentage of questions answered correctly
Test 2	Writing	Choose one of two topics (e.g., "For a better quality of life, all shops in Hong Kong should close at 6.30pm. Do you agree?"), and write an essay (approx. 250 words) within 30 minutes.	Content, organization and grammar
Test 3	Outline Writing	Based on the essay topic chosen, write an outline including purpose, thesis statement, and topic sentences.	Appropriateness and logics
Test 4	Listening	Listen to a conversation and answer 10 MC questions in 30 minutes.	Percentage of questions answered correctly
Test 5	Speaking	Speak for three minutes on one of the following six topics: 1. Climate change 2. E-commerce 3. Gun control in America 4. Hong Kong's air pollution 5. Hong Kong's property pricing 6. H5N1	Coherence, content, grammar, lexis and delivery

Table 3
Program Impact on Students' ESL Test Scores

Testing Domains	Performance of Sudents in the Project Group (N=6)	Performance of Students in the Drop-Out Group (N=3)
Reading	Positive difference by 6%	Negative difference by 20.8%
Listening	Positive difference by 26%	Negative difference by 0.1%
Oral	Positive difference by 31%	Negative difference by 12%
Outline writing	Positive difference by 40%	Negative difference by 35%
Essay writing	Positive difference by 28%	Negative difference by 8%

post-program improvements in their scores for all five language skills, whereas the three students who dropped out demonstrated declines in their scores.

Considering the small sample sizes for both groups as well as the exploratory nature (non-experimental design) of this program evaluation study, this difference in test scores for the participant and non-participant groups should be considered suggestive (rather than as providing definitive evidence) of program impact on student ESL skills. However, when viewed in conjunction with the qualitative data presented below, a more complete picture of program impact on students' English language skills emerges.

The students made numerous comments during the program sessions and in their post- project questionnaires that support and provide context to the

quantitative findings indicating improvements in their English language skills. Such comments fit into the following five thematic categories, with total number of responses and examples provided for each category:

1) General comments alluding to perceived self-improvement (8 responses):

   I can feel that this program has improved my English language skills. I did not expect my English can really improve in such a short program. It is only for 12 weeks and we only meet once a week for 2 hours. But the truth is, it really works!

2) Improved speaking skills (which several students attributed to having less fear and increased confidence to speak English) (7 responses):

   Not only did we have many opportunities to read, write and listen in English, we were given the chance to speak in English … in front of the whole class. This program not only made me more confident to communicate in English with others but also boosted my speak-on-the-stage confidence.

3) Benefits of non-traditional ESL learning context (students alluded to less pressure and more encouragement to practice outside of the classroom) (7 responses):

   My regular school English teachers, [sic] aimed at improving our English standard so that we can get a good result in the exam. But IG-ESL, [sic] improving English skills [for test] is not the only focus. My English is improved through doing different tasks. It is not boring and I can improve my English without any pressure.

4) Enhanced listening skills (6 responses):

   My listening skills are indeed improved due to frequently [sic] use of English in conversation with the elderly and others.

5) Increased awareness and use of English language learning resources (such as English language newspapers, movies, and TV news programs) (4 responses):

   This program has influenced me to read more English language news in South China Morning Post and watch Pearl News."

The older adult participants also emphasized the value of English language learning resources, as evident in the following comments made at one of the professional development sessions:

> Almond: "Every day, they [i.e., youth] can watch English language news on English Channel. They can also watch how legislators [i.e., law-making senates] argue in the legislative council. They can watch on the government's website. It is quite interesting to see how they argue with each other in the council. And they [the students] will learn a lot. There are a lot of hot topics. "
>
> Calvin [In discussing the activity with the program facilitator]: "(We can) ask the students to read an English language newspaper every day, and focus on those issues they are going to write... And from there they can learn what ideas [about the issue] have been given out, and then they need to put in their own ideas to the current ones. And they can have the chance to learn some terminology, some good sentences or whatever and what people have talked about the issues."

Students' conceptions about older adults. As noted in the Introduction section, one of the goals of the program was to establish an intergenerational communication dynamic in which the adult volunteers would stimulate student interest and practice with regard to using English language in real world contexts. One indication that this objective was achieved comes from student comments (in the post-project questionnaires) about how they viewed older adults as conversation partners who are fun, interesting, effective, and excited about helping youth to practice using English language in various real world situations. Students also articulated many other positive views about older adults beyond their project-related roles as educators and communicators, and this likely contributed to student interest and willingness to converse actively with them.

Students' comments about their views about older adults fit into the following five major categories, with the total number of responses and examples provided for each category:

1) Distinctive ESL teaching/motivating qualities of older adults: older adults were seen as being more interesting, more compelling (as English speaking models), and in some ways more knowledgeable and supportive than previously thought (5 responses):

   Frankly there are things that the youth cannot do without the guidance or advances by the

senior adults. For instance, we do not know the meaning of the idioms which was using [sic] in the ads since it refers to some traditional habit of Chinese and I never knew that before.

2) Multiple roles played by the older adults (beyond English language instructor): Students noted 12 distinct supporting roles – parent, grandparent, educator, supporter, leader, friend, listener, cooperator, guide, helper, reminder, and life instructor (5 responses):

   The older adult volunteers in the program played the role of instructor within the classroom and the role of life instructor outside the classroom.

3) Specific contributions to students' strategies for living, learning, and solving real-life problems: Students gave examples of how they benefited from information and advice provided by the older adults (5 responses):

   [My senior partner] has also told me many things about the medical field in HK like what the working environment will be like, and we talked about my career plans in the future.

4) Older adults as experienced, knowledgeable, and insightful about life (includes awareness of social issues) (5 responses):

   Through the Intergenerational Letter activity I have realized from the seniors some of the hidden problems in HK, such as clinical wastes treatment problems and that the three landfill sites in HK are going to fill up very soon in a few years.

5) Older adults are fun. Students alluded to positive feelings towards older adults as being more fun than previously thought (3 responses):

   Before working with the seniors, I think the seniors were very troublesome and annoying… After this IG-ESL program, I found that they are full of talents and ideas. They are creative and funny.

Program Impact on Older Adult Participants

Developing professional skills and goals. As reflected in the following quotes, the older adult participants noted gaining motivation, skills, a sense of empowerment, and a valuable teaching credential to support their growing interests in extending their career- and volunteer-related pursuits as ESL educators in the community:

> I will use [such] program experiences to influence the youngsters and help those who are weak in English Language, for example, the new immigrants or those organizations that need English volunteering teachers to help their minority group.
>
> I learned how to teach and how to make them [the students] more aggressive in learning ESL without shyness in the public."
>
> Career-wise, I now have a qualification with which to find meaningful volunteering work and pursuit of happiness that I enjoy, both with students themselves and myself. After completing the course of IG-ESL, it brings me chances to teach. I was asked by a charity body to help youngsters with their spoken English.

Program characteristics contributing to older adult participants' capacity to help ESL learners. The senior adult participants noted several characteristics of the overall IG-ESL program model as well as specific activities which enhanced their capacity to help the students develop and practice their English language skills:

> The program activities were innovative and interactive. The overall designs of program activities were significant with diversification. [The] Back to the Future activity promoted personal life review of senior group [sic]. [The] Intergenerational Hunt and Letter to the Editor encouraged the mutual contribution among co-partners. Intergenerational Advert enlightened teamwork and creativity. [The entire program] enabled intergenerational participation and sharing."
>
> It provides many opportunities to the senior adults and younger adults working together to complete the assignments. The assignments – video advert, letter to the press, and etc. – are hardly found in other educational programs nowadays."

Sharing Life Experience

The program also met the objective of providing the older adult participants with varied and valued opportunities to meet, get to know, and share their life experiences with today's youth. However, as noted in the example quotes provided below, the sharing of experience extended beyond the older adult participants

merely telling their life experiences to a passive group of youth. Rather, these comments suggest an element of reciprocity in the way both generations mutually framed, engaged, and benefited from their intergenerational exchanges:

> I have shared my success, vision, and experiences with the students. I have introduced the basic knowledge and techniques of video editing in the class. One student told me that my life story interested him and gave him encouragement to study. Another student, under my influence, has started to read English newspapers, watch English TV news, write short essays, and write a diary. He believed me that these habits were factors of success in improving English. It is a great reward to me.

> [The program] is not only interactive but also lets two generations share their strength, knowledge, ideas, and experiences. This program enlightens me that senior and young adults can learn together in a team with both able to benefit in the learning process. There is a Win-Win result to the seniors and the younger adults as well.

Program Impact on Participants' Personal Development

Several of the older adult and youth participants noted that the program experience expanded their social linkages in the community. The following comments from older adult participants convey the themes of networking and staying active:

> [The program] enhances and provides opportunities to expand my social network in the community. This program has enriched my life in many ways, most importantly the people I have met and the friendship I had made."

> I am excited, because I worked with people who share the same beliefs and proactive teenagers. Now we become friends. They are beyond your expectation. I also learn new ideas from them. It makes me feel energetic."

Additionally, several of the youth emphasized how the program expanded their social connections outside of school:

> Even [sic] the program cannot help you to improve your English, it can still give you a chance to know more people that you would not meet in your daily life."

> This program had broadened my social network outside of school. I have become friends with other seniors and youths."

Several of the participants (older adults and youth) also made comments alluding to how the program contributed to their enhanced self-confidence for being able to effectively communicate with others. In the following two comments noting the self-confidence theme, the first one is from an older adult participant and the second one is from a youth participant:

> Both seniors and young adults were encouraged to speak and present. It helped to strengthen self-confidence and self-esteem."

> Not only did we have many opportunities to read, write and listen in English, we were given the chance to speak in English … in front of the whole class. This program not only made me more confident to communicate in English with others but also boosted my speak-on-the-stage confidence.

Participant Recommendations for Program Revision

The participants provided several recommendations for improving the program, particularly in terms of the selection and organization of activities.

Suggestions from the students:

- "I think we can play a game and learn more words. For example, *Scrabble*."
- "Better to have ice-breaking activities to let us know each other first. It could reduce the embarrassing atmosphere."
- "Add a professional teaching session and invite some professional to teach us for editing and promoting a video."

Suggestions from the older adult participants:

- "More program activities such as movie entertainment or tour around the world."
- "Suggest some other activities that may arouse interests and fun for all participants, such as karaoke, film show/review, and puzzles."

Conclusions

Is IG-ESL a Successful Program?

The basic IG-ESL program objectives were achieved. The college students exhibited improved ESL skills and enhanced motivation to practice and extend their learning. A major contributing factor to this

outcome was the positioning of the older adults—in formal curricular activities and informal conversations—in ways that stimulated student interest and practice with regard to using English language in real world contexts. This improvement in students' literacy skills is consistent with the findings from some other intergenerational literacy programs in which older adults have a positive impact on children's and youths' linguistic skills (i.e., listening, speaking, reading, mediating, and writing), e.g., as noted in Macdonald (2006) and Meyer and colleagues (2002).

As for program impact on the older adult volunteers, most expressed satisfaction with the progress they made in terms of developing professional skills in teaching English as a second language, achieving enhanced intergenerational understanding, and exhibiting greater confidence and ability to engage and motivate youth in varied English language learning contexts. Several adult volunteers further noted feeling a sense of purpose and accomplishment upon learning that the students were valuing their contributions to the students' academic (ESL-related) skills and personal life decisions (e.g., new realms of knowledge and reflection about career choices).

The ESL Teaching and Learning Value of the Intergenerational Component

This case study provides support for the general contention that there is educational value to embedding second-language (L2) learning experiences in intergenerational contexts. The precise question at hand is how we should seek to operationalize "intergenerational contexts" to achieve desired educational outcomes. In the current study, results point to the significance of emergent intergenerational relationships for fueling students' language learning motivation and providing them with authentic language learning opportunities.

For instance, as the students established more positive views toward older adults (or at least recognized the inaccuracies of misconceptions that several of them held), they became more open to listening to, learning from, and actively engaging the older adults in English language conversations. As the students learned that older adults are "full of talents and ideas" and that they could be "creative and funny," they also became more open and excited about listening to their stories and sharing life experiences.

The intergenerational dimension also contributed to authentic learning (or real world relevance) of ESL. Even when interactions were intentionally framed with the intent of emphasizing specific ESL-related content, e.g., correct verb usage, the older adults liberally wove in information about their perspectives, life experiences, and discipline-specific expertise, thereby demonstrating real world applications of language use in multiple contexts.

This way of framing intergenerational engagement accentuates the importance of fluid, multidirectional, meaningful exchanges, which is consistent with and reinforces the contention made by some literacy educators that environments that provide positive emotional climates as well as intellectual support are conducive for enhancing a learner's capacity for intensive participation and higher mental processes in second language learning contexts (Bujarski, Hildebrand-Nilshon, & Kordt, 1999; Mitchell, Myles, & Marsden, 2013; Swain & Kinnear, 2010; & van Lier, 2004).

IG-ESL program evaluation results also confirm the conclusion drawn by Cordella et al. (2012) that it is not necessary to provide older adult volunteers with formal instruction in second language education for them to be effective in influencing students' ESL learning motivation and skills development. As we have argued elsewhere (Lai & Kaplan, 2013a), equally important is the older adults' capacity to function as "community context connectors." Older adults who are highly engaged in civic life can readily introduce real-life contexts and community-based opportunities for English language skills practice. As we repeatedly witnessed during the IG-ESL program, the senior volunteers were quite masterful in sharing and opening up new lines of conversation related to their work- and post-work activities and insights. This particular dynamic, when harnessed into an intentional educational strategy, is a way to address the line of criticism often leveled at mainstream ESL curricula, i.e., that insufficient attention is paid to promoting language use in meaningful contexts that happen outside of the instructional context (Liou, 2005, p. 188).

Learning from the demonstrated value of integrating an intergenerational component into ESL program contexts, a broader scope may need to be taken. For example, it may be worth exploring the potential of intergenerational models in other educational contexts. From a linguistics theory perspective, it is the potential of adding meaning and additional student encouragement to learning environments, thereby providing students with more affordances (i.e., information students could perceive or other content being learned) they could pick up directly and use actively. By practice, recruiting older adults from the retirement sector is a sustainable resource that could enrich and strengthen a wide range of college activities.

Limitations

The analysis of this study was based on a small number of participants. Thus, the results found are not readily generalizable to any other populations. Furthermore, the results were based solely on data collected in a Hong Kong-based program. To acquire a

better understanding of the value of the IG-ESL approach to embedding second language learning in intergenerational contexts, one would need to replicate this case study in other geographical areas with a bigger sample size. It might also be useful to compare the IG-ESL program model with a similar program minus the intergenerational component.

Implications for ESL Education

In contrast to concerns about the loss of meaningfulness in traditional ESL classrooms (van Lier, 2004), the infusion of an intergenerational component introduces a much-needed pathway to "meaningful learning." As noted by van Lier, an important aspect of language learning is the degree to which this learning enterprise is perceived as having lifelong value. The IG-ESL program was seen as having such value, as is reflected in the following quote from one of the students: "I would recommend this program to my friends because ample thing [sic] I learnt from this program might be useful for my whole life."

This perceived lifelong relevance is particularly pertinent in the Hong Kong context, where the education system has long been criticized for being too exam-oriented and for inadequately preparing students to use English to communicate in real world situations (Gil, 2010). Our experience with IG-ESL also suggests that activities are best programmed to allow both generations to own an action-based role, with freedom to contribute proactively to conversations and share responsibility for creating a stimulating and engaging language learning milieu. The students were able to influence the nature of their conversations with the older adults. Older adults' contributions of their life experiences and skills to the program were to a large extent structured by the curiosity and active engagement of the youth, e.g., in the way they asked questions, re-told the older adults' old stories, sought advice, and co-authored letters. Both groups of participants were empowered.

This is consistent with what van Lier (2008) described as "the essential human attitude of agency, which in ecological terms means that an organism learns and grows so long as it actively engages in and with its environment" (p. 6). Ownership of agency is thus the focal point since both ESL learners and older adult volunteers can become active agents. The communication dynamic that was established throughout the program was one of active engagement, mutual stimulation, and, as noted in the following quote from one of the older adults, empowerment: "I think empowerment is very important. We can empower them, and they can empower us as well."

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Toward a Caring Curriculum: Can Occupational Therapy Be Taught in a Caring Context?

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Caring is often cited as the central component of many health care professions. It is also identified as an equally important factor in patient physical and emotional recovery. In examining health care education, however, curriculum is becoming increasingly focused on the development of technical competence and skill with little focus on the affective aspects of providing care in a caring context. In the field of occupational therapy, little is written regarding facilitation of caring behaviors in occupational therapy students. Through examination of the educational philosophies of Paulo Freire and Nel Noddings, a framework for a caring curriculum can be developed. Through use of signature pedagogies in occupational therapy, the author utilizes fundamental aspects of a caring curriculum put forth by Freire and Noddings to develop a curriculum that not only develops the individual's technical skill, but makes them emotionally competent as well. Though the work of Freire and Noddings was not explicitly intended for higher learning or health care professional education, the principles put forth are not only relevant but provide a viable framework for the development of caring professionals. The benefit of this proposal will ultimately be to patients whom these emotionally competent occupational therapists serve.

Ask any health care professional about the most important aspect of his or her professional practice, and you are likely to hear, "I really care about my patients." Most health professions are founded on the ideal of caring for others. When examining the curriculum of health professional programs (particularly occupational therapy), however, little is provided in terms of methods to facilitate caring behaviors. Though most therapists espouse the notion of being caring professionals, educational programs have become increasingly focused on developing technical competence. The question, therefore, remains, "How do we teach caring?," and, "Can we create caring professionals who are both technically and emotionally competent?" One might suggest that caring is an intrinsic personality trait that one either possesses or doesn't possess. Educational theorists, such as Paulo Freire (2005) and Nel Noddings (2007), however, suggest otherwise. It is the intent of this paper to explore the idea of teaching or facilitating caring behaviors through a caring curriculum in occupational therapy professional education.

Caring can be defined in many ways and in many contexts. In some contexts, caring is defined merely as the practice of looking after those unable to care for themselves (Caring, 2014). In the context of providing care, however, caring takes on a much grander meaning. Caring implies displaying kindness and concern for others, having thought or regard, and showing compassion (Dictionary.com, 2014; Oxford dictionary, 2014). Caring also incorporates the concepts of ethics, social justice, and social competence and involves receptivity, an ability or willingness to receive new ideas or opinions; engrossment, obtaining all of the attention or interest of another; and reciprocity, engaging in an exchange with others toward mutual benefit (Larin, Benson, Wessel, Martin, & Ploeg, 2014).

The importance of caring in the health professions cannot be understated. When patients are asked about the qualities of their therapists that facilitated recovery, they frequently state that their therapists were not only technically competent but demonstrated caring behaviors (Battaglia, Mirabile, Shenker-Goldmacher, & Poole, 2001). Patients often cited affective qualities of their therapists that facilitated an environment that allowed for both physical and emotional healing. Good technical skill, though important, was not sufficient unless these skills were provided in a warm, supportive manner (Battaglia et al., 2001).

Murphy, Jones, Edwards, James, and Mayer (2009) explored the perception of caring behaviors of first-year and third-year nursing students. As these students moved through their educational programs into clinical practice, their perception of caring behaviors as part of nursing practice actually decreased. Though caring is a core nursing value, the educational process appears to have a negative effect on caring behaviors. It is possible that students start educational programs with strong beliefs regarding the role of caring in practice and often find that political and economic factors driving practice decrease their ability to engage in expressive care. Further, as practice becomes more technical, education focuses more on developing instrumental and physical competence while neglecting social and emotional experiences (Murphy et al., 2009).

Beagan (2003) investigated how exposing third year medical students to a course in social and cultural issues affected awareness of how social and cultural diversity influences their practice, the lives of their patients, and the patient-physician interaction. To the researcher's dismay, a majority of the medical students interviewed believed gender, race, sexual orientation, culture, and class made little or no difference in how they practiced. Students were found to be unaware of

issues related to socioeconomic diversity and were ignorant of racism, sexism, homophobia (even among fellow students), and relations of dominance and subordination. They further had little ability to relate to their own socioeconomic and cultural advantages (Beagan, 2003).

Historical Trends and Current Challenges in Occupational Therapy Pedagogy

Current challenges facing occupational therapy education are enumerated in the American Occupational Therapy Association's *Maturing of the Profession Task Group Report to Ad Hoc Committee for Future of Occupational Therapy Education* (Jensen, Peters, Pierce, Reed, & Reitz, n.d.). This report states that the culture of professional education is becoming one that places much value on technical knowledge and practical skill rather than humanistic aspects of the curriculum, leaving little room for student self-assessment or creative and narrative work. The report also identifies how historical approaches to occupational therapy education are being challenged by changes in health care delivery and increased demand, leading to a deficit in the affective and relational components of education and practice (Jensen et al., n.d.).

Shaber, Marsh and Wilcox (2012) identified three signature pedagogies employed over the history of formal occupational therapy education: (1) relational learning, (2) affective learning, and (3) active engagement ("learning-through-doing"). The first model, relational learning, is learning that occurs though human connection. This pedagogical model highlights the importance of teacher-student relationships through mentorship, apprenticeship, and modeling. The human connection made between mentor and student, and ultimately therapist and patient, is considered to be essential (Shaber et al., 2012).

The second model, affective learning, is based on transforming personal identity. Affective learning involves changes in attitudes, beliefs, and values through the teaching of transformative topics. Through shaping of character, students become part of the culture of the educational program, its customs, and ways of relating to others while exploring events that impact the lives of patients (Shaber et al. 2012).

The last model, active engagement, has been used in many forms over the history of occupational therapy education and has increasingly become the center of most professional education programs. The importance of learning-by-doing and teacher-student relationships is emphasized because the modeling and feedback provided during the application of principles shapes behaviors and develops specific skills. Occupational therapy education relies on fieldwork experiences to help develop the skills of occupational therapy students before they enter professional practice (Shaber et al., 2012).

The practice of educating occupational therapy students, however, is undergoing great change. The profession is becoming increasingly technical, with education focusing more on developing technical skills rather than facilitating affective aspects of care. This limited focus often leads to a decrease in caring behaviors, limited socio-cultural awareness, and limited development of emotional-social intelligence (Beagan, 2003; Larin et al., 2014; Murphy et al., 2009). The implementation of increased class sizes and geographic separation of teachers and students has also limited the human connection, further impacting the moral and ethical foundations of professional education (Jensen et al., n.d.).

Pedagogical Theories of Freire and Noddings: Models of Caring

Paulo Freire

Though the work of Freire and Noddings was not explicitly developed for higher or professional education, the theories, concepts, and beliefs espoused in their writings can provide a framework for the development of a caring curriculum. Freire's "Pedagogy of the Oppressed" established the need for use of a humanizing pedagogy (Freire, 2005). Freire's concept of humanism is centered on the capacity of humans to shape their experiences and achieve self-actualization in their development of full humanity (Salazar, 2013). Humanization is the process of becoming social, thinking, communicative, transformative individuals who participate in the world around them. Individuals must become conscious of their presence in the world and how that affects interactions with others (Freire, 2005).

In relation to pedagogy, Freire's ideology requires educators to have a clear ethical and political commitment to change in relation to oppressive societal conditions. Students must be engaged with the world in order to facilitate social change (Freire, 2005). Though no specific teaching methods are explicitly expressed, Freire encourages teachers to listen to their students and build on their life experiences in order to engage in contextualized, dynamic, and personalized education that facilitates social change and humanization of the learner (Salazar, 2013). This pedagogical approach involves a mutual dialogue between teacher and student that leads to greater critical consciousness of the process of identifying—and taking action against—social, political, and economic contradictions and realities, and it improves the individual's ability to

perceive social, political, and economic contradictions and take such action (Freire, 2005; Salazar, 2013).

Through analysis of literature, Salazar (2013) identified five key tenets of a humanizing pedagogy. The first is the importance of the full development of the person. This requires reciprocal opportunities for teachers and students to share their lives, a demonstration of compassion for lived experiences, and the situating of learning in social issues relevant to the experiences of marginalized communities. Education in the context of a humanizing pedagogy must include the psychological and emotional dimensions of human experience. This requires the education process to facilitate respect, trust, reciprocity, active listening, mentoring, compassion, and interest in the student's well-being (Bartolome, 1994; Cammarota & Romero, 2006; Gay, 2010; as referenced in Salazar, 2013).

Freire also challenged the "banking" model of education, in which students are merely banks where information is deposited and stored. Banking requires little student input or reciprocity and promotes passivity, acceptance, and submissiveness. This leaves education highly scripted and skill-focused, limiting the student's process of learning (Salazar, 2013). The product of banking education is a student who is unable to act as an agent of change (Freire, 2005). Freire (2005) contends that in order to eliminate this "banking model" of education, education between teacher and student must become a two way dialogue in which the teacher no longer is a teacher of students but also receives knowledge as information gets passed between the two. The teacher and student become jointly responsible for teaching and learning as this open dialogue and critical evaluation of what is being presented leads to greater understanding (Freire, 2005).

Freire (2005) also identified the need for student-teacher interactions to lead to critical consciousness regarding the student's own contribution (and contribution of society) to their perception of social injustice. Teachers become agents of change in this regard through the use of respect, mutual trust, verbal teachings, and being exemplary role models. A problem-posing dialogue develops in pursuit of humanization for all individuals and is grounded in one's lived experiences to foster action and change. This cultivates a connection with global issues, critical thinking, and a connection between life experiences and society (Salazar, 2013).

The next tenet was identified as praxis, or the reflection and action taken upon the world in order to create change (Freire, 2005). Praxis results in power being shared between teacher and student which, in turn, transforms power and privilege toward decreasing social injustice and increasing freedom. Praxis relies on educators engaging students in critical reflection, posing challenges to inequitable systems, and challenging students to critically engage in the world in order to create change (Salazar, 2013).

The final concept is the educator's responsibility for promoting humanism through his/her pedagogical principles and practices. The most relevant for this discussion is the educator's ability to build trusting and caring relationships with students. Educators must listen to students' interests, needs, and concerns; know students on a personal level and attempt to understand their life experiences; model kindness, patience, and respect; tend to students' emotional, social, and academic needs; create a support network for students; allow for risk taking and active involvement; and facilitate student's connection with their communities (Salazar, 2013).

DasGupta and colleagues (2006) related Freire's principles to medical education and identified fundamental values of medical professionals, including principles of patient welfare, autonomy, and social justice. Students are asked to think critically about subject matter, doctrines, processes of learning, and society. A more humanistic education (rather than the "banking model") incorporates aspects of problem-posing and co-intentionality in order for students to have some autonomy, incorporate their own past experiences, and reinforce practical application of what is taught in the classroom. Teachers must engage students in a dialogue in which students can engage in reflective thought (DasGupta, et al., 2006).

In the greater social context, educators challenge students to think critically, view students as complicated and substantial human beings, and challenge knowledge of the world. Therefore, clinicians not only will be trained clinically and technically, but also will uphold high moral and ethical standards. These behaviors are often facilitated through placing trainees in the position of their potential patients, allowing them to experience social injustice, challenge prejudices, and develop an understanding of communities they serve (DasGupta, et al., 2006).

Nel Noddings

Noddings (2007) has also written extensively on the philosophical basis for a caring curriculum. According to Noddings (2007), caring can be distributed throughout any curriculum design by organizing the curriculum around themes of care (i.e., caring for one's self, others, the natural world) that are then emphasized throughout educational planning. Educational achievement is not only reflected in academic achievement, but through a fundamental change in the way students see themselves and the world around them. Caring themes connect students to greater questions about the meaning of life, the students' role in society, and their connection to others (Noddings, 2007).

At institutional levels, schools must be organized to provide continuity and support while building an atmosphere of care and trust. Teachers integrate caring behaviors into student interactions, including allowing students to be expressive, developing an open dialogue with the students, and showing regard for the students' educational and personal growth (Noddings, 2007). For a caring curriculum to be successful, it requires enthusiastic support from the entire team of instructors who participate and find value in a caring curriculum (Noddings, 2007).

Like Freire's, the dialectical aspects of a caring curriculum outlined by Noddings (2007), require teachers and students to share beliefs and experiences that shape behaviors. Caring requires having needs heard and having those needs treated with respect. The teacher is therefore tasked with the challenge of providing compassionate, consistent guidance. By teachers becoming models of care, students are not only personal recipients of this caring behavior, but become a reflection of these caring actions. It is the teachers' duty to develop students with a capacity to care while these students are in pursuit of technical and academic competence (Noddings, 2007).

Caring must also direct policy. Larger class size, a more technically centered curriculum, and distance and hybrid learning formats are increasingly being implemented in higher education, often limiting teacher-student interactions. Noddings (2007) contends that policies reflecting a caring curriculum should encourage smaller schools or cohorts, with greater teacher-student interaction in order for students to develop the affective skills that are too frequently lost when education becomes impersonal. Furthermore, Noddings (2007) identifies the need for teacher continuity throughout the educational experience. It can be stated that continuity is equally important for a professional education cohort as these continued relationships help foster caring behaviors (Noddings, 2007).

Developing a Caring Occupational Therapy Curriculum

When using the concepts of Freire and Noddings as the structural framework for a caring curriculum in occupational therapy, there are some fundamental criteria that must be met. The first criterion is overwhelming support of a caring curriculum by the entire faculty or department. Without a concerted effort by all involved in this teaching endeavor, the establishment of the ideals presented by this caring curriculum will be limited. Furthermore, policies must support and provide the infrastructure for this type of program. This would require Occupational Therapy programs to follow an on-campus cohort student model. Coursework would be presented by a core team of full time faculty that would provide instruction over multiple courses throughout the educational process. Each student would be assigned a clinical mentor from the start of the program and would have contact with that mentor into their first year of employment. This would establish a relationship of trust and open dialogue with a mentor that has a personal investment in the student's development into a caring professional.

In terms of a pedagogical model of caring, caring themes would be present in all courses. These themes would include—but not be limited to—medical ethics, social justice, social and cultural awareness, humanitarianism, the social and psychological impact of illness, challenges of community integration, and the development of a holistic view of patients as human beings rather than defining them by their illness or disability. Aspects of the three signature pedagogies in occupational therapy—relational learning, affective learning, and active engagement—will also be represented and utilized in this model (Shaber et al., 2012).

Utilizing aspects of relational learning, mentorship, and modeling will play a major role in developing caring behaviors in students. Mentees will have the ability to discuss experiences, fears, and personal limitations related to their own human experiences. Mentors will ultimately have to create an open dialogue with their mentees in order to create a relationship of mutuality and trust. This is reflective of Freire's humanizing pedagogy as it reflects a curriculum that is inclusive of respect, trust, reciprocity, active listening, mentoring, compassion, high expectations, and interest in the student's overall well-being (Bartolome, 1994; Cammarota & Romero, 2006; Gay, 2010; as referenced in Salazar, 2013). Through modeling of empathic and caring behaviors, professional interactions with patients and other professionals, and exemplification of the behaviors and beliefs that occupational therapy is founded upon, students grow into technically and emotionally proficient therapists (Shaber et al., 2012).

Aspects of affective learning would be represented through use of service learning. Though often associated with active engagement models, service learning in this instance would be utilized as a transformative tool to shape attitudes, beliefs, and values (Shaber et al., 2014). Service learning would be a representation of what Freire termed "praxis." The theory of service learning, which in many ways represents the teachings of Dewey and Freire, allows for students to experience the world concretely rather than through abstract classroom assignments.

Dewey's philosophy regarding experiential learning is centered on principles of continuity and interaction. For Dewey, education is described as a process of living and experiencing. These experiences

occur on a continuum in which all experiences build from one to the next. With proper direction, student experiences lead to positive student growth and development. Further, for learning to be fully integrated and applicable, Dewey believed learning must occur through transactions between the learner and the environment. These transactions must ultimately be accompanied by reflective thinking about the experience in order to process what was observed and experienced, leading to true learning. Education should facilitate this process of continuous reconstruction of experiences (Dewey, 1929, 1938; Giles & Eyler, 1994).

Allowing students to experience the communities they will serve, to actively view and experience limitations faced by these communities, and to think reflectively of their experiences will not only encourage caring behaviors, but allow for integration of these behaviors into their daily practice (Cone & Harris, 1996). This service-learning approach further challenges the banking model of education so often discussed by Freire in that students get to experience the world, reflect, and become agents of change. Critical consciousness also develops as students reflect on and process the inequalities present in society. In this model of Occupational Therapy education, situational learning through service learning will be transformative of behaviors and beliefs, be integrated through transactions with the community, and be integrated through reflection of experiences.

To incorporate social learning into the curriculum, the first-year cohort would have to agree as a group (or smaller groups) on a service-learning project to be completed in the summer of their first year of the program. Students would prepare their project under the mentorship of the appropriate faculty member. An example of a service project could be the completion of accessibility evaluations of their own college campus and surrounding community. Students can experience life in a wheelchair while trying to access various parts of the campus or spend a week with a student with a disability to determine how accessible the campus and surrounding neighborhoods truly are. Upon completion of the project, students would compile a report to present to the University. In doing so, students essentially become agents of change. Students will also critically reflect on their experiences, discuss how these experiences altered their preconceived notions, and identify what needs to be done to correct these inconsistencies in practice.

Lastly, the occupational therapy caring curriculum would incorporate aspects of active engagement. Students would engage in therapist-patient interactions under the guidance of a clinical supervisor or mentor. Active engagement would incorporate the actual process of patient treatment and the identification of non-technical aspects of holistic treatment that students may miss while attempting to be technically competent. This is a difficult task because the institution often has little control over the student-teacher interactions that occur during fieldwork experiences. For active engagement to be useful in developing affective qualities of students, these experiences would require supervisors in the field to be acutely aware of the goal of the curriculum and to facilitate and model caring behaviors for the fieldwork student. Active engagement would also be incorporated into the curriculum by providing students with opportunities to experience simulated clinical interactions during their academic coursework. Facilitating these experiences in the classroom would allow for student reflection as a group, the discussion and exploration of social and cultural considerations to be made, and ultimately the facilitation of caring behaviors.

In all, a caring curriculum reflective of the ideals put forth by Freire and Noddings would have to incorporate aspects of policy change, change in delivery models, a commitment of faculty, and an open and honest dialogue on the part of teacher and student. Caring behaviors are facilitated through mentorship, service to the community, and active engagement in social change. Developing clinicians who are reflective of past experiences, are aware of the role of power, are ethical and compassionate, and are becoming agents of change would be the educational goal.

These concepts are not only applicable to occupational therapy pedagogy. As the literature states, many health professions have found that the educational process does little for developing these skills and behaviors in students (Beagan. 2003; Larin et al., 2014; Murphy et al., 2009). The ideas put forth in this caring curriculum could potentially be utilized as a fundamental basis for many helping profession educational programs (e.g., Nursing, Physical Therapy, Speech-Language Pathology). One should fear the effects on the health professions when education is no longer personal and when students are no longer required to explore the affective nature of the care they provide in exchange for purely technical knowledge. As the focus of health care education moves steadily toward increasing technical skill and the methods of content delivery rely more heavily on distance and hybrid models, the need to incorporate these concepts will become increasingly evident and important.

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The Strategy Project: Promoting Self-Regulated Learning through an Authentic Assignment

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Success in college requires the development of self-regulated learning strategies that move beyond high school skills. First-year students of all ability levels benefit when given instruction in how to use these strategies in an authentic context. This paper presents an instructional method that requires deliberate practice of self-regulated learning strategies including active reading, management of study time and achievement goals, proactive interaction with faculty, and metacognitive reflection within the context of a student-selected course. Four instructors implemented the assignment in their first-year seminar courses, and student reflection papers were analyzed for emerging themes. These themes suggest the positive impact of applying pedagogy that requires intentional within-course application of self-regulated learning strategies, suggesting the strategy project may be a viable way to teach and encourage college-level strategic behavior.

Beginning college students often enter their first semester underprepared for the personal responsibility of managing their own learning (Weinstein, Acee, & Jung, 2011). To be successful in the academic challenges they will face, college students must go beyond surface-level learning, taking ownership of learning by choosing and using the best resources and strategies for the task, as well as reflecting upon and monitoring their progress toward learning goals (Kitsantas, 2002). These skills, which are often grouped under the umbrella term "self-regulated learning" (e.g., Zimmerman, 2008), are not explicitly taught in most high school curricula, yet they are integral for academic success as well as adjustment to college (Park, Edmonson, & Lee, 2012).

Students come to college expecting that more will be required from them (Schilling & Schilling, 2005), but yet the high-school mindset persists (Erickson & Strommer, 2005). Lacking the skills to deeply and critically process information, manage their time and study habits and reflect on these strategies, many first-year college students experience failure during the first semester. Self-regulated learning programs have been successful in helping students develop these key skills in the first year (e.g., Rosário, et al., 2010; Tuckman & Kennedy, 2011), and some content-area instructors are able to weave instruction in self-regulated learning into the curriculum (see Weinstein, Tomberlin, Julie, & Kim, 2004, for examples). However, most often the pressure to cover content prevents the inclusion of self-regulation strategies in the type of courses most often taken by first-year students. Furthermore, unless students are directed to practice self-regulated learning strategies in an authentic context, any message given to them about their efficacy may be lost (Sternberg & Martin, 1988).

This paper presents an assignment that encourages students to acquire and practice the self-regulated learning strategies that are associated with success in college. The assignment is grounded in the literature on self-regulation strategies and college success, and it was designed to encourage the development of self-regulation mastery through deliberate practice of these strategies in an authentic context. It addresses the problem of implementation and authenticity by using the context of a course in which the student is currently enrolled. In the Strategy Project assignment, students learn time management, communication, and study strategies in the process of preparing for an actual test, then demonstrate that learning by submitting their test preparation activities as part of a graded project. By encouraging and providing feedback on reflective thinking and goal-directed interaction with faculty and peers—strategies that contribute to success in college—instructors can model the process of self-regulation. The next section presents a review of this literature as it relates to college success.

Self-Regulated Learning Strategies

Ambrose, Bridges, DiPietro, Lovett, and Norman (2010) suggest that "to become self-directed learners, students must learn to assess the demands of the task, evaluate their own knowledge and skills, plan their approach, monitor their progress, and adjust their strategies as needed" (p. 191). In other words, to become a self-regulated learner, students must first acquire the strategies that lead to success, then implement and reflect upon the results. Self-regulating behaviors are proven predictors of academic success (e.g., Pintrich & DeGroot, 1990). In college, learning strategies that go beyond memorization and passive knowledge acquisition are essential, as students who use higher-level metacognitive strategies are more successful in their courses (Kitsantas, 2002). For example, students who are taught to monitor their comprehension and evaluate their learning as they read show deeper processing of the material and better

retention than students who passively read the text (Nash-Ditzel, 2010). In addition, first-year students who successfully manage their time and seek out existing resources show greater achievement in the first year (Tuckman, 2003).

Research on self-regulated learning has a long history in the educational psychology literature, originating from work by Zimmerman, Schunk, Pressley, and others on goal setting, motivation, and strategy use (Zimmerman, 2008). As Zimmerman (2008) notes, a self-regulated learner is one who is motivated, reflective, and proactive in his use of learning strategies. For college students, self-regulation involves taking the initiative to learn and implement appropriate strategies for the task, set goals for learning, and reflect on one's approach, modifying it for the next task if necessary. Although it is often described in conjunction with academic strategies, it can be extended to proactive social behaviors, such as seeking help from the instructor (Zimmerman, 2008). A self-regulated college student knows a variety of strategies, understands when to use them, and is mindful of his progress toward short- and long-term goals.

Many students enter college believing that they are prepared for this challenge due to their success in high school (Balduf, 2009). However, because learning tasks at the college level require different skills and greater personal responsibility for managing those skills, many high school students begin to show deficits in these abilities once they reach the college level (Cohen, 2012; Levine & Cureton, 1998). This is not limited to poor performing students. While bright students may have better self-regulation strategies than their peers in middle and high school (e.g., Zimmerman & Martinez-Pons, 1990), those same students may reach the ceiling of their strategic ability in college where more active learning strategies are required (Balduf, 2009). This suggests the teaching of self-regulated learning strategies is important for college students of all achievement levels.

Ample evidence shows that self-regulated learning strategies, as primary contributors to academic success (Pintrich & DeGroot, 1990), *can* and *should* be taught (Cohen, 2012; Paris & Paris, 2001; Tuckman, 2003; Weinstein, et al., 2004), yet faculty attempting to teach them may face challenges. For example, despite negative feedback and poor grades in their initial semesters of college, many students are reluctant to change the learning strategies with which they were successful in high school (Dembo & Seli, 2004). Furthermore, many students are unable to appropriately judge whether or not they are actually learning—a key aspect of self-regulated learning—which can lead to overconfidence (Koriat & Bjork, 2005). The assignment presented in this paper encourages students to practice confronting their ineffective strategies and reflecting on outcomes of learning.

Models of expertise (e.g., Ericsson, 1996) have suggested that deliberate practice provides the best route to becoming an expert in a task. In order for a person to achieve at mastery levels, practice of the skill in an authentic context is necessary. While the amount of time a student studies is important, it is only predictive of grades when the time is spent in useful, deliberate practice of learning skills (Plant, Ericsson, Hill, & Asberg, 2005). When study time is carefully planned, focused, and appropriate for the task at hand, mastery of learning strategies is optimized. Students who commit to practicing good learning strategies, therefore, have a better chance at becoming self-regulated expert learners.

The type of deliberate, domain-specific practice that builds self-regulation can be achieved through the use of an authentic assignment such as the one presented in this paper. Authentic assignments are carefully designed by the instructor to mirror the types of tasks students will encounter in a real setting (Wiggins & McTighe, 2005). They require problem-solving, creativity, and application, and similar to real-world tasks, are complex and somewhat unstructured. Authentic assignments help students practice the learned strategies in the same way they will use the strategies in the future and promote the kind of metacognitive reflection that builds self-regulation.

This is most successful when contextualized in a setting that is meaningful and valuable to the student (Simpson, Hynd, Nist, & Burrell, 1997; Sternberg & Martin, 1988). When strategies are embedded in or taught alongside a content area, students are better able to transfer the strategies to future tasks and reflect on the outcome of that transfer (Steiner, Dean, Foote, & Goldfine, in press; Tuckman, 2003). In sum, the self-regulated learning strategies important for success in college are built through deliberate practice within an authentic context that has value for the student. The next section of this paper presents in detail an assignment which meets these goals.

The Strategy Project Assignment

In order to become successful college students, first-year students must be able to use deep processing strategies to retain what they learn and time management strategies to maximize efficiency. They also must be able to reflect continually on their progress with these strategies, seeking help when necessary. It is with these learning objectives in mind that the Strategy Project Assignment was developed. The Strategy Project (see Appendix) is a multistep project requiring students to plan, monitor, and evaluate their newly learned strategies as they prepare for a test in a course

in which they are currently enrolled. In this assignment, students are directed to complete the following activities related to an exam they have chosen for the project. Students must:

- create a plan for their study time;
- interact one-on-one with the instructor of their chosen course;
- use active reading strategies as they review exam material;
- use active note-taking strategies in class;
- implement additional active learning strategies that are appropriate for the content area, such as self-quizzing or concept mapping; and finally,
- reflect on their exam performance in a final paper.

The Strategy Project was designed for implementation in the first-year or learning-to-learn seminar, but can be adapted for a variety of courses and is especially appropriate in a learning community setting where a first-year seminar is linked to a content-area course (see Steiner et al., in press). Content-area instructors also can adapt this project for use in their own classes by assigning the project prior to a test in their own course.

First, students receive instruction on the use of self-regulated learning strategies as well as research-based evidence on why the strategies work. For example, the instructor may model the process of active reading by thinking aloud, writing annotations in the margin, and self-quizzing as she moves through a text. This lesson can be extended to a discussion on metacognition and the benefits of deep cognitive processing. After instruction in the various strategies, students are directed to identify a test in a course for which they have ample time to prepare and reflect. Typically, this is the second or third test in a semester-long course. When given the option to choose their own test, choices can vary widely, from Psychology to Math to Chemistry and others; however, most students choose a course in which they feel less confident and prepared. Students meet briefly with the strategy project instructor to review the requirements and determine if any substitutions should be made. For example, if a student chooses a course in which a textbook or other readings are not used, an alternate strategy that will replace the active reading strategy may be proposed by the student and approved by the instructor.

Next, the student makes an appointment with the instructor of the course they have chosen for the project (again, when the strategy project is assigned as part of a content-area course, this section may be modified). This is a significant piece of the strategy project, as it allows students not only to gain knowledge about how to succeed in the course, but to build a relationship with a professor who cares about the student's success and is invested in the student's growth as a self-regulated learner. Goodman, Baxter Magolda, Seifert, and King (2011) suggest that interacting with faculty members outside the classroom plays an important role in the transition to college. Requiring this interaction as part of the strategy project may help ease the initial discomfort that many new college students feel in speaking with their professors.

Students then plan their approach to the strategy project by mapping out a time- and task-specific "plan of study." As an essential component of self-regulation for college students (Kitsantas, Winsler, & Huie, 2008; Tuckman, 2003), time management is another important piece of the strategy project. With increased task demands and more responsibility for allocating their time, college students must be taught strategies for managing their study time. Students who use good time management strategies tend to achieve higher grades. Kitsantas and colleagues (2008), for example, found that good time management strategies during the first and second years of college was a better predictor of academic success than prior ability measures like high school GPA and SAT scores.

Specific learning strategies are the next components of the strategy project. The active reading portion allows for practice of textbook annotation, an active strategy that promotes deep processing and engagement with the material (Simpson & Nist, 1990). In the note taking portion, students are instructed to take notes for the duration of the exam-preparation time using the Cornell method of note-taking (Pauk, 1962)—a system of note-taking which encourages organization, self-quizzing, and paraphrasing—or a similar active note-taking method. Finally, students are directed to choose two additional strategies from among those discussed (for example, concept mapping, creating flashcards, self-quizzing, etc.) that are appropriate for test preparation in their course. Evidence of good quality textbook annotations, class notes, and study strategies are presented as a portion of the final strategy project.

Finally, students reflect on the results of their strategy project through a written assignment and oral presentation. Both of these final products are crucial to the success of the strategy project. Written reflections are often used in the first-year seminar to promote critical thinking and metacognition (see, for example, Everett, 2013). By encouraging students to critically analyze the efficacy of each portion of the project, the instructor-suggested prompts mirror the type of metacognitive evaluation that good self-regulators conduct naturally. By sharing these reflections with classmates, students expose each other to peer-driven models of self-regulation, and

they share discipline-specific strategies that may help their fellow students succeed in other courses.

In sum, the strategy project encourages the deliberate practice of self-regulation strategies embedded in the authentic context of a student's current class. The following section describes an analysis of student responses to the written reflection portion of the project. To best understand the impact the Strategy Project had on first-year students, analysis was restricted to the project's reflection papers. However, reference to the project continued to emerge in end-of-semester course evaluations and online ratings of instructors. Clearly, it was a project that made an impression on students during a time of transition. Emerging themes from these student reflections will be discussed in light of the literature examined in the previous section.

Emerging Themes

The Strategy Project was assigned in five sections of a first-year seminar course taught by four different instructors. The first-year seminar includes learning outcomes related to time management and study skills, and approximately four class sessions (six hours) are spent on instruction in this area. Strategy Project reflection papers and grade improvement scales (N=79; see Appendix) were collected at the close of the semester from first-year seminar students who signed consent forms agreeing to participate. Student names were dissociated from the papers, which were kept confidential.

Reflection papers were analyzed for recurring themes using open coding methods, which are rooted in the "grounded theory" qualitative approach (Strauss & Corbin, 1990). This method of content analysis is recommended for use in educational settings, as it allows themes to emerge naturally from their context (Mann, 1993). Formal content analysis of the reflection papers was conducted solely by the author; however, two of the instructors who provided reflection papers participated in a more informal review of the data and emerging themes, which closely matched the author's more formal analysis. This section presents a preliminary discussion of these themes (see Table 1 for a summary), including students' thoughts on the strategy project's role in the college transition; self-reported changes in strategy use, achievement, and self-efficacy; and projected long-term changes in self-regulatory behaviors. These themes will be illustrated with selected quotes from student reflection papers.

Task Value

Student motivation for a task is dependent in large part on the personal value of the task in question (Wigfield & Eccles, 2000). In order for students to commit to strategy change, they must find personal benefit in doing so. Therefore, perhaps the most important theme to emerge from the student reflections is the value the students saw in completing the strategy project assignment. Students felt this project was extremely helpful and worth their time, which is important given the demands that all college students face. "I am so gracious that I was assigned this project. I learned so much about myself and gained an enormous amount of self-confidence by committing myself to this assignment," said one student. "This project has to be the most eye opening project of my entire semester," said another. "It has efficiently changed my study habits and strategies throughout my college career. For that, I am extremely grateful that you chose this project to help us adapt to college." Even after the conclusion of the semester many students continued to mention this project as being the most transformative experience of their first-year seminar. This was especially significant because of the transformation in learning strategies the college transition requires.

The High School to College Transition

Students reported entering college with expectations of a higher work load and greater personal responsibility than they had in high school, which is similar to what many other first-year students expect (see Schilling & Schilling, 2005). However, some students seemed to be overconfident about their first college exams, while others were paralyzed with fear. One student admitted, "I was confident to the point of becoming overly ambitious and cocky when I went to bed the night before [my first] test." Another more fearful student said, "I feared this class in the beginning of the semester so much that I thought for sure I was going to fail." Optimistically, many of these students saw the strategy project as a way to dispel that fear and tackle the new demands of a college curriculum: "I figured this project was a chance for me to relieve some of that stress and learn ways to make me feel more prepared for my next test."

As in Balduf's (2009) study, the students reported doing very little studying in high school. Many said they had never read a textbook until faced with the strategy project requirement: "Coming to college has definitely been a wake-up call… In high school, I was a 4.0 student. If you went to class and paid attention, you could easily make an A. That is not the case in college." Students' lack of time management skills was also a prominent theme, reflecting a struggle common among first-year students (Pryor et al., 2012). One student described her struggles with managing classes, a part-time job, and new relationships: "A person can set time aside to do projects, but that doesn't mean it will get

Table 1
Summary of Emerging Themes in Strategy Project Reflection Papers.

Topic	Emerging theme
Task value	Students viewed this assignment as helpful.
	Students viewed this assignment as worth the time commitment.
High-school to college transition	Students expected a higher work load upon entering college.
	Students were overconfident in their strategies based on high school successes.
	Despite overconfidence, many students were fearful about their first college exams, not knowing what to expect.
	Students reported little studying and time management activities in high school.
	Students recognized after the first exam that new strategies would be necessary.
	Students were not willing to attempt this change in strategies on their own.
Changes in strategy use	Students were initially disinterested in the strategy project assignment.
	Students, especially those who reported enjoying some of the more difficult strategies, displayed emerging metacognition and an understanding of why some strategies worked while others did not.
	Students had mixed responses to most of the individual strategies, but the plan of study and professor interaction were universally well-liked.
Changes in achievement and self-efficacy	Students reported increased test grades in their chosen courses.
	Students reported increased confidence in their test-taking abilities.
Long-term benefits	Students reported permanent changes in their study and time-management strategies.
	Students reported a recognition of the value of effort in preparing for exams.

done; a lot of things come up and plans change, and it is sometimes hard to change with it." Many described themselves as procrastinators, like these students:

- "I waited until three days before to try to cram weeks' worth of information"
- "I used to wait till the day before to start my work and then turn it [in] half done."

Many of them recognized that although they were excited and confident about their college classes, new strategies were necessary: "Coming into this semester I thought that with sheer motivation and class attendance I could get through all of my classes, because I had plenty of it. As the year progressed, however, I recognized that that would not be enough." This "wake-up call" especially made an impact as students received feedback on their first and second tests in their courses: "Honestly, I hardly studied for the first exam because I had made an A in the same class in high school. That was a naïve mistake. Receiving the first exam grade was a rude awakening to college and proved that my study skills are lacking."

Interestingly, even though students knew they needed to change, they weren't always willing to attempt this change on their own. One student explained, "How I studied and prepared in high school worked for me then, and I honestly believed that it would also work in college. While I did realize that was not the case quite early on, I still was too stubborn to completely change how I went about completing my work for classes. Cramming at the last second and skimming over reading has always gotten me through classes and I wanted it to work in college as well. This project however, forced me to totally throw all of the things that I have done out the window and go about tackling this exam in a different manner." Thus the strategy project was the impetus for a change that may not have happened otherwise.

Changes in Strategy Use

Perhaps because of these prior habits, many students balked at the suggestion of such a comprehensive project that would lead to strategic change. The initial reaction to the strategy project was not all favorable: "When I originally heard about what all was required for the Strategy Project, I

immediately became uncomfortable," said one student. "I knew that every one of the things I was required to do for it was going to force me to step out of my comfort zone and traditional study habits that I have held all the way through school." Students reported feeling "overwhelmed" at first, seeing the project "as a burden. Just one more thing I had to do." Then, when the project was underway, their feelings seemed to change: "[The Strategy Project] took some time getting used to, and in all honesty I was thinking of not actually participating. Then again, a light bulb came on, and I realized that maybe doing the strategy project would not be such a bad idea."

After completing the strategy project, students reported many changes that indicated a better understanding of why some strategies work when others do not. One student described this understanding in detail:

> I placed a lot of my emphasis on the notecards throughout my [previous] study period, and that's why I believe I didn't get an A. Not saying the notecards weren't useful, there [were] just questions on the test that required you to apply the vocabulary definitions… In my Cornell Notes I was able to find more examples and teacher comments, leading to a better full understanding of the given terms. Knowing the definition can only take you so far, you have to be able to apply the terms to certain scenarios asked in exam questions.

Many students wrote about similar metacognitive experiences that led them to thinking about studying in a new way.

Student opinion on some of the individual strategies was mixed, perhaps reflecting the uniqueness of each student's testing situation. For example, about half the students found textbook annotations and Cornell note taking methods useful for their test preparation, and half did not. Many of them said they found those methods tedious and unnecessary initially, yet they changed their minds when their test scores increased as a result. Students who reported enjoying textbook annotations and Cornell note taking had reflection papers that included more references to metacognition, which may indicate that they truly understand the purpose of those strategies. There was overwhelming support for the plan of study and professor interaction portions of the project, as well as for the strategies of concept mapping and self-quizzing. The vast majority of students said that they would continue to create a study plan for future tests that included plenty of time for metacognitive strategies, and they would take the initiative to speak with each of their professors at the start of every semester.

Changes in Achievement and Self-Efficacy

Among the students who reported their test grades before and after the strategy project, approximately 45% reported increases of a letter grade or greater and an additional 26% reported smaller grade increases. Three students made perfect scores on their tests after completing the strategy project. One described his success in a notoriously difficult course:

> Finally the moment arrived, exam time. I cleared my mind before the exam was distributed, I reminded myself that I had done a great job sticking to my strategy project, I reminded myself that I was going to impress [the professor] by doing really well on her legendary exams, I could do this, I knew I could. I took my exam with surprising ease and confidence… Then, later that evening, when I checked my grades, I saw it; I had made a perfect score, a one hundred percent on one of [the professor's] exams. I couldn't believe it, at first I thought there had been some mistake, but upon reflecting on all that I had done to prepare for that exam, I knew that this was the grade I deserved.

Students also reported changes in self-efficacy as a result of practicing self-regulated learning, mirroring many of the findings from studies discussed above (e.g., Zimmerman & Martinez-Pons, 1990). After practicing self-regulated learning for the strategy project, students felt more confident in their test-taking abilities. In fact, this increased confidence was one of the strategy project benefits most often mentioned by the students. One student remarked:

> Whenever a test or quiz is mentioned, anxiety will almost always be present. Before the exam, I had some anxiety, but I just reminded myself that I studied using my strategies, I was prepared, and I knew I could do it. During the test I felt confident and happy that I understood the information, [and] lastly I thought to myself, 'I will do well!'

Another commented, "Now I feel confident doing math again."

Not all students saw an increase in their test grades as a result of the strategy project. Nine percent of the students reported a small decrease in their test grades after the strategy project, and 13% reported a decrease of a letter grade or more. When these students' reflection papers were analyzed separately from the larger group, some surprising themes emerged. Perhaps

the most surprising was the honesty with which students confronted their failure. The vast majority of this group voluntarily admitted that they did not put forth the necessary effort on the project, taking personal responsibility with comments like, "I have no one to blame but myself." They had challenging personal circumstances:

> The past few months things in my life have been a ping-pong ball and that is stressful. Not only do I have to worry about grades but I have to worry about what I am going to do next year and even next semester.

They also made mistakes in test preparation: "Taking notes on the wrong part of a chapter in Economics can do much more harm than one might expect. I attribute some of the loss of maximum points on the test to this unfortunate mistake." Some failed to follow their plan of study:

> It was definitely in my intentions, but I would get too tired some nights, or just get back in my room too late and not feel like studying... I feel as though if I had stuck to my study plan exactly, I would have done better on my test.

Only two students out of 79 felt as if they had put in quality time to a project that did not benefit them in the end. These students, according to their reflections, had trouble understanding and applying the learned strategies and therefore felt frustrated with the project in general.

Long-Term Benefits of the Project

Many students indicated that they will make permanent changes in their self-regulated learning strategies as a result of this project. Even students who were not successful in raising their test grades reported that they will continue to use these strategies in the future. A student who did not improve her grade initially said, "The best thing about this whole project for me is the lasting effects... I used these methods again because I thought that maybe I just needed to adjust to them. Making myself take the time to do these things has helped so much. I know [my test score] isn't a great one. However, compared to the other two [previous] scores, that is a GREAT score and I am proud of it." Students seemed to recognize the value of effort in achievement, which is critical to viewing success as an attainable goal (Dweck, 1986). And as projected, these students saw the strategy project as the beginning step in the process of becoming self-regulated. One student said, "I will try to keep constantly adjusting my study habits throughout my college career, and I hope the Strategy Project lays the ground work for just that." They felt they had a fresh outlook on college and were prepared to tackle future classes: "I am excited to start next semester because I know I will do a lot better."

Concluding Thoughts

The assignment described in this paper was developed to aid students in building better self-regulated learning strategies in an authentic context. Student responses indicated that the project did raise awareness of, and encourage the use of, these beneficial strategies, and for most students, also increased their test scores. Research using this assignment may help clarify the effect of self-regulated learning strategies on student metacognition and achievement. However, some limitations of the assignment itself must be acknowledged. Because authentic assignments are representative of real-world problems (in this case, studying for actual college exams), they are somewhat more subjective than other assignments. The strategy project is flexible enough to be used with many different courses, and it may be modified by students when necessary. This occasionally caused discomfort for instructors (and students) who preferred more controlled, proscribed, objective assessments of learning. Detailed grading rubrics for each part of the project are currently in development; these may help clarify expectations for students and instructors. The strategy project also relies on self-reports from students and, therefore, must make the assumption that students are being truthful about the strategies they used and the grades they received. Finally, like most assignments, the strategy project will be successful only with student buy-in. Unmotivated students who fail to complete the requirements will not reap the project's benefits.

In order for first-year students to develop habits for success, they must learn and commit to practice good metacognitive skills for studying, time management, and self-reflection. The strategy project is an emerging, effective pedagogical aid to encourage these good self-regulation skills. It allows for deliberate practice of the newly learned strategies in the authentic context of a course in which the student is currently enrolled, thereby increasing its personal value for students. Although many students entered college with deficient learning strategies, they indicated that they would not have taken the initiative to change their strategies on their own. This project provides the momentum to overcome the academic inertia that plagues many first-year students. Although this is a multi-part assignment that takes considerable commitment from students, students are motivated to

complete it because of the immediate feedback they receive and often are pleased with the resulting good grades. This positive feedback may encourage them to make permanent changes in their self-regulation strategies for future courses. In sum, the strategy project is a flexible assignment that may be useful in a variety of courses to help students build the self-regulated learning strategies that will enable their success in higher education. Future research on this assignment can shed more light on the lasting effects this project has on student achievement.

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Appendix

Strategy Project[1]

This is one of the most important assignments for the course, as it is where you will put the information you learn in this course into action. You will choose one test in another course that you're currently taking and apply the strategies and hints that we've learned in this course to preparing for your test. This assignment will require you to submit all your test preparation and other strategies along with a written reflection about your experience by the last day of class. As part of your grade, you will also present your strategy project to the class.

Specific Strategy Project Components:

1. **Contract (5 points).** Choose a test in another course that is not the first test given in that course, but has sufficient time for reflection after the test is returned. The strategy project will work best if you choose a high-stakes test that you anticipate will be challenging. Complete the "Strategy Project Contract" with your instructor.

2. **Professor Interaction (20 points).** Make an appointment to meet with the professor of the course well before your chosen test for an interview and help session. Feel free to explain that you're there as part of a strategy project in another course. Please write a brief (1-2 page) description of what went on during your professor interaction. A list of suggested questions is below, but please also add your own:

   - What is the format of the upcoming test?
   - What do you think are the best ways to study for this test?
   - What do you think differentiates the most successful students in your class from the least successful students?
   - What do you like most about being in academics?
   - Do you conduct research? If so, what is it about?

3. **Plan of Study (20 points).** Using the suggestions from your professor as well as what you've learned in our class, please outline your plan of study for this test. You should create a detailed study schedule that describes what you will do and when you will do it.

4. **Active Reading (10 points).** Preview and annotate all textbook chapters associated with this test. You will present your annotations to your instructor when you turn in your final project.

5. **Active Notetaking (10 points).** Use the Cornell method to take notes during the entire pre-test period, making sure to set aside the left margin for self-quizzing. You will present your notes to your instructor when you turn in your final project.

6. **Test Preparation Strategies (20 points).** Select at least two additional test preparation strategies (e.g., flashcards, concept maps, question generation, self-quizzing, etc.) that are appropriate for your course. You will present your completed test preparation strategies to your instructor when you turn in your final project.

7. **Written Reflection (40 points).** After you take your test but before you receive it back, please estimate the grade you think you received. When you receive your graded test, please write a reflection paper 3-5 pages in length about your experiences with the strategy project. In particular, please reflect on which elements of the project you think helped and which did not. Please also reflect on the grade you received, and whether it

[1] The research study described in this manuscript used a pilot version of the strategy project assignment, which is provided here. For an updated version of the assignment, please contact the author at hsteiner@kennesaw.edu.

matched what you thought you'd receive. Please also attach your completed Grade Improvement Scale (found below). Submit your reflection paper and scale as part of your final project.

8. **Class Presentation (25 points).** Please plan to share your Strategy Project with fellow students in an informal presentation of about 10 minutes in length. You may use the doc cam to show elements of your project. In particular, your fellow students would like to know: What is your course like? Was the professor receptive to your questions? What elements of the Strategy Project worked in your course?

To summarize:

- Your contract that describes the test you will use for your project is due on [date].
- Complete the active reading, active notetaking, professor interaction, plan of study, and test preparation strategies **before** your chosen test. After you have taken the test, but before you receive it back, estimate the grade you think you received.
- After you receive your test back, complete the written reflection and grade improvement scale, and prepare for your presentation. Make an appointment with your instructor to present your active reading, active notetaking, and test preparation strategies, and submit your professor interaction, plan of study, and written reflection/grade improvement scale to the dropbox.

Strategy Project Contract

Name_____

Course you will use for this project_____

Date of Test_____

No modifications for the Strategy Project will be necessary for my test.

_____
Student Signature

OR:

I will need to modify the following Strategy Project requirements:

I propose the following strategies to take the place of the above:

_____
Student Signature

Approved_____

Grade Improvement Scale

Name of course used for strategy project:

My grade on the first test in that course was _____.

My grade on the second test (for which I used the strategy project) was _____.

From the first test to the second test, my grade:

1	2	3	4	5
Decreased significantly (10% or more)	Decreased slightly (less than 10%)	Stayed the same	Increased slightly (less than 10%)	Increased significantly (10% or more)

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Learning through the Variation Theory: A Case Study

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The variation theory stems from the concept of phenomenography. Although some applications of the theory can be found, the theory is not well known in the field of education, especially with respect to the teaching of business and management subjects. The aim of this paper is to explore the use of the variation theory for teaching management concepts. A case of designing an educational setting for learning two easily confused theories of knowledge management was presented. With the intended object of learning, the educational setting was divided into three parts, based on which students experienced the four patterns of variation (i.e., contrast, separation, generalization, and fusion) by using their own generated examples. The theory helps students draw upon their personal experiences and discern learning from different perspectives.

The variation theory stems from the concept of phenomenography. Since its emergence in the late 1990s (Marton & Booth, 1997), the theory has quickly become one of the most famous instructional approaches. The theory is useful in education as it helps teachers learn to discern learning from different perspectives, and it can be used to address individual differences in the classroom by allowing students to draw upon their personal experiences and apply them in their learning (Ornek, 2008). Accordingly, the variation theory can contribute to the design of pedagogical settings for teaching large classes (Gu, Huang, & Marton, 2004) as it helps to deal with students' diverse abilities, which, according to Cheng, Tang, and Cheng (2014), has long been the core issue in education.

Although some applications of the theory can be found, such as teaching computer programming (Thuné & Eckerdal, 2009) and Chinese characters (Ho, 2014), the theory is not widely applied for improving teaching, especially with respect to business and management subjects. Its lesser popularity can be explained by the fact that the importance of teaching is underestimated. Without paying attention to the complex nature of learning and the presence of individual differences in pedagogical understanding, teachers only perceive teaching as "a relatively straightforward task rooted in the notion of delivering information" (Loughran, 2009, p. 189). Such an "out-of-focus" perception should not be an obstacle preventing the introduction of useful teaching theories that can enhance students learning.

In order to increase the application of the variation theory, more examples from different disciplines should be demonstrated. Therefore, this paper aims at exploring how the theory can be employed to improve the teaching of management theories by reference to a case study example. Such a case study approach is referred to as "learning study" by Marton and Lo (e.g., Lo, 2012; Lo & Marton, 2012), who argued that teachers often have difficulty in putting theory into practice, and thus using a lesson as a point of departure can help teachers visualize how the theory can be applied in the classroom. It is perhaps the first paper to demonstrate the use of the variation theory in teaching easily confused management concepts. The writing of this paper was challenging and rewarding because all the concepts of phenomenography, variation, and transfer of training can be integrated in the pedagogical setup. In the following sections, some basics about the concepts and theories are provided. The teaching strategy for an object of learning is then presented to illustrate how the concepts and theories can be applied in a real context.

Background Theories

Phenomenography

Phenomenography refers to "the qualitatively different ways in which people are aware of the world, and the ways in which they experience various phenomena and situations around them" (Marton & Pang, 2008, p. 535). In a pedagogical setting, teachers should identify the multiple conceptions students have regarding a specific phenomenon because different students may experience a phenomenon in various ways. As phenomenography is known to be empirical in nature or, more specifically, qualitative in nature, teachers should study the awareness and reflections of the students (Marton & Pang, 2008). This process is referred to as "bracketing", which means that the teacher should let a student approach a particular topic using his or her own way of experiencing it without any input from the teacher's perspective (Ornek, 2008, p. 3).

The way of experiencing a topic is twofold (Booth, 1997; Marton, 1986). First, it is a way to separate the phenomenon from its context (i.e., external horizon), and second, it is a way to associate the phenomenon with its essential parts (i.e., internal horizon). As such, it is the student who determines the parts of the phenomenon that should be moved to the background

and the parts that should be brought into focal awareness. Except for those critical aspects of the phenomenon brought into focal awareness (e.g., the theme), all the remaining aspects are retained in the thematic field. The critical aspects form the core for developing understanding and experience. Learning occurs when the critical aspects of the phenomenon vary, thereby allowing variations to be brought into focal awareness.

Variation Theory

Variation theory explains that individuals see, understand, and experience the world from their own perspectives (Orgill, 2012). Therefore, students may not learn effectively if they are not aware of things in exactly the same way as the teacher (Lo, 2012). However, the theory is suitable to improve learning by helping students develop their own ways to experience the phenomenon (or the object of learning). Learning takes place when a student is "capable of being simultaneously and focally aware of other aspects or more aspects of a phenomenon" (Marton & Booth, 1997, p. 142). Marton, Runesson, and Tsui (2004, p. 7) referred to this as "powerful ways of acting" being derived from "powerful ways of seeing". Lo (2012) supplements that teachers should help students develop "powerful ways of seeing" so that students can become more independent in dealing with new problems and issues in the future.

The theory envisages that for learning to occur, some critical aspects of the object of learning must vary while other aspects remain constant (Ho, 2014; Ko & Marton, 2004; Marton & Booth, 1997). It further suggests that how students perceive a specific object of learning depends on what pattern of variation is provided by the teacher. It is expected that different patterns of variation result in different types of learning. According to Marton and colleagues (2004, pp. 16-17), there are four patterns of variation: contrast (i.e., recognizing values of an aspect), generalization (i.e., experiencing varied appearances of the same value), separation (i.e., separating aspects with varying values from invariant aspects), and fusion (i.e., experiencing several critical aspects simultaneously). Lo and Pong (2005, p. 21) refer to them as "possible functions". In such a learning study approach (Marton & Pang, 2008), teachers should be able to construct learning instructions and activities for students to experience and discern a particular pattern of variation that can strengthen their learning of the object of learning.

Transfer of Learning

To ensure that students have learned what was intended for them to learn, evidence of the transfer of learning must be collected. Transfer of learning is defined as the extent to which learned knowledge and skills are being applied to other situations (Noe, 2012). This can also be referred to as positive transfer (Mariano, 2014). According to "the doctrine of sameness", the learner who has learned to do something in one situation may be able to do the same thing in another situation, given the perceived similarities between the two situations (Marton, 2006, p. 499). This represents an emphasis on the general principle that can be applied to similar situations. Thus, such a near transfer of learning is about relationships between situations that are perceived to be related through similarities (Mariano, 2014).

However, from an educational perspective, "it appears more fruitful to consider the case when the learner, having learned to do something in one situation, might be able to do something *different* in other situations, thanks to perceived *differences* between situations" (Marton, 2006, p. 499). This later argument draws attention to the question of "how situations are related through differences". By discerning such differences between situations (similar to the varying appearances in the concept of *generalization*), learners can adapt what they have learned to different situations, enabling the so called far transfer of learning. Therefore, researchers have suggested that learners be presented with more situations during the learning experience (e.g., Reeves & Weisberg, 1994). Yet, such instances must be experienced simultaneously even though they are encountered at different points in time. Marton and colleagues (2004, p. 17) refers to this as "diachronic simultaneity."

The Case Study

In this section a case is presented to illustrate the use of the variation theory. Using a case as a real-life example to report evidence is one major application for the case study approach (Gillham, 2000; Yin, 2009). Case knowledge is argued to be central to human learning (Flyvbjerg, 2006). As noted by Powell (2013), readers can "feel" about the case and make their own generalizations about the experience reflected in the case (the so called *naturalistic generalization*).

In the present study, a single-case study methodology was employed. This methodology is a type of qualitative research, which can be defined as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990, p. 17). It helps to extend the understanding of a phenomenon when little is known about it (Hoepfl, 1997). The present case study played a supportive role in facilitating the understanding of the topic being

studied, the variation theory (Baxter & Jack, 2008). Yin (2009) referred to the case study as descriptive, while Stake (1995, 2006) referred to the case study as instrumental. The qualitative analysis was based on the evidence converged from direct observations in the classroom and students' work (aka physical artifacts; Gillham, 2000; Morse & McEvoy, 2014). Because the variation theory focuses on taking students in the center (Lo, 2012), the analytic strategy includes certain aspects of the student-centered approach, such as whether the teaching method can improve student involvement and discussion in class (Abdelmalak & Trespalacios, 2013; Jones, 2007).

The Participants

The participating students (n = 38) were enrolled in a module of knowledge management at a higher education institution. The part of a lesson observed involved the teaching of the two theories of knowledge. In this case study, students were divided into several groups, and each group consisted of four to five students. However, no specific arrangement was made for grouping students. Although differentiation among students in terms of their backgrounds is sometimes considered in the selection of the participants and in the composition of the groups, homogeneous and heterogeneous groups have possessed specific functions (Toy & Ok, 2012). The former may take advantage of students' shared experiences, while the latter may capitalize on different perspectives in a case (Kitzinger, 1995).

The Pedagogical Setting

This case is about the teaching of two easily confused knowledge theories. As noted by Åkerlind (2008), the variation theory changes a teaching and learning event from a teacher-centered to a student-centered approach to understanding the phenomenon through variations in student experience. While reporting the case in the following paragraphs, relevant concepts from the variation theory are mentioned in various parts so that readers are able to link theory into practice. The educational setting introduced in this section is appropriate to be adopted for university teaching.

Background of the Object of Learning

The intended object of learning included two theories of knowledge management. This is "the object within the teacher's awareness" (Huang & Leung, 2005, p. 36). The two theories, which were different classifications of knowledge, were (1) embedded and migratory knowledge (Badaracco, 1991), and (2) tacit and explicit knowledge (Nonaka & Takeuchi, 1995). In the conventional pedagogical setting, the two theories were taught separately with definitions of the theories being given to the students and examples being provided by the teacher to illustrate the difference between the two terms with respect to each theory. After the lesson, however, some students exhibited confusion between the two theories when they completed an exercise on the flow of knowledge. For example, some students believed that tacit knowledge and embedded knowledge were the same, while migratory knowledge was mainly explicit.

Conversely, the real principle is that tacit knowledge can be embedded or migratory, as can explicit knowledge. On the other hand, embedded knowledge can be tacit or explicit, as can migratory knowledge. Even when students were informed of such relationships, some still used wrong examples when demonstrating their understanding of the theories.

In this case, a pedagogical setting was developed to improve student understanding of the two theories. According to Mok (2003), this enacted object of learning refers to how the teacher structures the lesson in such a way that the students are aware of the intended object of learning. This setting consists of three steps. The first step was to teach the two theories one by one using examples. The second step was to illustrate the difference between the two theories using examples. The third step was to test student understanding by way of exercises. Moreover, students were divided into several groups whereby each group focused on a particular type of organization. For example, Group A was assigned a bank, Group B focused on a supermarket, Group C was ascribed a university, etc.

Teaching the Two Theories Separately Using Examples

This step had two tasks. The first was to discuss about how an organization should address knowledge, and the second involved the teaching and learning of the two theories in combination with the theory of variation. Through discussion, the "space of learning" could be clarified in such a way that students were able to identify the critical aspects wherein each theory of knowledge was an aspect. A learning event was then designed that enhanced student awareness of the presence of theories and allowed the students to understand the theories through their experiencing process. According to Marton and Booth (1997, p. 84), this refers to "direct object of learning" (i.e., the "what" behind the learning). For this learning to occur, the following questions were asked by the teacher:

1. Why is knowledge important to an organization? This question leads students to think about the function of knowledge in an

organization. For example, knowledge can be used to support the organization's operations, and it can also be used to help customers know more about the organization's products.

2. How can knowledge be obtained? As an extension of the first question, this question helps students understand that knowledge can flow into and out of the organization's boundaries.
3. What knowledge is needed for the specific organization assigned to your group? Based on the first and second questions, students are required to provide examples about knowledge that flows into and out of the organization. Additionally, they must identify the sources of such knowledge.

With the above three questions as a foundation, students were encouraged to think about what and how knowledge moved throughout, into, within, and outside an organization using their own examples. Such "student-generated examples" were essential for concept development as students were able to see a pattern in their examples as well as in the examples of others (Watson & Mason, 2002, p. 247). In this lesson, general examples, which were easily drawn, were sufficient for demonstrating that the students had learned and understood the two theories. Possible conclusions from the qualitative analysis were summarized as follows:

- Knowledge could flow into and out of an organization. Examples of knowledge flowing out of the organization include banking procedures for applying for personal loans, brochures about product information, and prices of products in a supermarket. Examples of knowledge flowing into the organization include the financial information about the economy that is supplied by the government to the bank and the wholesale prices of products from wholesalers for a supermarket. Examples of knowledge circulating within the organization include announcements to employees, notifications of promotions and/or redeployment of staff, and changes of policies.
- Knowledge could remain in private to the individual, or it could be kept by the organization. Examples of private knowledge that resided within one's mind include how a university professor teaches his or her students and how a supermarket manager handles customers' complaints. Examples of knowledge kept by the organization include the ordinances to be followed by a bank's employees and the supermarket's rules about the etiquette for dealing with customers.
- Knowledge could be kept within an organization, or it could be shared with parties outside the organization. Examples of knowledge kept within the organization include salary information of employees at a university and the product cost details of a supermarket. Examples of knowledge shared with parties outside the organization include personal and mortgage loan interest rates in a bank and tuition fees for programs in a university.

The two theories and their examples used by the students illustrated the differences between the two concepts of each theory. Similar to conventional teaching methodologies, the two theories were introduced separately to the students. Following the concept of "experiencing learning" (Marton & Booth, 1997, p. 91), this lesson first addressed the "what of learning" (i.e., the direct object of learning). With respect to the first theory, embedded knowledge and migratory knowledge were two opposite concepts (i.e., the meaning aspect of student experience). To discern how the two concepts differed from each other, the structural aspect of student learning was emphasized. Hence, embedded knowledge could be distinguished from migratory knowledge based on an example from the students. By comparing different experiences (i.e., the theory of contrast), students could understand the values of the critical aspect (i.e., the two concepts of each theory) in terms of their given examples.

Use mortgage loan interest rate of a bank as an example. The teacher asked why a bank needed to disclose its mortgage loan interest rate to the customer. The teacher then asked what would happen to the bank if the mortgage loan interest rate was not disclosed to the customer. Based on these two questions, students began to understand the difference between the two situations (experiences) with respect to the mortgage loan interest rate. Examples from other students were then used until the students were able to discern the difference between the two values (i.e., the two concepts) of the critical aspect (i.e., the theory). The same method was used to teach the two concepts of another knowledge theory (i.e., explicit and tacit knowledge).

Illustrating the Difference Between the Two Theories Using Examples

In the previous setting, students discerned the direct object of learning (the understanding of the two theories). Now, the emphasis turned to the "how of learning" (i.e., the indirect object of learning and the act of learning). This section is about the indirect object of learning, while the next section is about the act of learning. Similar to the previous section, students knew

that the two theories represented two different classifications (i.e., the meaning aspect of their experience). However, they did not understand how these two classifications differed. Focusing on the structural aspect of their learning, the concept of variation (*separation*) was applied to help students discern the difference between the two theories by use of the examples that they created in the first part. Figure 1 illustrates "the space of variations" (Marton et al., 2004, p. 21) that help determine the educational setting appropriate for the comparison of the two theories of knowledge (i.e., the critical aspects of the object of learning).

As shown in Figure 1, four situations were identified from the two sets of theories:

- Tacit knowledge that could be migrated (i.e., tacit-migratory) or migratory knowledge that was tacit in nature (i.e., migratory-tacit).
- Tacit knowledge that must be embedded (i.e., tacit-embedded) or embedded knowledge that was tacit in nature (i.e., embedded-tacit).
- Explicit knowledge that could be migrated (i.e., explicit-migratory) or migratory knowledge that was explicit in nature (i.e., migratory-explicit).
- Explicit knowledge that must be embedded (i.e., explicit-embedded) or embedded knowledge that was explicit in nature (i.e., embedded-explicit).

Using their specific organization, Students were then told to identify examples of the above four situations. For example, in the tacit-migratory situation, each group of students must find from its assigned type of organization an example that while the knowledge was in tacit form, it could be moved out of the organization. A list of examples for the four situations is in Table 1.

In addition, the arrows shown in Figure 1 indicate that there are four comparisons among the four concepts of the two theories. Such comparisons facilitated student discernment with respect to the aspects of the specific object of learning by separating the similar (or invariant) from the different (or variant) aspects (Marton et al., 2004):

- Comparing embedded and tacit knowledge: To enable this comparison, three previously identified situations were used. Either embedded or tacit knowledge should be kept constant, while examples should be provided for each of the two categories of the other theory. Thus, there were two examples of embedded knowledge, one each for the embedded-tacit and embedded-explicit situations, and two examples of tacit knowledge, one each for the tacit-embedded and the tacit-migratory situations. However, because the embedded-tacit and tacit-embedded situations were identical, only three examples were necessary.
- Comparing migratory and tacit knowledge: Similar to the previous comparison, there were two examples of migratory knowledge, one each for the migratory-tacit and migratory-explicit situations, and two examples of tacit knowledge, one each for the tacit-embedded and tacit-migratory situations. Because the migratory-tacit and tacit-migratory were identical, only three examples were needed.
- Comparing embedded and explicit knowledge: Similarly, there were two examples of embedded knowledge, one each for the embedded-tacit and embedded-explicit situations, and two examples of explicit knowledge, one each for the explicit-embedded and explicit-migratory situations. Because the embedded-explicit and explicit-embedded situations were identical, only three examples were required.
- Comparing migratory and explicit knowledge: Similarly, there were two examples of migratory knowledge, one each for the migratory-tacit and migratory-explicit situations, and two examples of explicit knowledge, one each for the explicit-embedded and explicit-migratory situations. Since the migratory-explicit and explicit-migratory situations were identical, only three examples were necessary.

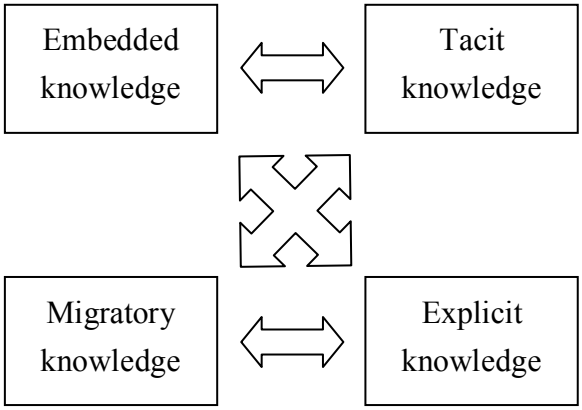
Class discussions that focused on each of the four comparisons were conducted until all students were aware of the values of the various aspects being compared. For example, consider the comparison between migratory and explicit knowledge. This specific example is chosen for this case study due to the misunderstanding among students that the two concepts were similar. However, because migratory and explicit knowledge belonged to two different theories, they could not be directly compared. Therefore, the teacher first held migratory knowledge as a constant (i.e., an invariant aspect) and compared the tacit and explicit values of the examples about the migratory knowledge.

As shown in Table 1, for the group of students who were assigned the organization of "banking," the migratory-tacit example was "bank managers' advice given to customers about investment options," while the migratory-explicit example was "bank's loan application procedures shown to customers." Thus, students were aware that any migratory knowledge could take either an explicit or a tacit form, and they should not confuse the two concepts. Their

Table 1
A List of Examples of Different Organizations

Type of organization		Embedded	Migratory
Bank	Tacit	Personal knowledge of bank managers in handling customers' complaints	Bank managers' advice given to customers about investment options
	Explicit	Bank's policies to be applied within the bank	Bank's loan application procedures shown to customers
Supermarket	Tacit	Managers' knowledge about which brands are more popular in the supermarket	Managers' advice given to subordinates on how to deal with customers
	Explicit	Products' costs charged by wholesalers	Prices of products shown to customers
University	Tacit	Professors' knowledge about their research	Professors' teaching in classes
	Explicit	Professors' employment contract details, such as salary, contract terms, etc.	Professors' research published in journals

Figure 1
Comparison of the Two Theories of Knowledge



understanding could then be reinforced by further experiencing the two examples regarding the varying values (the embedded and migratory forms) of the explicit knowledge (see Table 1).

Further enhancement of discernment, including the generalization of the values of a critical aspect, was obtained by incorporating the examples from other types of organizations, such as the supermarket and university. Specifically, different examples for the same situation (see Table 1), which were referred to as the varying appearances or instances, were experienced simultaneously by the students to facilitate the transfer of learning.

Testing Students' Level of Understanding With Exercises

The aim of this section is to present how students' level of understanding was tested with the exercise provided by the teacher. Moreover, the results from the

test and the observation in the classroom are presented and discussed.

The act of learning requires students to apply what they have learned by doing the exercise. Their newly acquired ability from the previous experiences is referred to as their "lived object of learning" (Marton et al., 2004, p. 22). In the lesson, the *fusion* concept was applied to an exercise that aimed to assess the level of the students' understanding of the intended object of learning. This exercise consisted of five questions. Each question required students to provide two correct answers. A sample of the exercise is shown in Figure 2. Moreover, the teacher guided the students to reflect on their understanding of the knowledge theories applied in different contexts of the questions in the exercise. For example, with respect to the fifth question (see Figure 2), the teacher asked what types of knowledge could be identified during a meeting, and the students responded with their own experience. More in-depth post-lesson discussion of critical features from real-life examples should be part of the learning study (Lo, 2012).

Results and Discussion

The results of the exercise were compared with those of previous cohorts to determine whether the students had improved in learning the theories. Compared with those of previous cohorts, students of this cohort were found to have a better performance in completing the exercise. For the previous cohorts, there were approximately 40% of the students choosing the correct answers for all questions. Some students (approximately 25%) chose one or two incorrect answers, while a few students (approximately 5%) chose more than four incorrect answers. In the present cohort, approximately 80% of the students answered all the questions correctly. No students chose more than four incorrect answers. By using their own examples and designing the pedagogical setting based on the patterns of variation, students showed substantial improvement in their learning of the two knowledge theories.

Moreover, students were observed throughout the whole session. In addition to their favorable results in the exercise, the students were shown to be more positive in certain aspects of student-centered learning compared with those of the previous cohorts. Abdelmalak and Trespalacios (2013) argued that the student-centered approach can motivate students to spend more time and effort on a lesson. The present cohort has similar achievements to the variation theory. First, students paid more attention to the two knowledge theories and were more interested in identifying their own examples. This allowed them to concentrate on learning the theories. Those students

Figure 2
Sample Questions

Read the following questions and choose the type of knowledge that best describes each underlined situation.	**Tacit**	**Explicit**	**Embedded**	**Migratory**
1. The marketing manager told his subordinate to print the product brochure	[ ]	[x]	[ ]	[ ]
to be distributed on the shop floor.	[ ]	[ ]	[ ]	[x]
2. Among all students, only Peter knows the answer for the question,	[x]	[ ]	[ ]	[ ]
but he doesn't tell others.	[ ]	[ ]	[x]	[ ]
3. Calvin goes to the playground to watch David playing football	[ ]	[ ]	[ ]	[x]
and imitates how to kick the "banana shoot".	[x]	[ ]	[ ]	[ ]
4. The teacher has mentioned that the marking scheme of the examination	[ ]	[x]	[ ]	[ ]
is not supposed to be given to students.	[ ]	[ ]	[x]	[ ]
5. After the meeting, the manager told the chief executive officer	[ ]	[ ]	[ ]	[x]
about the decision made by the team.	[ ]	[x]	[ ]	[ ]

who were less motivated were encouraged by other members to contribute to group discussion. This is an effective way to overcome resistance from those students with less learning motivation (Jones, 2007). Second, they were actively involved in addressing the teacher's questions. As those questions were posed to connect student examples to a particular situation, students not only spent more time but also participated more actively in discussion, resulting in being more committed to the lesson. Researchers have already linked effective learning to the time devoted in class toward interaction (Weimer, 2002) and active involvement in the classroom (Wagenaar, Scherpbier, Boshuizen, & Van der Vleuten, 2003). Third, they were more confident when completing the exercise. Compared with those of previous cohorts, students in the present cohort were more enthusiastic toward answering the questions. Students with this perspective are involved in a process of learning through persistent effort (Cook, 1992). As a consequence, students' individual differences in learning styles were shown to be effectively met by the variation theory (Lo & Pong, 2005).

Conclusions

This paper introduces the variation theory and uses it to develop an educational setting that helps students learn two theories of knowledge management (i.e., the intended object of learning). Students used their own generated examples to compare the concepts of the two theories. Moreover, comparisons between the examples supplied by different groups enabled students to examine one critical aspect by cross-referencing different examples, enhancing their discernment and learning of the principle, and thereby improving their ability to generalize or transfer their learning to other situations. Such a pedagogical design draws on student-centered principles which "encourage students to take responsibility for their own learning" and "invite (them) to have more power over that learning" (Abdelmalak & Trespalacios, 2013, p. 329). The study implies that increasing student involvement in classrooms may result in more effective learning (Wagenaar et al., 2003). However, the results of the case indicate that a few students have not fully understood the theories. As noted by Lo (2012, p. 119), making use of the patterns of variation does not guarantee that all students will learn. It is the quality of the teacher's manipulation that determines the success of student learning (Tong, 2012). This finding identifies the need for a teacher's ability to integrate the variation theory into the lesson. One critical aspect may be whether the teacher can ask questions in a way that allows the students to account for their actions within their own frame of reference (Entwistle, 1997). The variation theory, therefore, guides the teacher toward proper pedagogical design that can help students discern the object of learning.

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Creating Trans-Inclusive Schools: Introductory Activities that Enhance the Critical Consciousness of Future Educators

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The Lawrence King murder and other tragedies surrounding transgender youth have prompted a national discussion about the need for schools to be more supportive and inclusive of transgender students. In this multi-authored reflection, the authors describe a series of three introductory activities in an undergraduate educational studies course aimed at cultivating critical consciousness about transgender students. The instructor and students discussed their viewing of televised interviews featuring transgender individuals and participated in a gallery walk and a role-playing activity. These activities cultivated students' critical awareness of the experiences of transgender students and strategies for creating trans- inclusive classrooms and schools.

On February 12, 2008, fourteen-year-old Brandon McInerney brought a handgun to school and shot his classmate, Lawrence King, a transgender[1] student, twice in the back of the head during a computer class at E.O. Green Junior High School in Oxnard, CA. Major news agencies such as CNN and the *New York Times* covered the events leading and following this shooting for several years until Brandon McInerney's second degree murder conviction. *Valentine Road,* a 2013 HBO documentary, chronicled the tragedy, including the perspectives of E.O Green teachers and students and the prosecution of Brandon McInerney. The murder of Lawrence King and other recent tragedies (e.g., the widely publicized suicide of a transgender high school student, Leelah Alcorn) have shed light on the victimization of transgender youth in schools throughout the country (Kosciw, Greytak, Bartkiewicz, Boesen, & Palmer, 2012; Pullen, 2010). Findings from the 2013 National School Climate Survey (NSCS) show that teachers and principals have crafted policies that directly target transgender students. For instance, the NSCS found that 42.2% of transgender students had been prohibited from using their preferred names, and 59.2% of transgender students had been required to use a bathroom or locker room of their legal biological sex. Other studies have found that transgender youth experience significantly higher levels of verbal and physical harassment from peers when compared to their gender conforming peers (Kosciw et al., 2012; Russell, Ryan, Toomey, Diaz, & Sanchez, 2011). Forms of harassment include having their gender and/or sexual identity questioned by peers, experiencing physical assault, being deliberately excluded from school activities, being the object of hate-motivated speech, and having feelings of social isolation (Kosciw et al., 2012). A hostile school environment and consistent school victimization are associated with depression, suicide, dropout, academic failure, substance abuse, risky sexual behaviors, and long term outcomes such as poverty and unemployment (Goldblum et al., 2012; Greene, Britton, & Fitts, 2014).

In response to recent tragedies and concerning school climate data, national education organizations (e.g., Gay, Lesbian, and Straight Education Network) have advocated for the training of teachers, principals, and other school staff on how to support the well-being of transgender students. Some professional development for educators conducted by organizations such as Gender Spectrum and TransYouth Family Allies have emerged in public schools throughout the country. Given the call for more training, this multi-authored reflection of a professor and students in a undergraduate education course outlines introductory activities for future educators interested in creating inclusive schools for transgender youth.

Creating Trans-Inclusive Schools

Cultivating a supportive school environment for transgender students necessitates the training of teachers, principals, and school staff in how to develop safe and protective classroom and school environments (Fisher & Kennedy, 2012). However, recent research has indicated that university-based teacher education programs lack curriculum and training opportunities for future teachers and principals. In a content analysis of educational foundations textbooks, Macgillivray and Jennings (2008), for instance, found that less than 1% of content in educational foundations textbooks include any lesbian, gay, bisexual, or transgender topics. Of the content that relates to these topics, the authors found that educational foundations textbooks treat LGBT individuals

[1] A term for people whose gender identity, expression, or behavior is different from those typically associated with their assigned sex at birth.

in general as victims and pathologize their sexual and gender identities and life experiences. Moreover, few teacher education programs provide training on school and classroom-based strategies aimed specifically at supporting the students in school (Jennings & Macgillivray, 2011; Jennings & Sherwin, 2008; Macgillivray & Jennings, 2008).

Affirmative Trans-Inclusive Educators

Teachers and principals can affirm transgender youth by approaching the planning and implementation of curriculum, instruction, and school policies with a trans-inclusive perspective (Meyer & Pullen Sansafacon, 2015). In classrooms, teachers and other school staff can model the use of gender-inclusive language with students and develop caring relationships with transgender students (Meyer & Pullen Sansafacon, 2015). Teachers could also include transgender topics across the curriculum. When choosing texts for a high school literature class, for instance, a teacher could assign students an autobiography that describes the complexities of life for a transgender individual. At the school level, principals may develop and implement school-wide policies and procedures that address discrimination. School leaders enforce policies that protect the rights of transgender female students to fully participate in girls' sports teams, provide gender inclusive facilities, and draft dress codes that permit transgender students to express their gender identity without discrimination.

The Role of Critical Consciousness in Developing Trans-Inclusive Educators

The main objective of this course was to create learning opportunities for future educators to develop their critical consciousness about transgender students in schools and how to make school environments trans-inclusive. Educators develop critical consciousness by participating in dialogues about how schools reinforce power, privilege, and oppression in society and how they can interrupt transphobia and cisgender privilege[2] through curriculum and school policy.

Defining critical consciousness. Critical consciousness aims for students to develop an in-depth understanding of the world, allowing for the perception and exploration of social and political contradictions (Freire, 1973; Watts, Diemer, & Voight, 2011). Watts, Diemer, and Voight (2011) also defined critical consciousness as providing educational spaces "where oppressed or marginalized people learn to critically analyze their social conditions and act to change them." (p. 44). In educational settings that aim for critical consciousness, Freire (1973) implies intergenerational equity between students and teachers. Both students and teachers learn, question, reflect and participate in meaning making activities as a community. Freire (1973) outlines three interrelated mechanisms of critical consciousness that are seen in social justice oriented courses: critical reflection, political efficacy, and critical action (Freire, 1973). First, critical reflection is the process in which a person has the opportunity to observe and reject oppressions in society. This includes observing and evaluating social behaviors, laws, and policies in any given situation. For instance, cisgender students may experience greater critical consciousness by watching a film of a gender non-conforming student who is murdered at school by a cisgender classmate. Freire (1973) explained critical consciousness as a sociopolitical educative tool that engages learners in questioning the nature of their historical and social situation. Second, students experience a sense of socio-political efficacy: the belief that one is able to transform the conditions of a society that produces injustice. Third, students develop skills for critical action, defined as active participation in personal and/or community level activities and practices that change the conditions that sustain social inequities. In the context of this course, the series of activities primarily created opportunities for students to develop their critical consciousness, specifically 1) using critical reflection through observing transphobia and cisgender privilege in televised interviews; 2) developing a sense of socio-political efficacy by identifying how schools as institutions reinforce transphobia and cisgender privilege; and 3) simulating critical action through role playing activities that bring about strategies for change.

Using sociocultural learning and counseling approaches for critical consciousness. Classroom activities framed by sociocultural learning support the development of critical consciousness. Sociocultural learning theories emphasize the interconnectedness of social and individual processes in the co-construction of knowledge among students and teachers (John-Steiner & Mahn, 1998). Current applications of sociocultural theory include students and teachers co-participating in cooperative learning, collaborative learning, and joint discovery. Hence, instead of a teacher lecturing about existing knowledge of a topic, knowledge about the topic is co-constructed by teachers and students (John-Steiner & Mahn, 1998). In a sociocultural learning classroom, teachers and students share defined tasks of questioning, clarifying,

[2] Cisgender is a label for individuals who have a match between the gender they were assigned at birth, their bodies, and their personal identity. Cisgender privilege refers to institutional and interpersonal practices that reinforce cisgender as normal and transgender as abnormal. Transphobia is defined as emotional disgust, fear, anger, or discomfort felt or expressed towards people who do not conform to society's expectations.

summarizing, and predicting in order to construct knowledge. In the context of this course, sociocultural theory was demonstrated in the viewing of the televised interviews, gallery walk, and follow-up discussions in both whole group and small group formats. These activities supported students in a) gaining awareness about oppression aimed at the transgender community, b) assessing the role of social institutions (e.g., schools, family, health care, religious institutions) in reinforcing the marginalization of transgender students, and c) exploring how schools can support the inclusion of transgender students.

Counseling approaches can also be utilized to help students develop critical consciousness. According to Blatner (2006), counseling techniques can be useful tools when teaching in a classroom setting, especially in the higher educational system. Blatner (2006) believed that "experiential learning, for some academic subjects, is an ideal tool" (p. 30). One such tool is role-playing, a therapeutic activity used in Gestalt therapy, psychotherapy, person centered therapy, reality therapy, and sociodrama (Berven & Thomas, 2004; Blatner, 2006). For college students, role-playing with peers helps them understand multiple perspectives of highly sensitive, controversial issues (Berven & Thomas, 2004). Role-playing also gives students the opportunity to visualize a meaningful conversation or situation with another person or group (Blatner, 2006). In the process, students figuratively place themselves in the lives of the other individuals as they practice what they would do or say in a particular situation. An open-ended whole class dialogue follows and elicits critical thinking about the controversy. In this course, role-playing was utilized to help students understand the challenges of school leaders implementing trans-inclusive policies, amidst resistance from parents, teachers, students, and other school stakeholders.

Methods

From the perspectives of an instructor and students in an undergraduate education course, this instructional article outlines activities designed to introduce future educators to key issues surrounding transgender youth in schools and practices for creating trans-inclusive school environments. The activities enhanced the critical consciousness of students as they investigated cisgender privilege and transphobia in schools and ways to interrupt these dynamics as future educators. Sociocultural learning and counseling approaches in the activities were utilized so that students could actively construct critical consciousness.

Overview of Trans-Inclusive Educational Strategies

As seen in Figure 1, students engaged in a series of three classroom activities aimed at facilitating critical consciousness: critical reflection, development of a sense of socio-political efficacy, and critical action. First, students and instructors viewed television interviews featuring notable transgender advocates and witnessed transphobia and cisgender privilege. Second, the students embarked on a classroom gallery walk to document how cisgender privilege and transphobia operate in schools and other social institutions (e.g. law and health care). Third, the students engaged in a debate about the inclusion of transgender athletes in high schools and participated in a role-playing activity in which they, as school principals, described a trans-inclusive athletic policy in a fictional high school in front of an audience of teachers, parents, students, and other school stakeholders.

Prior to these activities, the instructor presented the concepts of cisgender privilege, transphobia, and oppression to the class. After each concept was defined, the instructor provided examples of cisgender privilege and transphobia in the media. In order to create a safe space, the instructor and students also constructed a list of group norms for all class activities. Some expectations included understanding that there are no right or wrong answers, using "I" statements, maintaining confidentiality (e.g., what is discussed in the room stays in the room), and bringing positive energy. The instructor and students also agreed on the norm, "move forward, move back," which encourages students to monitor how often they contribute to small group and whole group discussions. As seen in Tables 1-3, we provide key suggestions for the implementation of each activity.

Transphobia and cisgender privilege in media. As seen in Table 1, the first activity involved students' viewing of television interviews between transgender advocates and popular journalists on major television networks. The first clips were two interviews between Janet Mock, an African-American transgender woman, and Piers Morgan, a prominent journalist on the CNN program, *Piers Morgan Tonight*. The first interview held the tagline, "Born a boy, now a girl." Piers Morgan asked Janet Mock about questions focusing on the biological transition. For instance, Morgan repeatedly asked questions regarding the gender re-assignment surgery and being born a boy, which offended Janet Mock. In the days that followed the interview, Morgan received public backlash on social media websites such as Twitter for his series of questions, which were perceived by members of the transgender community as offensive. Morgan and his CNN team conducted a second, impromptu interview with Janet Mock days

Figure 1
The Development of Critical Consciousness in a Series of Three Activities

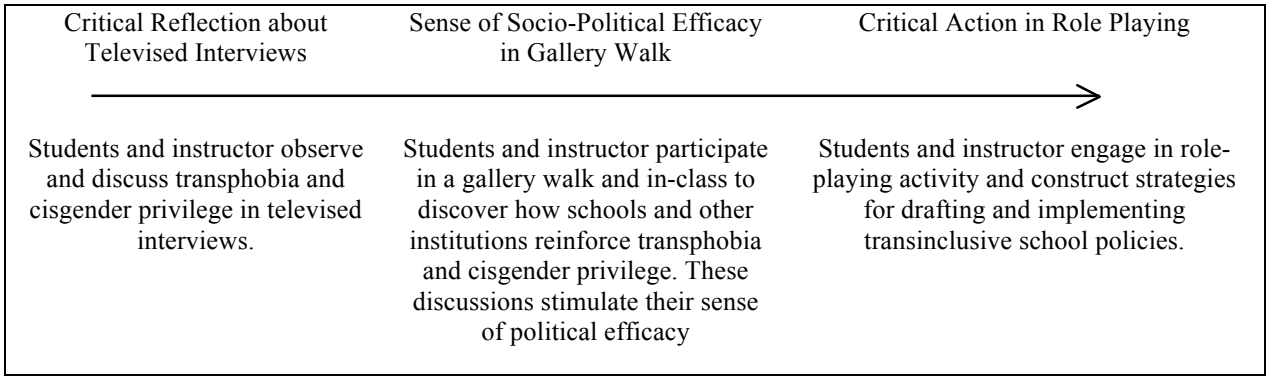

Table 1
Critical Reflection of Transphobia and Cisgender Privilege in Televised Interviews

Learning Objective	Summary of Activities	Suggestions for Activity Implementation
1. Identify transphobia and cisgender privileges occurring in each interview.	1. Students view a series of television interviews between transgender advocates and popular journalists.	1. Anticipate that students may display a variety of reactions, including abhorrence, to transphobia in the interviews.
2. Participate in critical reflection about transphobia and cisgender privilege.	2. Students then share their initial reactions with partners.	2. Help students to understand that there may be other views other than their own.
	3. As a whole group, students assess and discuss examples of transphobia and cisgender privilege in the televised interviews.	3. Encourage students to challenge their own cisgender privilege and transphobia.

later to discuss the social media aftermath of the first interview.

Students then watched a second series of two interviews on the Katie Show between prominent talk show host and journalist Katie Couric and a transgender actress and advocate, Laverne Cox. In the first interview, Katie Couric also asked probing questions about gender reassignment. Laverne Cox responded with the explanation that the lives of transgender women are more complex than the gender reassignment process and include disproportionate rates of unemployment, homelessness, and violence towards transgender women of color. After students watched these clips, they shared initial reactions with partners and then were prompted by the instructor to assess and think about transphobia and cisgender privilege in the televised exchanges. As a whole class, the class also discussed how Piers Morgan's line of questioning may have been transphobic and how Mock used media to uncover other issues surrounding the transgender community (e.g., poverty rates, homelessness, and discrimination). One student, a cisgender male, responded by saying that Piers Morgan, a cisgender male, talked over Janet Mock, adding that this is an example of cisgender privilege at work.

Developing awareness of how schools and other institutions reinforce cisgender privilege. As seen in Table 2, the second set of activities involved a gallery walk for students to assess how schools and surrounding institutions can reinforce cisgender privilege through transphobic school policies and practices. In this activity the instructor posted seven pieces of chart paper at different points in the room. Each piece of chart paper had a name of an institution in large print: school, family, health care, religious institution, law, and media. Students were divided into seven groups of 3-4 students and were assigned to one institution. As a group, they discussed how this institution may reflect cisgender privilege and enact transphobia and then write examples on the chart paper.

Table 2
Sense of Political Efficacy for Transgender Students in a Gallery Walk

Learning Objectives	Summary of Activities	Suggestions for Activity Implementation
1. Assess how schools and surrounding institutions reinforce cisgender privilege. 2. Explore how multiple societal institutions influence school policies and practices. 3. Transition from critical reflection to the development of a sense of political efficacy for transgender students.	1. In a gallery walk format, students in groups of 3-4 are prompted to write down examples of each institution reinforces transphobia and cisgender privilege. Societal institutions include school, family, health care, religious institutions, laws, and media. 2. After the gallery walk, each group reflects on written responses in one institution. 3. The whole group conducts an open discussion about transphobia and cisgender privilege.	1. Mark and affix each piece of chart paper with the name of a societal institution around the room. One piece of chart paper is the school institution and is positioned in the center of the room on a table. This demonstrates that surrounding institutions influence schools. 2. Allow enough time for each group to reflect at each institution (about six minutes per institution). 3. During whole group conversations, make connections on how forms of cisgender privilege and transphobia in different institutions are interconnected. (E.g. Negative media representations of transgender individuals may fuel the views and practices of transphobic teachers).

Every six minutes each group rotated to the next institution, discussed previous responses, and recorded new responses. At the end of the multiple rotations, each group returned to their first institution, discussed all the responses, and reported back to the whole group about what written responses were most surprising to them. One group of students was tasked with reviewing their peers' written responses to how media reinforce cisgender privilege and enact transphobia. A student from this group commented that she was surprised that current portrayals of transgender individuals in television shows are pathologizing and/or objectifying.

Enacting trans-inclusive policies as a high school principal. As seen in Table 3, the third activity involved students reading a recent state education policy about the inclusion of transgender female athletes in high school girls' sports. In small groups, students discussed their personal perspectives, which resulted in a whole class discussion on how high school sports reinforce the gender binary in such sports. The instructor then asked students to hypothesize a new policy requiring the inclusion of transgender athletes into girls' sports at a local high school near the college campus. Then, drawing from personal knowledge of the community, students discussed the potential reactions of parents and then challenges of a principal tasked with policy implementation. Students then drafted a two-paragraph school policy and implementation plan. The next part of the activity required a student to play the role of a principal delivering the policy and enforcement plan at a high school parent meeting. Students in the audience played the role of parents, teachers, and school staff, asking potential questions regarding transgender athletes in girls' sports. After the role-play activity, the instructor then led a group discussion regarding the misconceptions of transgender athletes, stereotypes, and school enforcement challenges. One student, who played the role of the principal, commented that transgender male to female athletes have an unfair advantage in competitive high school sports, which resulted in a class debate. This debate provided students with an opportunity to reflect on cisgender privilege and its effects on transgender students.

Students' Reflection about Activities

In this section, each of the three student co-authors present their reflections on the activities. Each co-author demonstrated their process of growing awareness of issues surrounding transgender students and trans-inclusive schooling.

Table 3
Enacting Trans-inclusive Policies as a High School Principal

Learning Objectives	Summary of Activities	Suggestions for Activity Implementation
1. Develop skills for critical action. 2. Reflect on cisgender privilege and its effects on transgender students. 3. Experience how critical action can be embraced or rejected by a variety of individual in a school community. 4. Transition from a sense of political efficacy to critical action.	1. Students read a recent state education policy about the inclusion of transgender female athletes on high school girls' sports teams. 2. Small groups of students discuss their personal and others' perspectives about the policy. 3. Students then draft a school policy and implementation plan for the inclusion of transgender athletes. 4. The class chooses one student to play the role of a principal who will explain the implementation plan at a school board meeting. 5. During the role-play, other students in the audience play the role of parents, teachers, students, and school staff, asking potential questions regarding the new transgender inclusive policy.	1. Be aware that students playing the role of the principal are faced with the difficult task of announcing a plan to a concerned school community with individuals who may or may not agree with the policy. Remind students about safe space rules. 2. During the role-play, instructor can spark the role playing activity with questions, comments, and concerns. . 3. Encourage students to see how school policies may be accepted and critiqued by members of a school community. 4. Provide students with an opportunity to debrief through writing an in-class individual reflection after the role play activity.

Exploring Transphobia and Cisgender Privilege in Television Interviews: Student Co-Author #1

Just one week before inter-term classes started at Chapman University, Leelah Alcorn, a transgender female, took her own life. News of this tragedy quickly spread through countless media outlets. The world's eyes were opening to the devastation that affects so many transgender youth. The LGBT and Question Issues in Education class was an enlightening course because it opens students' eyes to many issues that the LGBTQ community faces. The way media was used in the classroom to educate students on transphobia, cisgender privilege, and the exploration of the experiences of transgender individuals was extremely insightful.

I believe using videos from media outlets can fight transphobia. I've always believed bigotry could be stopped by literally putting a face and personality to an individual. I believe it's more difficult to hate a group of people when you can understand and empathize with their struggles. When we watch videos of someone sweet and funny like Jazz or eloquent and powerful like Laverne Cox who speaks about their life experiences, it's one of strongest ways I've ever seen oppression fought. It reminds me that everyone is human being and deserves respect.

Even when our discussion became controversial, I could tell that everyone in class had their best interests at heart, though some conversations (like one about transgender teens joining high school sports) began to border on discrimination. A reminder that the discussion was about children who just wanted to enjoy their high school experience helped steer it back. Seeing actual transgender people helped humanize them for many students, especially those who may have never met a transgender person before. Shows like Orange is the New Black, discussed several times in class, are essential to this process, as well as for people who have yet to come out to friends and family and want to ease them into the concept.

As a cisgender woman with transgender friends, I feel it is part of my responsibility to promote equity. Using videos of transgender individuals is a great way to advocate by, not over their voices. I believe this class proved this approach to be true. I believe by the end of

the class the students came more enlightened and able to be better allies for transgender individuals.

Developing My Awareness of How Institutions Reinforce Cisgender Privilege: Student Co-Author #2

Before taking LGBTQ Issues in Education, I took a primarily ambivalent stance about issues the LGBTQ community faced. After watching inspirational and enlightening LGBTQ advocate videos and participating in The Gallery Walk exercise that facilitated much classroom discussion, I quickly transformed my stance on LGBTQ issues. I began to adopt a more active approach. I suddenly felt the overwhelming urge to protect the rights of the transgender community as if they were my own rights being attacked. The Gallery Walk was one activity that facilitated internal change by humanizing the experiences of the transgender community. This activity allowed me to disassemble the mystery, fear, and uncertainty behind transgender individuals and cisgender privilege. I began to establish a level of equality between the different groups of individuals.

The Gallery Walk was particularly effective in educating myself and other students about transphobia by encouraging the students to give specific examples of transgender oppression they've seen or experienced within the various institutions they're a part of. These included such institutions as schools, churches, courts, and healthcare systems. Providing real-life examples helped students understand issues in the Transgender community by directly stating the rights being stripped from them in comparison to the cisgender individuals. These activities introduced new information to create ways to deconstruct transphobia and cisgender privilege. Because previous exercises and discussions placed transgender and cisgender individuals on an equal level, students soon adopted an active approach to understanding the constructs that particularly oppressed the transgender community. In addition to understanding the existing oppressions, we were motivated to go a step further by using class activities to initiate change.

Enacting Trans-inclusive Policies as a High School Principal: Student Co-Author #3

This course was the first LGBTQ class I've taken, and to say that the process was an eye opener is an understatement. I realized the issues of the LGBTQ community are constantly disregarded. Through discussions, role-playing, activities, and reflections the instructors were efficiently able to cover critical, difficult, and important material. The instructors effectively used different methods to teach an eclectic group of students about LGBTQ issues.

The most eye-opening and thought provoking aspect of the course was our time specifically exploring transgender issues. We touched on various parts of the subject, from basic language to the psychological aspect a transgender person might go through and issues they face in schools and society. To me, the best activity in the course was when I role-played as a principal of a high school who was implementing new school policies for the equality of transgender students. The rest of the class role-played as parents who raised issues and concerns about the new policies. Granted, everyone was playing a part, but the hurtful, ignorant questions and comments coming from the 'parents' made me see the struggle transgender individuals endure.

Transphobia in education is a prominent issue that is difficult to eliminate. Society doesn't always cope well with change because we don't know how to handle change. I've learned that fear from transphobia has a much broader definition than just being afraid. Transphobia is immeasurable today because transgender inclusivity is a new concept for society. Leaders should consider the interests of everyone and apply transgender inclusive policies. Role-playing as a principal made me think, how does one eradicate transphobia? Being in a leadership position, like a high school principal, you have to be cautious to do what's right and execute policies in a reasonable manner. This role-playing experience made me believe our society needs transformational leaders that demonstrate strong leadership skills.

Discussion and Limitations

The reflections suggest that all three activities supported students' critical consciousness (e.g., sense of political efficacy, critical reflection) of transgender students and the need for trans-inclusion in schools. Erin's and Jade's reflections indicate a sense of critical reflection about how transgender students are mistreated by teachers and students and at the institutional level, prompting a desire to change schools. Moreover, Brock's reflection shows that students may have developed a sense of political efficacy. Brock's reflection recounts the role-playing exercise, where students participated in divisive arguments, common among parents and educators regarding trans-inclusive school policies. Brock further notes that application of trans-inclusion in schools accounts conflicts with the prejudice of stakeholders in a school community (e.g., parents and principals). A principal interested in transinclusion would have to craft school policy that advances inclusion but acknowledges the lack of willingness of parents,

teachers, and other stakeholders to accept trans-inclusive policies.

One challenge that arose in the experience of teaching this undergraduate course was the tendency of the instructor and students to infuse dialogue with political correctness, especially as members of the dominant group—cisgender students enrolled in this course—expressed fear of making offensive comments toward the transgender community and wanted to identify the "right" strategies to foster inclusive environments for transgender students. Moreover, we found that the instructor and students had the tendency to "police" other students during group discussions. For instance, in the discussion on transgender athletes in high schools, some students pointed out the argument that transgender female athletes had an unfair advantage when competing in high school girls' sports teams. Other students responded by verbally attacking their peers, stating that their arguments were ethically wrong. Policing may have prevented some students and the instructor from unpacking their own prejudices toward transgender individuals.

There are multiple reasons for the orientation toward "political correctness" and "policing." One explanation may be the general lack of discussions about gender identity from a social justice perspective in college courses and in their K-12 schooling. In schools throughout the country, there is a dearth of opportunities for students to engage in dialogues about social justice and diversity issues. Another explanation could be that that the instructor and students needed more opportunities to reflect individually about issues concerning transphobia and cisgender privilege, especially after intense class debates. Social justice and diversity educators often recommend opportunities for facilitators and students to debrief after intense discussions on concepts related to diversity, power, and privilege (Griffin & Ouellett, 2007). Debriefing activities, such as an in-class written reflection, provides a space for students to develop empathy and understanding for their peers. For instance, after the heated debate on the inclusion of transgender students in sports teams, the class could have participated in individual written reflection activities in which the instructor and each student could have identified personal beliefs and biases about transgender individuals and reactions to contrasting perspectives on the controversy. Both the instructor and students could have then shared individual reflections with partners, followed by a whole group discussion.

To address political correctness and policing in the classroom, we offer a few more recommendations for students and instructors. First, the instructor and students can create ground rules that provide a safe space for class discussion. In this class, we encouraged each other to *sit in the discomfort*, *that there are no wrong answers* and *to use "I" statements*. Both faculty and students could remind each other of these expectations during moments of heated debate. Second, we recommend that instructors and students engage with research and data to provide a social context to controversies. For instance, in the principal role playing activity, the instructor and students could begin the activity by presenting data that compares the school experiences (e.g. bullying, mental health, teacher support) of transgender and non-transgender youth from the 2013 GLSEN National School Climate Survey. Data showing the adversities of transgender youth in schools could provide an objective case for changing exclusionary school policies regardless of personal beliefs.

Conclusion

Educators have to be capable of creating supportive classrooms and schools for all students, especially marginalized youth. This requires professional development and training. At present, educators have few opportunities for training on the issues of transgender students and trans-inclusive school environments, and thus they are ill-equipped to prevent tragedies such as the murder of Lawrence King. The series of activities described in this paper were designed to enhance the critical consciousness of future educators as they learned about cisgender privilege and transphobia, the challenges facing transgender students, and strategies for creating trans-inclusive school environments in their future professional roles. These experiences provided the class with a space to learn how to navigate conflicts with transphobic school adults, students, and parents as they create and enforce trans-inclusive school policies and procedures.

While educator training on transinclusive schools has emerged in recent years (e.g., Gender Spectrum), the inclusion of transgender topics is largely missing from most educator development programs. There is a need for educational leaders and researchers to integrate transgender issues into teacher training. The activities presented in this paper reflect a potential critical consciousness framework that can be applied to the training of future trans-inclusive educators.

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