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Interteaching: Its effects on exam scores in a compressed-schedule format

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Abstract: Although previous research has found interteaching to be an effective form of instruction, all of the currently published data have been collected in courses that have allowed for a minimum of 48 hours between class sessions. In the current study, we examined the effectiveness of interteaching compared to traditional lecture during a six week summer session of a behavior modification course. Two non-concurrent sections of the behavior modification course were taught during which the instructor alternated between interteaching and traditional lecture. These courses were counterbalanced, such that when material from one section was covered using an interteaching approach, the same material in the other section was presented using a traditional lecture. Unlike previous studies, students did not score higher on exams following interteaching sessions. Additionally, students indicated a preference for lecture-based instruction as opposed to interteaching. Interpretations of these results, the social validity responses, practical implications, and recommendations for additional research are discussed.

Keywords: interteaching, college instruction, active learning, pedagogy, behavior analysis

Introduction

Effective classroom instruction that capitalizes on well-established behavioral principles has been well-documented (e.g., Moran & Malott, 2004). Approaches such as reciprocal peer tutoring (e.g., Pigott, Fantuzzo, & Clement, 1986), Just-in-Time Teaching (Benedict & Anderton, 2004), direct instruction and precision teaching (Binder & Watkins, 1990), and Keller's (1968) Personalized System of Instruction have all demonstrated to be effective alternatives to traditional (e.g., lecture format) instructional approaches. Nevertheless, these approaches have not been systematically adopted by instructors for various reasons (see Saville, Zinn, Neef, Van Norman, & Ferreri, 2006). Recently, a behavioral method to classroom instruction called interteaching has begun to gather interest due to a more flexible approach when utilizing behavior-analytic principles (Boyce & Hineline, 2002).

Interteaching sessions first require students to complete a preparation (prep) guide before each class session that has been developed by the instructor. The type of questions on the prep guide vary depending upon the assigned reading for that class period, but generally consist of questions that are designed to require students to select basic concepts from the assigned reading and then apply that information to additional questions that assess higher level comprehension of the material. During class, the students are divided into dyads and discuss their answers to the

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prep guide questions in "a mutually probing, mutually informing conversation between two people" (Boyce & Hineline, 2002, pg. 20). While this occurs, the instructor moves from group to group and provides clarification and helps to facilitate discussion between the students. Once the students finish their discussion, they are asked to complete an interteaching record that asks them to identify any topic from that class session that they found difficult. The instructor compiles these responses and creates a brief lecture for the following class session that focuses on the material that students found difficult. After the lecture is completed, the students are divided into dyads and the process begins again (see Boyce & Hineline, 2002 for a more detailed description of interteaching sessions).

The effectiveness of interteaching has been empirically demonstrated across a variety of courses, including nutrition (Goto & Schneider, 2009, 2010), special education (Cannella-Malone, Axe, & Parker, 2009; Saville et al., 2006), computer programming (Emurian & Zheng, 2010), business (Edwards, 2005), and psychology (Saville, Zinn, & Elliott, 2005; Saville, et al., 2006; Scoboria & Pascual-Leone, 2009); with additional instructors also anecdotally describing the advantages of this approach in their classrooms (e.g., sociology – Tsui, 2010; religious studies – Zeller, 2010). One of the first studies to demonstrate the effectiveness of interteaching as compared to traditional approaches (e.g., lecture) in a classroom setting was Saville et al. (2006). In study 2 of their paper, students in two sections of an undergraduate research methods course were taught material using both an interteaching approach and traditional lecture format (i.e., summarize previous material, introduce new topics, present relevant examples, etc.). The authors counterbalanced the sections, such that while the first section was receiving information using an interteaching approach, the second section was taught using a lecture format. Results from this study showed that students who were taught the material using an interteaching approach, performed better on exams than students who were taught the same material using a lecture format. Additionally, the majority of students in both sections reported a preference for the interteaching approach to instruction.

Additional research has been conducted examining the various components of interteaching. Saville and Zinn (2009) examined the effect of quality points on student exam scores. Quality points are assigned when students who worked as partners during a specific interteaching session both correctly answer a question (i.e., short answer or essay) on the exam related to the interteaching material. For example, if Chelsea and Nicole are partners during a class session where they interteach material about extinction and both of them answer the question on the exam about extinction correctly, they would receive additional bonus points. However, if only Chelsea answered the question correctly, no additional points would be provided. Thus, engaging in high-quality interteaching is beneficial for both students. Saville and Zinn (2009) used an alternating treatments design to assess the effects of quality points on exam score. Two sections of an introductory psychology course were taught using an interteaching approach, with the sections being counterbalanced, such that when one section was receiving quality points for interteaching the other section was not. Results of the study showed that quality points did not appear to play a significant role in improving students' exam scores, which supports an earlier study that found a significant difference between interteaching and other forms of instruction even though no quality points were provided (Saville et al., 2005). Researchers have also examined the influence of interteaching prep guides on student quiz scores. Cannella et al. (2009) taught a special education course using interteaching and varied the composition of the prep guide by either requiring students to create their own or to answer questions that were developed by the instructor. Having students write their own prep guide

questions led to slightly higher quiz scores than answering instructor-prepared questions; however, the difference in quiz scores was not substantial. Social validity measures indicated that students preferred a standard lecture approach instead of interteaching, which the authors believe may have been due to the students' previous experience of taking classes with the instructor in which interteaching was not used, as well as additional work (e.g., prep guides, more quizzes, etc.) that is not required in typical lecture-based courses. While this research is helpful in identifying the influence of student-written versus instructor-written prep guide questions, the lack of a control group limited the conclusions on what effect prep guides actually have on student quiz scores in an interteaching-based course.

Although the increasing amount of research on interteaching has largely supported its effectiveness when compared to more traditional instructional approaches, none of the currently published research has utilized interteaching in courses that meet during a more compressed academic schedule requiring classes to meet more than three times per week (i.e., summer-session classes). Therefore, the current study was designed to examine the effectiveness of interteaching as compared to a traditional lecture-based course in a compressed-format class offered during a six-week summer session. Based on the previous research demonstrating the efficacy of interteaching, the authors anticipated that students' exam scores would be significantly higher during interteaching conditions, and that students would prefer that the instructor use the interteaching format as opposed to the traditional lecture format when presenting course content.

Method

Participants

Participants were 21 undergraduate students (14 women and 7 men) in two non-concurrent sections of a six-week summer-session, introduction to behavior modification course. The participants' median age was 20 years-old (range 19 to 60) and were classified as either sophomores (n = 2), juniors (n = 12), or seniors (n = 7) in college. There were 9 participants (6 women and 3 men) in the first section (SEC 1) and 12 participants (8 women and 4 men) in the second section (SEC 2). Both sections were taught by the first author and met on Mondays, Tuesdays, Thursdays, and Fridays for 85 minutes per class.

Materials and Procedure

A multi-crossover, counterbalanced design was used to compare the effects of interteaching to traditional lecture on students' exam scores. The instructor would alternate between presenting material using lecture and interteaching over the course of the summer-session. Additionally, the format of instruction was counterbalanced across sections, such that while SEC 1 received information using interteaching, SEC 2 was taught the same material using lecture.

Lecture. Lectures consisted of the instructor presenting material over the assigned readings (Martin & Pear, 2007) using PowerPoint® presentations. Outlines of the notes were posted online (i.e., Blackboard) prior to the class meetings so that students could print them off and take additional notes on relevant information discussed during class. Lectures lasted approximately 85 minutes and included examples and questions designed to demonstrate

comprehension, analysis, and synthesis by the students (Bloom, 1956). Students were also provided with a brief study guide for each exam that contained similar (but less detailed) questions as those on the prep guides used during interteaching sessions.

Interteaching. Interteaching class sessions followed the description outlined earlier in this article. Prior to class, students were presented with a prep guide that was created by the instructor. Each prep guide contained approximately 7-10 questions (range 5-14) designed to highlight the key concepts from their reading assignment and to provide them with an opportunity to apply the information. For example, a sample question from the prep guide associated with operant extinction read:

> Paul hits his little sister in order to get his mother's attention. When this happens, Paul's Mom sets him aside and gives him a long explanation of why he shouldn't hit his sister. Paul continues to hit his sister. Is extinction a good procedure to use in this case? If not, what approach could you take to decrease Paul's hitting behavior?

At the beginning of class, students were divided into dyads, or occasionally triads if student attendance required this arrangement. Students were allowed to pick their own partners; however, they had to have a different partner each day during the week. Students spent approximately 45-50 minutes discussing items on the prep guide while the instructor moved from group to group and helped to facilitate the discussions. Following the discussions, the students spent approximately 5 minutes completing the interteaching record sheet (for a template, see Boyce and Hineline, 2002). The instructor compiled the sheets and designed a brief lecture (25-30 minutes) for the beginning of the next class to clarify any of the material that the students found difficult. Similar to the lecture condition, an outline of the brief lecture was posted online prior to the next class meeting so that students could print off the slides and take additional notes during class. Upon completion of the lecture, the students were divided into their groups and the discussion over the prep guide for that day's reading assignment began. For completing the prep guide and participating in the discussion, students received points that accounted for approximately 9% of their overall grade. Due to previous research, the authors decided not to use quality points (Saville & Zinn, 2009).

Tests

Students in both sections completed four exams (two following interteaching sessions and two following lecture sessions) over the course of the summer-session. Tests consisted of multiple choice questions (70 points total) and six essay questions (five points each). Multiple choice and essay questions were directly related to questions taken from the prep guide. For example, one of the prep guide questions asked students to "Describe how tokens are used in a token economy and the initial steps in setting up a token economy." One of the essay questions on the following test required students to "Describe why it is important for individuals to earn enough tokens to exchange for back-up reinforcers in the early phases of a token economy." Similarly, a multiple choice question related to the prep guide question was: "A researcher plans to implement a token economy with a group of juvenile offenders in a treatment program. What is the first step in planning a token economy?" with the correct answer (defining the target behavior) provided along with three other distracters.

Interobserver Agreement (IOA)

The instructor and a graduate teaching assistant who was naïve to the purpose of the study independently graded each exam. Answers to essay questions were scored on separate data sheets to limit the possibility of influencing the score provided by the other grader. An agreement was scored if the two graders assigned the same score to an answer. To determine IOA the following formula was used: (agreements/ (agreements+disagreements)) x 100%. Mean agreement scores were 90% for interteaching (range 84% to 100%), and 89% for lecture (range 82% to 98%).

Social Validity

Following the completion of the course, each participant anonymously completed a six-item questionnaire to assess students' preferences for instructional format (see Table 1). Additional open-ended comments were collected during the final course evaluation.

Statistical Analyses

Participant demographics. Because the authors could not randomly assign participants to sections, we collected self-reported demographic data on variables including: (a) gender; (b) major; (c) cumulative grade point average; (d) number of psychology credits taken; (e) number of credit hours they were currently enrolled; (f) how many credits they had taken from the instructor previously; (g) if they were employed; (h) if they participated in extracurricular activities; (i) if they had significant others; and (j) whether they had children. These data were used to help determine how similar students in the two sections were prior to introducing the independent variable. Chi-square tests and independent samples *t* tests were conducted to assess participant demographics, with a significance level of $p<0.05$.

Test scores. Independent-samples *t* tests were conducted to examine differences between the lecture and interteaching conditions on each of the four exams, with a significance level of $p<0.05$.

Box plots of test scores. Given the small number of students in each section, and the possibility of outliers affecting the overall mean, exam scores were also analyzed using box plots. Box plots were created in Excel 2010® by determining the minimum value, first quartile (25^{th} percentile), median (50^{th} percentile), third quartile (75^{th} percentile), and maximum value of exam scores for each test administered to both sections.

Results

Participant Demographics

Six chi-square tests (gender, major, employment status, extracurricular activity, significant others, and children) and four independent-samples *t* tests (GPA, number of psychology courses, credit hours, and credit hours from instructor) found no significant differences between the two sections on any of the demographic data (all *p*s >.20).

Tests

The mean scores on each of the four exams for participants in both SEC 1 and SEC 2 are displayed in Figure 1. Statistically significant effects were found on Exam 2 $t(19) = .723$, $p = .001$ and Exam 3 $t(19) = -.826$, $p = .026$; with students performing significantly better during the lecture condition on Exam 2, and students performing better during the interteaching condition on Exam 3. No significant differences were found for Exam 1 $t(19) = .429$, $p = .08$ or Exam 4 $t(19) = -.321$, $p = .839$. Although both methods of instruction produced acceptable averages for the instructor, unlike previous studies (e.g. Saville et al., 2006), students' overall mean scores were not higher on exams following interteaching ($M = 78.48$, $SD = 4.74$) as compared to exams following lecture ($M = 78.67$, $SD = 1.01$).

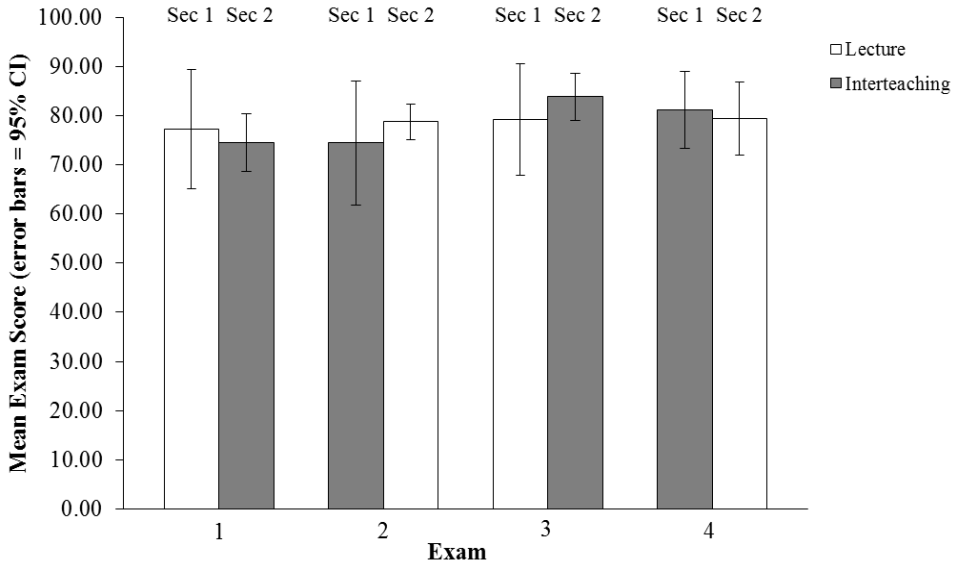

Figure 1. Overall mean percent correct across four exams. Mean exam scores and 95% confidence intervals are displayed for each section and across the four exams administered during the compressed six-week summer sessions.

Figure 2 shows box plots for the four exams administered to each section. In a box plot, lines are drawn at the 25th, 50th, and 75th percentiles. The capped vertical bars extend to the lowest and highest exam scores in that section, with a maximum of 1.5 interquartile ranges. When comparing the median exam scores (50th percentile) across interteaching and lecture conditions, the results indicate no consistent pattern or difference between conditions, which are similar to the findings displayed in Figure 1.

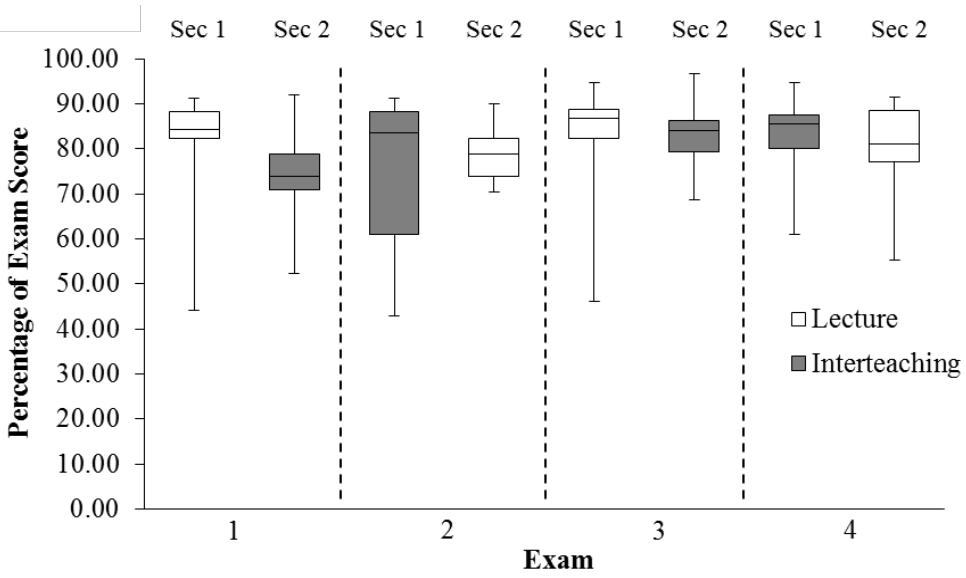

Figure 2. Boxplots of exam scores across sections and teaching conditions. Box plots displaying the minimum exam value, 25th, 50th, and 75th percentile scores, and maximum exam value are displayed.

Social Validity

Based on responses to the social validity questionnaire (see Table 1), and contrary to previous studies (e.g., Saville et al., 2005, 2006), a majority of the students preferred lecture-based classes (52.4%) as opposed to interteaching (38.1%).

Discussion

Although previous studies have suggested that interteaching is a beneficial and student-preferred alternative to traditional instructional formats (e.g., Saville et al., 2005, 2006), the results from the present study demonstrate that interteaching may not be as effective when used in courses that have a compressed format (e.g., summer sessions or quarter system). Given the abundant amount of research on the effects of distributed practice on learning (see Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006; Donovan & Radosevich, 1999; Janiszewski, Noel, & Sawyer, 2003 for reviews) these results are not unexpected. During interteaching sessions, students had less than 24 hours to complete the assigned reading (usually 12-15 pages), answer the 7-10 prep guide questions, and comprehend the material at a level that would allow them to discuss it with their classmates the following day. While this may be a reasonable expectation for courses on a semester system, when students are taking two or three additional courses, working a job, and engaging in extracurricular activities, one can see that interteaching requirements may become overwhelming for students taking classes in a compressed-format. In contrast, previous research on interteaching has been conducted in settings that have 48 hours (or more) between class sessions. This not only allows students more time to complete the assignments, but as the research on spacing effects suggests, they are more likely to retain this information (Cepeda et al., 2006).

Table 1

Social Validity Data Assessing Student Preference for Interteaching or Lecture

	Not at all	Somewhat	Neutral	Mostly	Always
1. How beneficial were class periods that used a lecture-based teaching approach?	0% (0)	0% (0)	14.3% (3)	76.2% (16)	9.5% (2)
2. How beneficial were class periods that used an interteaching approach?	0% (0)	4.8% (1)	4.8% (1)	71.4% (15)	19% (4)
3. How useful was it to discuss the assigned readings with another student?	4.8% (1)	9.5% (2)	9.5% (2)	71.4% (15)	4.8% (1)
4. Please rate the extent to which you thought interteaching prep guides were helpful in obtaining higher exam scores.	4.8% (1)	4.8% (1)	28.6% (6)	57% (12)	4.8% (1)
5. Overall, which form of instruction did you prefer?					
Lecture	52.4% (11)				
Interteaching	38.1% (8)				
No preference	9.5% (2)				
6. From which type of instruction do you think you learned most efficiently?					
Lecture	47.6% (10)				
Interteaching	42.9% (9)				
No difference	9.5% (2)				

Note. The number of student responses is in parentheses.

The findings from the social validity questionnaire also suggest that the amount of time between class sessions and the time dedicated to interteaching (45-50 minutes, four days a week), was overwhelming. Although, over 90% of the students did report that they found interteaching sessions to be beneficial. Additional written comments on the course evaluation indicated that students thought interteaching had the potential to be useful, but was extremely challenging due to the amount of work that was required (i.e., reading assignments and prep guide questions) on a near daily basis. Nevertheless, it should be noted that the instructor checked for prep guide completion on interteaching days and over 95% of the students had completed the prep guides prior to coming to class.

In addition to the differences in the amount of time between class sessions, there are several other factors that could have contributed to the findings. First, interteaching sessions were not conducted exactly as outlined by Boyce and Hineline (2002). Based on previous research suggesting that quality points do not play a significant role in improving exam scores

(Saville & Zinn, 2009), the current investigators did not use this approach. Additionally, no "probes" were used to evaluate student progress. As described by Boyce and Hineline (2002), a probe is similar to a quiz, except that students are aware of the possible questions prior to being tested. It is recommended that probes be provided regularly and frequently (i.e., a minimum of five during a semester) to assess student progress. Due to the limited amount of time during these summer sessions, the investigators opted to only use exams and worksheets to evaluate student learning. Based on the previous data on interteaching (e.g., Saville & Zinn, 2009; Saville et al., 2006), it is unlikely that the omission of these components contributed to the effects of interteaching in the current study; however, this possibility cannot be entirely dismissed.

A second factor that may have influenced the results is the number of interteaching sessions completed by students. Prior studies that found interteaching to be effective reported that students engaged in interteaching sessions from a low of 10 (Study 1, Saville et al., 2006) to a high of 13 (Goto & Schneider, 2010; Study 2, Saville et al., 2006), with another study falling within this range (Scoboria & Pascual-Leone, 2009). In the current study, the students participated in nine interteaching sessions. While this number is not substantially lower than previous studies, it is possible that students may benefit from interteaching more as they become increasingly comfortable with this new instructional approach. However, only one statistically significant difference was found as the summer session progressed – Section 2 students improved significantly on their exam scores following their second exposure to the interteaching condition (Exam 1 to Exam 3) $t(20) = -2.55$, $p = .01$. All other comparisons between earlier exams and later exams were not significant (all ps > .19). Additional research may be needed to examine the effects of the number of interteaching sessions by varying how many sessions are used in the course or by evaluating how students who have had previous interteaching-based courses compare to students for whom this is a novel instructional format.

Finally, the inclusion of a study/prep guide for students during the lecture condition may have contributed to an increase in exam scores in the absence of the other interteaching components. Saville et al. (2005) conducted a preliminary analysis on the effects of interteaching compared to other forms of instruction (e.g., lecture, reading assignments, etc.), and additional studies have examined other components including lecture (Saville, Cox, O'Brien, & Vanderveldt, 2011), group size (Truelove, Saville, & Van Patten, 2013), and quality points (Saville & Zinn, 2009); however, a full component analysis of interteaching has yet to be published. Based on previous research examining the effects of study guides on exam scores (e.g., Cannella-Malone et al., 2009; Dickson, Miller, & Devoley, 2005; Flora & Logan, 1996), it is possible that the prep guide is the most critical feature of interteaching and is sufficient enough to improve exam scores irrespective of the additional interteaching components (i.e., dyadic discussions, quality points, clarifying lectures). As Saville et al. (2006) note, by creating a prep guide that clearly creates a link between course information and test items, students are more likely to focus their studying efforts on relevant material and experience additional reinforcement contingencies (e.g., decreased test anxiety, increased motivation, etc.) that help to facilitate learning. Additional research is needed to determine if prep guides are sufficient to improve student performance in the absence of the other components of interteaching or if their effectiveness can be enhanced by including specific features (e.g., clarifying lectures or discussion groups).

Although our results suggest that interteaching was an equally effective form of instruction for use in classes on a compressed-schedule format – as opposed to previous research that found it to be more effective than a traditional lecture approach – there are limitations to the

present study. First, the authors did not control for or assess the type of studying students engaged in outside of the classroom. After first experiencing interteaching, it is possible that students may have met outside of classroom hours and studied exam material following lecture sessions using techniques (e.g., going over the study guide and asking each other questions, etc.) similar to interteaching. Second, due to the amount of time available for class meetings, students were only tested four times during the class; although recent research on interteaching and the testing effect suggests additional testing may not enhance the efficacy of this instructional method (Lambert & Saville, 2012; Saville, Pope, Lovaas, & Williams, 2012). A final limitation of the present study was a small sample size. Due to the limited number of students enrolled in the two sections, outliers on exam scores could have shifted the mean exam scores significantly and influenced the interpretation of the effects of interteaching or lecture; although the data displayed in the box plots in Figure 2 suggest that outliers were not influential in this study. However, additional studies in compressed-format schedules with larger sample sizes would be beneficial.

Despite the perceived benefits of interteaching, including cooperative learning and active participation (Griffin & Griffin, 1998; Yoder & Hochevar, 2005), the present findings on the effects of interteaching in compressed-format based courses were minimal. Unlike prior research (e.g., Saville et al., 2005, 2006) that has indicated interteaching to be a student-preferred pedagogical approach capable of enhancing student academic performance, the current study found that students favored lecture-based instruction, and that there was no difference on exam scores between interteaching and a traditional lecture-based instructional approach. Additional research examining interteaching is needed to determine whether this approach is beneficial for instructors and students in classes that meet on a more frequent basis.

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Student perspectives on self-directed learning

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Abstract: Undergraduate student perspectives regarding specific factors associated with self-directed learning were collected through eight focus groups. A total of 80 upperclassmen provided input revealing three emergent themes in the focus groups responses: (1) Student-Controlled, (2) Faculty-Controlled, and (3) Administration-Controlled Facilitators and Barriers to promoting self-directed learning. Students acknowledged much of their learning was within their control. However, they did note that faculty and administrators have a significant impact on their desire and ability to learn. In an effort to empower students to direct their own learning processes the results of this study have been integrated into campus assessment initiatives including the development of a student organization to provide a consistent, student-led forum for students to voice their opinions and concerns about their learning processes and assessment.

Keywords: self-assessment, self-directed learning, student success, student organizations

Introduction

Academic institutions are driven to increase retention and improve academic success. To that end, institutions attempt to effectively connect with students at various points within their academic careers to provide interventions, if needed, to promote retention and success. A variety of published tools gather and summarize information from students (e.g. National Survey of Student Engagement or Map-Works®), and while it is challenging to gather information from all students at key points in the semester, sometimes simply asking students to outline their reasons for coming to the university and plans for continuing their education provides useful information related to student learning outcomes (Guiffrida, Lynch, Wall, & Abel, 2013). Perhaps two of the most important questions institutional administrators can ask of their students are "How do you direct your own learning and how can we best help in that effort?"

Although universities can provide extrinsic motivations to students, such as grades and a positive campus environment, it may be more important to determine ways to empower students to direct their own learning processes (Flint & Johnson, 2011). By encouraging students to reflect on their own learning processes, evaluate the depth of knowledge they have on a subject, and identify areas that require further development, universities are increasing the potential success of their students (Brown, 2004-2005; Nicol & Macfarlane-Dick, 2006). Clearly, when students are intrinsically motivated to succeed, they will perform better in high cognitive tasks (Pink, 2011).

According to the constructivist theory of learning, students build their own understanding of a subject through engaged activities, rather than passively accepting information presented to them. Instructors can support students' constructivism by asking good questions, listening to

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students' needs, and creating environments that allow students to make choices that reinforce the overall goals for courses (Reeve, 2009). Conversely, when rigid assessment tools are used, students lose control and autonomy over their learning, reducing their intrinsic motivation (Flint & Johnson, 2011).

Self-determination theory posits that motivation ranges from extrinsic (e.g. grades or wanting to please) to intrinsic (e.g. satisfying personal goals) (Ryan & Deci, 2000). Students become intrinsically motivated when learning tasks give them a sense of *autonomy, competence, relatedness, or purpose*. Guiffrida et al. (2013) found students' self-reported grade point average and intent to persist were positively and significantly related to students' focus on subjects or activities closely related to their interests (*autonomy*) as well as an internal desire to challenge themselves (*competence*).

Fortunately, instructor attitudes and class structures can support students' intrinsic motivation. Instructors who have high expectations and truly believe that their students can meet them are likely to provide the necessary support for student success. Similarly, when students feel instructors believe in their abilities, they often are more motivated to achieve (Herman, 2012). Another way to encourage students to build their own knowledge is through sustained collaborative activities (*relatedness*). Learning occurs as students present information to and assess each other with the aim to create new knowledge through work on shared projects (Paavola & Hakkarainen, 2005). However, for peer teaching to be successful, instructors must provide significant guidance to the learners (Kirschner, Sweller, & Clark, 2006).

Encouraging students to become involved in developing course requirements (*purpose*) also increases their internal motivation to learn (Herman, 2012). The more control students have in their learning process, the more they sharpen their ability to sort through presented information as well as critically reflect and analyze their performance (Trigwell & Prosser, 1991). Additionally, student-directed assessment can be utilized as a learning tool that can positively impact self-reflection and analysis (Dochy, 1992; Glaser, 1990).

Because university faculty foster critical thinking in students through collaboration and mentoring (Sanders, 2006), academicians have the opportunity to support students on a lifelong path of self-directed learning and assessment. The current climate of increasing the engagement of students in higher education provides an optimal environment to incorporate student self-assessment in to the university curriculum. This qualitative research was therefore directed towards having students provide input on the most important factors they and their university can influence to encourage self-directed learning and self-assessment. The goal of the study was to explore students' thoughts regarding their own self-directive learning and explore ways to facilitate further self-directive learning. The objectives of the study were to (1) collect student data on their learning and support for their learning, (2) review these data for emerging themes, and (3) utilize the review of these data for institutional improvement.

Methods

Research Questions: The primary research questions for the study were: (1) What promotes self-directive learning in our students and (2) How can our institution facilitate self-directive learning in our students? There were no preconceived hypotheses for this study as it was guided by a grounded theory approach as outlined by Strauss and Corbin (1998).

Participants: Participants included 80 undergraduate upperclassmen recruited from the College of Business and the College of Health and Human Sciences at a large Midwestern

university. A convenience sample of selected courses within these two colleges was used. Although this was done, in part, because the researchers were affiliated with these colleges, it was unlikely to have affected the results given that four of the five coders were from the College of Liberal Arts and Sciences. However, convenience sampling, a nonprobability sampling method, does limit generalizability of findings (Babbie, 1998, pp. 194-195) and thus may not reflect the perceptions of individuals outside of the sample.

Data Collection: Information was collected through eight focus groups held in spring 2008 to address a variety of questions related to student experiences with learning and assessment. The focus groups were facilitated by teams of undergraduate marketing students trained as moderators and recorders of focus group data, with oversight by the first author. Focus group sizes ranged from 8-12 participants divided between business students (39 participants in 4 groups) and health and human sciences students (41 participants in 4 groups). Focus groups were chosen as the primary research method in this study because the researchers wanted to better and quickly understand, from the student perspective, how students could be encouraged to engage in self-directed learning and assessment at this particular institution. This required in-depth, open-ended questioning of students. It was the belief of the researchers that this would be best accomplished in group settings with peer facilitators. The Association for Institutional Research (AIR) has expressed support for this belief in a recent publication (Billups, 2012).

Focus Group Questions: The primary focus group questions were (1) What goals, if any, have you set for your learning in college and how do you monitor your progress on those goals?; (2) How can students be involved in directing and measuring their own learning in meaningful ways?; (3) What are some of the ways you and other students can identify gaps in your learning?; (4) In what ways could you and other students redirect your efforts to close these gaps and improve your learning?; (5) What obstacles, if any, do you think get in the way of directing and measuring your learning?; and (6) How can faculty and staff support students in their efforts to direct and measure their own learning processes? Although moderators introduced topics, students were allowed to go off-topic and brainstorm within limits, allowing for the widest variety of ideas. Throughout, the moderators conducted respondent validation or "member check" by summarizing the information and questioning participants to confirm accuracy. Social interactions provided by the focus group environment encouraged students to describe key aspects of the university's role in creating environments in which students could direct their own learning processes and self-assess their learning outcomes.

Focus group facilitators transcribed the data from the recorded sessions and their notes. Data analysis was conducted using a grounded theory approach as outlined by Strauss and Corbin (1998). This inductive approach is suitable when researchers are gathering data on a particular phenomenon with no pre-conceived hypotheses but, rather, with the intention of observing patterns across individual observations and subsequently developing themes among these patterns and proposing general explanatory statements (Potter, 1996). In this case, three independent university researchers coded the transcriptions. Each transcript was double-coded, and the team used an iterative approach to create over 100 observational codes. Where there was disagreement on the codes, the third independent researcher was called in to rectify this conflict. These codes were collaboratively collapsed into 58 codes that fit beneath 10 key dimensions of three overarching themes. As a validity check on the coding, the eight focus group transcripts were then once again double-coded by two graduate student researchers working independently and using this coding schema. As needed, codes were revised to address input from the two student researchers. This last check helped to assure that the researchers understood the students'

meanings in their focus group comments by including a student perspective in the coding process.

Results

Results revealed three emergent themes in the focus groups responses: (1) student-controlled, (2) faculty-controlled, and (3) administration-controlled facilitators and barriers to self-directed learning. Within these themes, the inter-rater reliabilities on the coding of ten dimensions, ranging from .72 - .91, were within acceptable limits, that is, above .7 (Stemler, 2004). In most cases, the examples cited for each dimension could be seen as a facilitator or barrier to self-directed learning for the students, depending on the manner in which it was discussed. These examples and dimensions are listed in Tables 1-3 as both facilitators and barriers.

Student-Controlled Facilitators and Barriers

Student-controlled facilitators and barriers were defined as key dimensions students identified that helped or hindered student self-directed learning and were within student control. Students identified five key dimensions for self-directed learning: (1) being proactive in class, (2) being proactive with other students, (3) being proactive outside of class, (4) having good study habits, and (5) metacognitive factors (see Table 1).

Table 1

Student-Controlled Facilitators and Barriers to student self-directed learning

Facilitator/Barrier	Frequently Cited Example
Being Proactive in Class	Attending class Taking good notes Actively participating in classes
Being Proactive with other Students	Participating in student organizations Networking with other students Forming study groups
Being Proactive Outside of Class	Talking to professors to identify learning gaps Networking with people in the field
Good Study Habits	Time management Building a routine to assess own learning Minimizing excessive socialization
Metacognitive Factors	Understanding own learning styles

Being proactive in class included being actively involved in class which, of course, was predicated on attending class, as many students noted. Taking good notes and actively participating in classes were also frequently cited as means to promote self-directed learning, a finding presented in previous research (Yazedjian, Toews, Sevin, & Purswell, 2008). One student said, *"actually going to class"* had been key to becoming more proactive. Another said,

"You have to show up to class and take notes." Another student said, *"I…get the PowerPoints if they are there, and I write the notes down on it because that's how I learn."* One student talked about actively participating in class when he said, *"You have to take some ownership here for what you are trying to learn…you have onus for yourself."* Another noted, *"It's really on the student to take the most away from their college experience because the professors aren't going to be able to do that for you."*

Being proactive with other students was expressed as involvement in student organizations, networking with other students, and forming outside study groups. Comments from students in the current study supported prior research (Kuh, Kinzie, Schuh, & Whitt, 2005) by indicating they clearly saw interaction with their peers as a path toward greater understanding of their own learning processes. One student noted, *".... getting involved in organizations I know has really helped me (direct my own learning)."* Another stated, *"I think meeting different people, getting variety and diversity, um, helps me have a good learning experience."* From another, "*The networking thing is just so important today."*

Herman (2012) outlined how peer interaction can increase students' internal motivation by developing their own sense of competency, and that of their peers. This was evident in the present study in that many students viewed study groups as a way to direct learning and self-assess by comparing with peers, even when students were at different levels of understanding, "*If you can teach it, then you know it really well."* However, some students found study group barriers to learning, *"Some study groups are hard to actually get some studying done because everyone's on their own page. If someone doesn't do the required reading material, then one person is behind, and three people are ahead, unless that person doesn't mind you going ahead, it kind of holds everyone back."* Van Etten, Pressley, McInerney and Liem (2008) also observed that study groups can be both a facilitator and a barrier to student learning.

Being proactive outside of class for these students primarily meant talking to professors to identify gaps in learning and networking with people in the field. *"Going up to the teacher and asking questions about like why you missed it (an exam question) and what they were intending"* was noted as a key way to identify gaps in learning, which was consistent with prior research (Yazejian et al., 2008). Another stated, *"Or talk to someone else in the field ... that knows for sure if you are not going to use this technique at all."* One student commented about networking in the field, *"I just think it helps you decide what you want to learn."*

Similar to Robbins, Lauver, Davis, Langley and Carlstom's (2004) suggestion that good study habits enhance academic performance; students discussed the need to focus on academic material. Time management and creating a routine utilizing a variety of study methods were frequently cited as facilitators in this area, while too much time spent socializing was the number one obstacle to success. Time management was emphasized by one student: *"Some classes are like; you have to be on top of your readings, on top of your lectures, and studying all the time to really grasp the information."* In describing a schedule of self-assessment, another said, *"I will go over my notes and either read or re-write them or re-type them and that's my study guide, I'm doing (it) myself."* Commenting on excessive socialization as a barrier to self-directed learning, one student said, *"I go out too much. It really hurts me in terms of building my knowledge of the field, I just go out and then I don't have the time or desire to figure out what I need to be learning."*

Last, under student-controlled factors, students cited metacognition issues. Consistent with students in Van Etten et al.'s (2008) study, many students stated that understanding their own learning styles and setting personal learning goals were crucial facilitators, while a lack of

motivation was the most often noted barrier. *"I think it's also important to know your own individual learning style."* Setting personal goals was important to students, *"I've enjoyed …taking classes that didn't affect my major…one of my main goals was to get a taste of everything."* Many students noted that staying motivated to learn and self-monitoring that learning were crucial, *"There is always something better to do than your school work, always. So you kind of need to stay focused because it is really easy to get off that path."*

Faculty-Controlled Facilitators and Barriers

Faculty-controlled facilitators and barriers were defined as key dimensions students identified that helped or hindered student self-directed learning and were within faculty control. Students identified three dimensions controlled by faculty that impacted directing their own learning and self-assessment: (1) class structure, (2) curriculum design, and (3) professorial attitudes and traits (see Table 2).

Table 2

Faculty-Controlled Facilitators and Barriers to student self-directed learning and assessment

Facilitator/Barrier	Frequently Cited Examples
Class Structure	Attendance policies Clear and relevant grading structure
Curriculum Design	Job shadowing opportunities Independent projects Internship and clinical opportunities
Professorial Attitudes/Traits	Faculty advising and support Faculty use of real world experiences Professorial enthusiasm

Similar to Van Etten et al. (2008) who stated that "a good syllabus in a course is key to student planning," students indicated that classes with attendance policies and clear and relevant grading structures helped them learn*, "She weighs it on you to take attendance, I mean it's one hundred points."* Regarding grading structures, one student commented, *"It helps when a professor has a clear grading structure.* Another stated, *"The best is when the grades are an indicator of how much you've actually learned."* This distinction between grades and learning is a concern for some students, *"I kind of feel like the teachers sometimes always focus on grades rather than what you've learned."* Another stated, *"The grades matter when you are doing it, but afterwards, as long as you got something out of it, that is…most important."*

Students believed the curriculum design of the specific courses was a major predictor of their ability to manage their own learning and self-assessment. Job shadowing was helpful because students were able to gain *"practice and experience…just by learning and being there."* One student commented that she was helped by *"shadowing… people from geology departments even though it wasn't really specific for the class. I got to see other departments, how they work. Especially since our major is so broad and I don't know exactly what I want to do with a job (shadowing helps) in the long-term...I see different positions."* Although most students reported

they had many group projects in their courses, many indicated independent projects would better help them self-direct their learning and self-assess. This was summed up by one student who said, *"I like more independent projects because when you go to your job, it's not going to be like, well, what is the answer? If you already get some kind of experience like, well, here's your assignment, do the best you can, give it back to me as a memo or a report, I think that might be a little more beneficial (than a group project)."* In regards to internship and clinical opportunities one student noted, *"you have had like some real world experience… you can assess yourself-(and say) oh, I really need to be paying more attention to this…you need to be able to pick out what you really need to learn…when you are given a real situation, you can kind of say, well, that is what's important."* Several students identified internships or clinicals as the preeminent goal of their time at the university, one stating, *"Everything I do is to get that internship."*

Professorial attitudes included faculty advising and support, use of real-world experiences, and professorial enthusiasm. These factors were also related to student motivation in Van Etten et al.'s (2008) study. One student commented on a faculty member giving her advice and support to enroll in a course she felt she needed that was unavailable at the institution, *"I had talked to Dr. X about going to (another institution.)…because…they don't have those classes here…they'll work with you on it. So that's an option (to direct your own learning process)."* Students appreciated it when professors used real world experiences in the curriculum *"My roommate is an [allied health] major and everything she does is real world stuff, like tests and working on cadavers."* Another commented, *"For me, a better way of learning…is how it's going to be, um, more involved in reality."* Many students commented on professorial enthusiasm as a major impetus to be more involved in their own learning processes. *"I learned so much from that class like, I could use it in other classes, and he made you want to come to class….I felt that I could get up and interact with something, interact with the class, and it was because of him."*

The results of this study support Gruiffrida et al's (2013) findings that students who sought faculty/student relationships were more internally motivated to learn, *"When you become a friend of professors or mentors, whatever, you are not gonna wanna fail, because they are gonna be like 'what's going on?' You know, it makes, at least for me, makes me wanna try actually harder."* Conversely, a lack of enthusiasm by a professor can have a negative effect on a student's willingness to engage in self-directed learning *" My motivation [for learning and self-assessment] gets cut when a professor doesn't seem that interested, or he is kind of just lecturing, lecturing, lecturing, I don't feel like studying…"*

Administration-Controlled Facilitators and Barriers

Administration-controlled facilitators and barriers were defined as key dimensions students identified that helped or hindered student self-directed learning and were within the university administration's control. Student responses revealed two key dimensions of administration-controlled facilitators and barriers: infrastructures and resources, and incentives for students. Students cited scheduling of courses, class size, faculty workload, and access to technology as factors related to self-directed learning and self-assessment. The second key dimension in this area was identified in the college of business students' responses but was not present in the health and human sciences focus groups. This was incentives for student involvement in directing their own learning processes and undertaking self-assessment (see Table 3).

Table 3

Administration-Controlled Facilitators and Barriers to student self-directed learning and assessment

Facilitator/Barrier	Frequently Cited Examples
Infrastructure and Resources	Scheduling of courses Class size Faculty workload Technology access
Incentives for Students	Rewards Recognition

Students noted lack of course availability as a barrier, *"It makes it hard to take classes cause they are only offered in the fall or the spring…They always fill up fast, so if you miss it, you are like a whole year behind cause the classes are like prerequisites for others so like in that way it really holds you back."* Scheduling of a specific course also was noted as impacting students' ability to self-direct and self-assess learning. *"Well, even if we were allowed to have our internship in between the junior and senior year, …if you're able to do that, you're able to go back and say, 'Maybe I should take this elective or maybe I should take this class again because I don't understand it, you know, kind of like put yourself-in there, see how you do in the real world and then go back to the class and do what you need to do."* Several students thought the administration could plan better, *"They know how many people are looking to graduate in May, they know how many people are gonna have to sign up for these classes, so they should know they need to have more availability for these classes."*

Similar to the students in Van Etten et al.'s (2008) study, large class sizes were noted as impeding self-directed learning and self-assessment, *"In an auditorium you are not going to raise your hand and stop the class for three minutes to answer your question, it's like you know, two hundred and fifty people, you don't want to, at least I don't want to, ask any questions."* On the other hand, small class sizes facilitated self-directed learning and assessment, *"you have to get involved if it's a small class, you have to talk it through so I think in that case, I understand it a lot better"* and *"if the professor has thirty people, they are going to make sure you know the info, because they are going to look at you directly, because you are right in front of them."* Heavy faculty workload was cited as a barrier to utilizing faculty as a learning resource. *"It doesn't help that we have…three teachers. Yeah we only have three teachers and they are like doubling as teachers and advisors…they all have huge workloads for classes."*

Technology was seen as a facilitator and a barrier depending on the student's college. Business students enjoyed a new building with increased technology, *"we have all the smart classrooms, all the technology"* and *"…there's lots of computer labs."* These students acknowledged they benefitted from their new facility, "*[across campus] people have to fight for a computer"* and "*those classrooms are uncomfortable…I would not like to go there for four years.*" A lack of access to technology was seen as impeding the self-directed learning process, *"I know one of our professors in our lab, she said if she could possibly get, you know 20 machines in the class, she could teach us so much. And that's what she wants to do but the school is not willing to give her the money to get the machines."*

Incentives for students were suggested by two of the business focus groups. Cash

rewards or other forms of recognition seemed most likely to compel to these students to engage in self-directed learning and assessment. *"The reason why we are all here right now is money. We…wouldn't be sitting in a marketing class for fun. I think money motivates you and getting a good job."* Another commented, *"We should get our name like on a plaque in the College of Business or we're on the television like all the time. [Group laughing] I'm serious, you know, recognition. Maybe cash rewards."* Van Etten et al. (2008) also reported that rewards and the physical environment affected motivation. However, students in their study indicated external rewards were rare (e.g. admission to graduate school), so they tended to provide realistic self-rewards.

Conclusion and Discussion

The purpose of this study was to explore students' thoughts regarding their own self-directive learning and explore ways to facilitate further self-directive learning. By asking juniors and seniors to reflect on their successes as students, we hoped to determine factors that impeded and enhanced positive student outcomes. Three primary themes emerged from analysis of data collected in the eight focus groups undertaken with 80 student participants from the business and health and human sciences colleges on campus: (1) Student-Controlled, (2) Faculty-Controlled, and (3) Administration-Controlled Facilitators and Barriers to self-directed learning.

Students indicated that being proactive in class, being proactive with other students, being proactive outside of class, maintaining good study habits, and paying attention to their own learning habits did facilitate their learning. Students knew they needed to actively participate in classes, network with other students, talk to their professors, have good time management, set personal goals, and actually go to class in order to succeed. These are not new ideas (Flint & Johnson, 2011; Herman, 2012; Van Etten et al., 2008; Yazedjian et al., 2008). What was new for many of the participants was that they were being asked to consider how these student-controlled actions impacted their own self-directed learning processes and assessment. It was a new way of thinking about learning for some of them but, once they understood, the students volunteered a long list of student-controlled actions related to engagement in self-directed learning. Therefore, it seems clear that while self-directed learning might not be the first thing students think of when determining their own academic success, they do understand that it can play an important role.

Students stated that a great deal of the responsibility for self-directed learning lay at their feet. One student said, *"You have to take some ownership here for what you are trying to learn."* However, they strongly believed the environment which promotes self-directed learning (or not) is largely the product of the actions of faculty and administration. Students identified critical faculty-controlled dimensions in this process, including class structure, curriculum design, and professorial attitudes and traits. Although these were external factors, they did have an impact on student's motivation to study and succeed as exemplified in one comment, *" my motivation (for learning and self-assessment) gets cut when a professor doesn't seem that interested, or he is kind of just lecturing, lecturing, lecturing, I don't feel like studying…*"

The list is straightforward: self-directed learning and self-assessment are facilitated by professors who have clear and relevant grading structures, offering job-shadowing and internship or clinical opportunities, are supportive of students and enthusiastic about teaching and learning. Good teachers know these are good practices, but what they may not know is how important students regard these actions to be in empowering self-directed learning and increasing the intrinsic motivation of their students.

Likewise, administrators try to make student-focused decisions but may not realize how prominent students regard administrators role in facilitating or blocking self-directed learning through scheduling courses, determining class sizes, setting faculty loads, and developing budgets for classroom technology. As with good teachers, good administrators know these are important to student success (Kuh et al., 2005) but may not be aware of how strongly students perceive the impact on their ability to direct their own learning.

Another finding of note is that not all students would be more motivated to engage in these processes if administrators provided incentives. This is an important reminder that "one-size-does-not-fit-all" when it comes to motivating students. Student motivation and success are unique experiences for each student (McCune & Entwistle, 2011). In order to most effectively empower students in their own self-directed learning, institutions must directly ask students about their goals and plans (Guiffrida et al., 2013).

Student comments supported the tenets of self-directed motivation theory. Specifically, students noted that learning tasks that gave them a sense of autonomy, competence, relatedness, or purpose did increase their motivation to self-direct their own learning. For example, students were grateful for opportunities to focus on topics that interested them (autonomy). They commented on instructors who discussed 'real life' examples and indicated the effectiveness of internships in helping them self-direct their own learning.

For the most part, students felt they had the ability to succeed (competence) but believed the number of available social activities often pulled them away from academics. One student noted that combining the social aspect of college life with studying was effective, *"If she's gonna go to the library with me, then I'll go for real, most of the time it's better if you have your friends do it with you."* In terms of relatedness, students viewed group work as potentially helpful. However, the format of the groups and the assignments were important for students to feel that everyone benefitted. Ultimately, when students felt they had control over their learning (purpose), they extended more effort resulting in greater academic success.

Future Directions

This focus group study supports previous research on the importance of including student voices in assessment on campus. Students have presented specific factors they believe affect their ability to self-direct their own learning. They described learning environments that best facilitate (or limit) a student's ability to self-direct and self-assess their own learning. Future empirically designed studies can further support the development of real-world academic solutions.

A limitation of this study was the lack of demographic information on the participants as well as the students' grade point average. Guiffrida et al. (2013) indicate race/ethnicity and gender affect the factors that influence internal motivation in students. Therefore, it is likely that there will be differences across the student population in terms of individual facilitators and barriers to self-directed learning and obtaining this information in future studies will be important.

Further, this study relied on data from just two colleges, the College of Business and the College of Health and Human Sciences. Between these two colleges, at least one difference emerged; business students were more interested in external incentives for learning than were health and human sciences students. Rewards have been cited as a motivating factor in other studies. For example, Van Etten et al. (2008) reported students set up self-rewards that were

helpful in motivating their success. Repeating this study with a broader sample might produce more robust themes across all disciplines.

This study was conducted at a large public university with an extremely diverse student body. It is possible the results are not generalizable to students at other types of institutions (e.g. private elite schools or smaller state schools). However, there is one outcome that can be generalized. Students have an important voice in defining their own learning processes.

Findings from this study have been shared with our campus community. Discussions arising from these findings have led to greater awareness and changes associated with self-directed learning and self-assessment, including the development of a Student Advisory Council on Learning Outcomes (SACLO). SACLO's goal is to provide a consistent, student-led forum for students to voice their opinions and concerns about their learning processes and assessment. SACLO aims to create an environment in which the path to increasing self-directed learning and self-assessment in our students is a shared one. The findings of this and other studies strongly indicate that while students must play the primary role in this effort, faculty and administrators must support them by creating an environment conducive to this endeavor.

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Changes in emotional-social intelligence, caring, leadership and moral judgment during health science education programs

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Abstract: In addition to having academic knowledge and clinical skills, health care professionals need to be caring, ethical practitioners who are able to understand the emotional concerns of their patients and to effect change. The purpose of this study was to determine whether emotional-social intelligence, caring, leadership and moral judgment of health care students change from the beginning to the end of their programs. Students from nursing, bachelor of health science and two physical therapy programs completed self-report questionnaires to evaluate emotional-social intelligence [BarOn Emotional Quotient Inventory: Short (EQ-i:S)], caring [Caring Ability Inventory (CAI)] and leadership [Self-Assessment Leadership Inventory] at the beginning and end of their programs. Students in three of the programs also completed a test of moral decision-making [Defining Issues Test (DIT-2)] at both time points. Two-way analyses of variance (program versus time) demonstrated significant time effects for the total score of EQ-i:S, the Knowing subscale of CAI and the N2 score of the DIT-2. There were no other significant time effects and no major differences between programs. It can be concluded that health care and health science students show small improvements in emotional-social intelligence, caring, and moral judgment from the beginning to the end of their educational programs.

Keywords: emotional-social intelligence, caring, leadership, moral judgment, health science education

Background and Purpose

Educators in health care professional programs aim to develop specific attitudes and behaviors in their students, and teach them knowledge and skills relevant to their professions. Among the attitudes and behaviors desired in students and graduates of these programs are emotional-social intelligence (ESI), caring, leadership, and ethical behavior and decision making (American Physical Therapy Association, 2006; College of Nurses of Ontario, 2008; Physiotherapy Education Accreditation Canada, 2012). These attributes have been positively associated with clinical performance (Beauvais, Brady, O'Shea, & Griffin, 2011; Rochester, Kilstoff, & Scott, 2005; Sisola, 2000) as well as patients' outcomes (Palese et al., 2011). Educators would hope that the curricula of health care professional programs would contribute to enhancements in ESI, caring, leadership and moral judgment.

Bar-On (2002) defines ESI as "a multi-factorial array of emotional and social competencies that determine how effectively we relate with ourselves and others and cope with

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daily demands and pressures" (p. 31). Various authors (Brewer & Cadman, 2000; Gard & Gyllensten, 2004; Rochester et al., 2005) have indicated that health professionals must understand their own and others' emotions so that they can use this knowledge to work with their colleagues, communicate effectively with their patients, deal with stress and uncertainty, and produce better treatment outcomes. Yet, research has not always demonstrated a positive change in the ESI of health science students over their programs. Lewis (2011) found no changes in the ESI of physical therapy students over a three-year program. Benson, Ploeg, and Brown (2010) showed that final-year nursing students had higher ESI than first-year students in a cross-sectional study. However, in a subsequent longitudinal study (Benson, Martin, Ploeg, & Wessel, 2012), nursing students had significant but small increases in only one subscale of ESI (adaptability). Larin et al. (2011) found no overall time effects when testing the ESI of nursing and physical therapy students at the beginning of their programs and after their first clinical placements.

'Caring' is an important concept in the health professions, (Romanello & Knight-Abowitz, 2000; Warelow & Edward, 2007) and one that has been linked to ESI (Akerjordet & Severinsson, 2008; Rego, Godinho, McQueen, & Cunha, 2010; Wessel et al., 2008). Definitions of caring vary, but include reference to both the physical actions and emotional concern of the 'carer' as he/she supports and responds to the needs of others (McQueen, 2004). Caring has also been described as a relationship that involves receptivity, engrossment and reciprocity of the one caring and the person being cared for (Romanello & Knight-Abowitz, 2000). Duffy (2005) pointed out that although 'caring' is integrated in nursing curricula, there is little information on the caring ability of nursing graduates. Significant increases in some aspects of caring have occurred in nursing students during and after their educational programs (Benson et al., 2012; Nelson, Howell, Larson, & Karpiuk, 2001; Simmons & Cavanaugh, 2000), but not in nursing and physical therapy students during the early parts of their programs (Larin et al., 2011).

Leadership ability is another attribute desired in health professionals (Borbasi & Jackson, 2005; Snow, 2001). Jones and Sackett (2009) emphasized the need for leadership skills, not only in management and leadership positions, but also in everyday nursing practice. They suggested that leadership competencies at entry level to practice should include effective communication with healthcare professionals, translation of evidence into practice, and knowledge and skills related to information technology. Some studies in physical therapy (Lopopolo, Schafer, & Nosse, 2004; Schafer, Lopopolo, & Luedtke-Hoffmann, 2007) also identified communication as an important entry-level leadership skill, along with professional involvement, delegation and supervision, and ethical practice. Although Nelson et al. (2001) showed an increase in a leadership measure in nursing students from pre-clinical to the end of their program, other investigators failed to show significant changes for nursing or physical therapy students during their entry-level education programs (Benson et al., 2012; Larin et al., 2011).

Much has been written on the ethical practice/moral reasoning in the health professions (Barnitt, 1993; Barnitt, 1998; Barnitt & Roberts, 2000; Sisola, 2000; Triezenberg, 1996; Triezenberg, 1997; Triezenberg & Davis, 2000). Triezenberg and Davis (2000) contend that educators must go beyond the professional code of ethics and help students apply ethical theory to clinical situations, debate bioethics issues, and develop moral sensitivity (awareness of their own and others' values and beliefs). Longitudinal studies of health science students have shown mixed results; some showed no change (Dieruf, 2004; Kim, Park, Son, & Han, 2004) while others showed improvements in moral judgment (Duckett et al., 1997; Geddes, Salvatori, & Eva, 2009).

In previous research, we studied these concepts in nursing, physical therapy and health science students at entry to their respective programs (Wessel et al., 2008). We found a relationship between ESI, caring and leadership, but not moral judgment. Students of different disciplines, levels of education (graduate or undergraduate) and instructional approach had similar scores on the measurement of these concepts. In order to determine the effect of professional curricula on these attributes, we decided to measure the changes that occurred in these students from entry to graduation. The three professional programs (1 nursing, 2 physical therapy) covered aspects of ESI, caring, leadership and moral judgment. The Bachelor of Health Science (BHSc) program did not specifically address any of them, other than ethics approval in research. The nursing curriculum was based on a 'caring' framework. One of the physical therapy programs followed a conventional educational method (lectures and laboratories) while the other three programs were problem-based (learning takes place in small tutorial groups and is based on case scenarios).

The purpose of this study was to determine if health professional students have an improvement in ESI, caring, leadership and moral judgment over the course of their programs. Based on the differences across programs, the following hypotheses were considered (also see Figure 1):

1. If the professional programs (academic and clinical) are the key to change, the nursing and physical therapy students will have greater changes in ESI, caring, leadership and moral judgment than the BHSc students in a non-professional program.
2. If disciplinary content makes a difference, the nursing students will have greater changes in caring than the other three groups.
3. If method of education is important, the students in the three problem-based programs will have greater changes in ESI, caring, leadership and moral judgment than the students in the conventional education program.

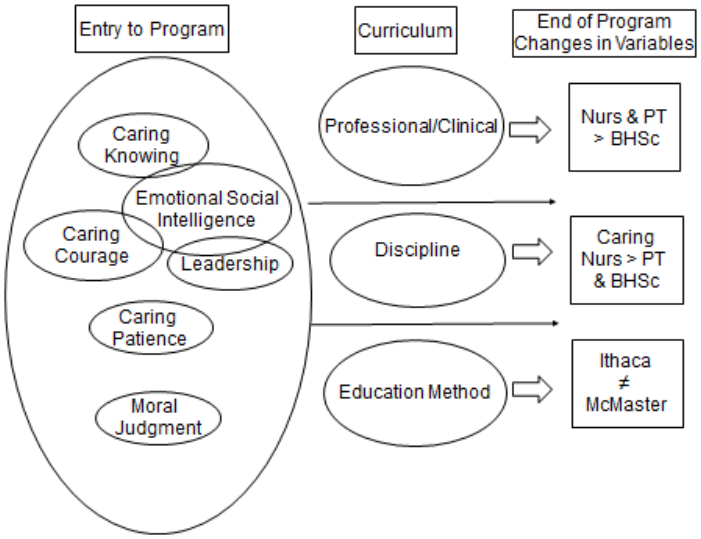

Figure 1. Conceptual framework demonstrating the relationship among ESI, caring, leadership and moral judgment at entry to program (left hand section) and the hypotheses for this study (remaining part of the figure). The hollow arrows represent specific hypotheses and the narrow arrows indicate expected changes due to curricula.

Methods

Study Design

This study followed a pre-post, group comparison design.

Participants and Settings

Students from four programs and two educational institutions [McMaster University Bachelor of Health Science (BHSc), Nursing and Physical Therapy programs, and Ithaca College Physical Therapy program] were invited to participate in the study. Students in the BHSc and Nursing programs were in their first undergraduate year of their four-year programs. McMaster physical therapy students had completed varied undergraduate degrees and were commencing a 2-year (24 months) master's entry-level program. Ithaca students had completed 2 years of pre-professional, undergraduate studies, and were commencing 3 years of study that would lead to a master's entry-level degree in physical therapy. The inclusion of these cohorts allowed for the comparison of (a) professional programs versus a non-professional health science program (BHSc), (b) two health professional disciplines (physical therapy and nursing), and (c) two educational methods (problem-based learning and conventional). Although the groups were at different levels of education (undergraduate or graduate), we did not consider these comparisons because our previous work showed no differences in the study concepts of the four groups at baseline (Wessel et al., 2008). Sample size calculations indicated that 25 students per group were required to detect a between-group difference of one standard deviation (SD) on the EQ-i:S, with alpha = 0.05, and power = 0.80.

There were no specific curricular interventions targeting the outcome measures of ESI, caring, leadership and moral judgment in the four programs. However, the three professional programs addressed personal growth and client-centered approach, concepts similar to the personal and interpersonal aspects of ESI. Moreover, the students' clinical experiences were expected to increase their understanding and caring of others. The nursing curriculum was based on the caring concept of Bevis and Watson (2000) recognizing the need for students to have an awareness of self in order to engage in a professional caring relationship with patients. Leadership models were addressed in both the nursing program and the Ithaca physical therapy program, and the two physical therapy programs included content on ethical decision making.

Three of the cohorts (BHSc, nursing and McMaster physical therapy) received problem-based education, where a health care problem/situation serves as the stimulus and guide to student learning in small group tutorials. As the students attempt to understand the problem, they identify their learning needs, research and apply information to the problem and work together as a group. These students were required to evaluate their own performance and that of others. Aspects of leadership, such as facilitating individuals, group process and task completion, were encouraged in the tutorial sessions. They learned their practical skills in laboratory sessions. Students in the Ithaca Physical Therapy program followed a conventional education method: content was provided in lectures, but small groups were utilized in the learning of practical skills.

Recruitment

At entry to their respective programs, students were informed of the study via e-mail, and were asked to contact the research team if they were interested. All students who participated were asked to provide an email address so that they could be contacted in the last semester of their programs. A pizza lunch or a small gift certificate was provided to the participants at the end of each data collection session.

Data Collection

The study received ethical approval from the ethics review boards of both institutions involved in the study, and all participants provided written informed consent. All students completed a short demographic questionnaire and three self-report questionnaires: the BarOn Emotional Quotient Inventory Short (EQ-i:S) (Bar-On, 2006), the Caring Ability Inventory (CAI) (Nkongho, 2003), and the Self-Assessment Leadership Instrument (SALI) (Smola, 1988), on entry to their programs (Time 1), and in the final months of their programs (Time 2). Students in the BHSc and the two physical therapy programs also completed the Defining Issues Test (DIT-2) (Rest, Edwards, & Thoma, 1997) at both time points. To decrease the burden of testing for the nursing students, they were not given the DIT-2 because they were completing another questionnaire as part of a larger study. The testing time was approximately 45-60 minutes. The lengths of time between the two data collection sessions were: 30, 42, 22, and 32 months for BHSc, Nursing, McMaster Physical Therapy and Ithaca Physical Therapy respectively.

Measurement Tools

The BarOn Emotional Quotient Inventory: Short (EQ-i:S) is a self-report measure of ESI behaviors (Bar-On, 2006). The EQ-i:S contains 51 statements which respondents rate on a scale ranging from 1 (very seldom or not true of me) to 5 (very often or true of me). A total score and five subscale scores (intrapersonal, interpersonal, stress management, adaptability and general mood) can be calculated. Raw scores are converted into standard scores based on age and gender. These normalized scores have a mean of 100 and SD of 15. A higher score indicates greater ESI, with Bar-On referring to standard scores of 85-115 as 'effective functioning', greater than 115 as 'enhanced skills', and less than 85 as 'area for enrichment'. Bar-On (2004) reported an internal consistency of 0.97, and test retest reliability coefficients of 0.72 for males and 0.80 for females.

The Caring Ability Inventory (CAI) is a self-report measure that examines a person's ability to care for others (Nkongho, 2003). It is based on Mayeroff's (1971) definition of caring: "helping another grow and actualize himself … a process, a way of relating to someone that involves development" (p. 1). The CAI consists of 37 items, each rated on a 7-point Likert scale ranging from 1 to 7, and distributed across three subscales that were determined by factor analysis: Knowing [CAI_K] (14 items) relates to understanding of self and others, Courage [CAI_C] (13 items) captures ability to cope with the unknown, and Patience [CAI_P] (10 items) refers to tolerance and persistence. After reverse scoring of some items, the subscale scores are calculated by summing the items in that subscale. Higher scores indicate a greater degree of caring. The CAI is viewed as a reliable measure of caring with internal consistency on the total CAI ranging from 0.79 to 0.84 and a test retest coefficient of 0.75 (Nkongho, 2003). It has

discriminated between nursing students and nurses, between nursing students and non-nursing students, and between females and males (Nkongho, 2003).

The Self-Assessment Leadership Inventory (SALI) is a measure of leadership characteristics, where leadership is defined as the process of influencing the behaviors of other persons in their efforts towards goal setting and achievement (Smola, 1988). This instrument was originally developed by Yura (1970) and incorporated various leadership theories. Respondents rate 40 behaviors as they relate to their leadership. A 5-point Likert scale is used indicating, "usually not behave in this manner" (0) to "almost always behave in this manner" (4). A higher total score indicates high self-assessment of leadership characteristics. Testing for internal consistency produced a Cohen's coefficient K of 0.54. The SALI was able to discriminate between groups expected to be different on leadership ability (Smola, 1988).

The Defining Issues Test (DIT-2) is derived from Kohlberg's theory of the development of moral judgment, a process by which people determine one course of action is morally right and another course is morally wrong (Rest, Edwards, & Thoma, 1997). The test consists of five ethical "dilemmas". For each dilemma, the respondents are asked to make a decision about the action to take and then rate 12 statements (on a 5-point scale) for their importance in making the decision. Finally they rank the 4 most important statements (Bebeau & Thoma, 2003). A number of scores can be computer-generated. The N2 score was used in this study. It is a combined measure of ability to recognize principled items (ranking of these as most important) and to discard the simplistic and biased solutions (rate these lower than principled items). The construct validity has been supported by correlations between the N2 score and moral comprehension, pro-social behavior and civil libertarian attitudes, by differences in age/educational groups, and by longitudinal and interventional changes (Rest, Thoma, Narvaez, & Bebeau, 1997). The BHSc and physical therapy students completed this questionnaire; the nursing students did not.

These tools are summarized in an appendix with definitions of the concepts and examples of items from each tool.

Data Analysis

The PASW statistical package, version 18 (SPSS Inc., 2009) was used for all analyses. The data were evaluated for fit with a normal distribution by means of the Kolmogorov-Smirnov statistic, with a Lilliefors significance level. As the p values for this test were >0.05 for all data, two-way analyses of variance (ANOVAs) with repeated measures were used to compare four groups on EQ-i:S, CAI and SALI scores, and three groups on the N2 score from the DIT-2 at Times 1 and 2. Effect sizes were estimated from the partial eta squared obtained from the ANOVA program. Significant program effects were further evaluated with a Tukey test. Alpha was set at $p<0.05$ for all tests.

Results

A baseline cohort of 157 students (BHSc 21, Nursing 76, McMaster Physical Therapy 21, Ithaca Physical Therapy 39) agreed to participate in the study. Of these, 132 students completed the questionnaires at Time 2. Dropouts were due to: withdrawing from program (Nursing 4, Ithaca Physical Therapy 3), delay in program (Nursing 6), and failure to respond to request to complete Time 2 questionnaires (BHSc 1, Nursing 11). The characteristics of the students completing the study are described in Table 1.

Table 1

Characteristics of Participants

Program	N at T2	Male/Female	Age mean (SD)	Educational Characteristics
BHSc	20	4/16	18 (0.5)	PBL, non-professional
	205	*84/121*	*18*	
Nursing	55	5/50	20 (4.0)	PBL, professional, caring
	385	*30/355*	*20*	
McMaster PT	21	1/20	24 (4.0)	PBL, professional
	59	*9/50*	*25*	
Ithaca PT	36	5/31	20 (2.1)	Conventional, professional
	67	*18/49*	*21*	
Total	132	15/117	20.6 (3.6)	

The numbers in *italics* are the values for the entire class from which the sample was drawn.
BHSc: Bachelor of Health Science; PT: Physical Therapy; PBL: Problem-Based Learning.

The results of the EQ-i:S are presented in Figure 2, and the results of the CAI, SALI and N2 score in Table 2. The changes from Time 1 to Time 2 were not large in any of the measures; effect sizes ranged from 0.006 for CAI_P to 0.128 for the N2 score. Significant time differences were found for EQ-i:S total score ($F=14.2$, df=1,128, $p<0.001$), CAI_K ($F=9.9$, df=1,126, $p=0.002$) and N2 score ($F=10.9$, df=1,74, $p=0.002$). The only significant group by time interaction was found for the Stress Management subscale of the EQ-i:S ($F=3.9$, df=3,128, $p=0.010$). The BHSc and McMaster physical therapy students had increases in their scores while nursing and Ithaca physical therapy students had minimal change. There were no significant group main effects for any of the measures.

Discussion

This is the first longitudinal study to measure the changes of ESI, caring, leadership and moral judgment concurrently in four cohorts representing different disciplines and educational approaches. The results showed small but significant improvements in measures of ESI, the knowing component of caring, and moral judgment. Except for a difference between the programs in the pattern of change in Stress Management (two groups had improved scores, two groups stayed the same), there were no differences between programs in any of the measures.

The results do not support any of the research hypotheses. The students in the professional programs did not have greater changes in ESI, caring, leadership and moral judgment than students in a non-professional program (BHSc). In spite of having a curriculum based on a caring framework, nursing students did not change more in this attribute than the physical therapy and BHSc students. In addition there were no differences in the changes occurring in students from the problem-based programs and the conventional education program.

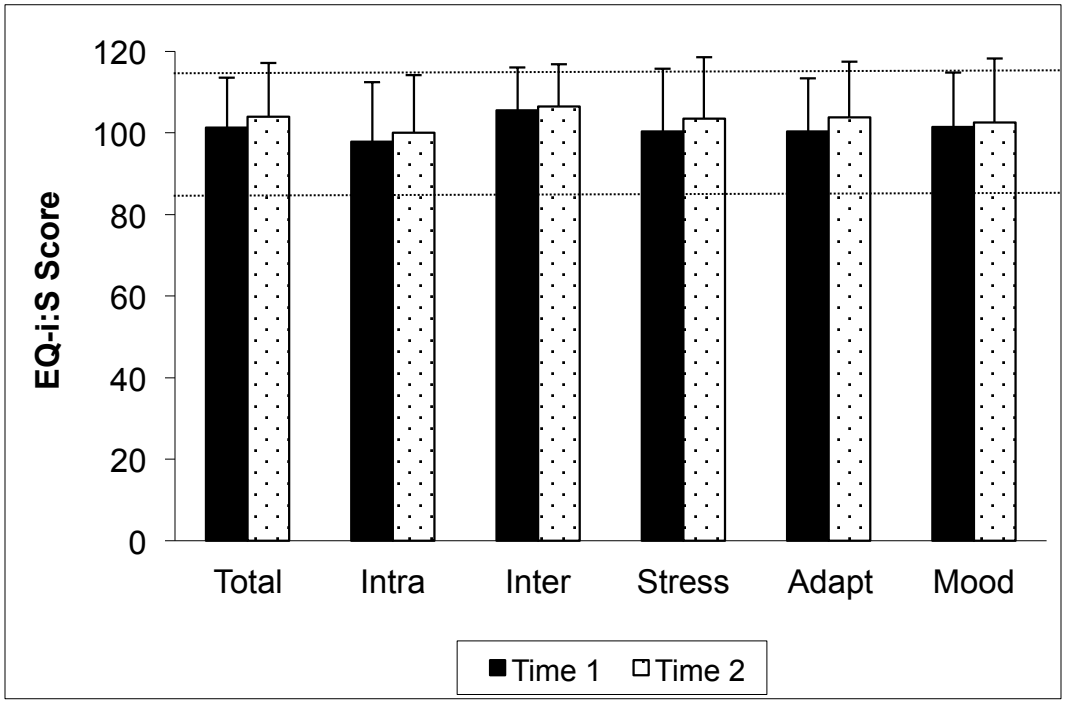

Figure 2. EQ-i:S standard scores (total and subscales) for all participants at beginning (Time 1) and end (Time 2) of their programs. The horizontal lines represent ±1 SD of the standard scores, and indicate 'effective functioning' of ESI. Subscales - Intra: Intrapersonal; Inter: Interpersonal; Stress: Stress Management; Adapt: Adaptability; Mood: General Mood.

Some results in this study are similar to previous work. Jaeger (2003) reported that graduate students in public administration programs had small but significant increases in total and subscale scores of the EQ-i:S following their participation in a general management course. Nelson et al. (2001) found an increase in SALI and CAI_K with little change in CAI_C for nursing students from preclinical to the end of their BScN program. However, they noted a decrease in CAI_P in their study while we found no change. The CAI_K includes awareness of self and others – two concepts that are noted in the Intrapersonal and Interpersonal subscales of EQ-i:S. An improvement in CAI_K may be due to the clinical and small group educational experiences of the students.

The mean values for the N2 score in the present study were above the means reported by Rest, Narvaez, Thoma, and Bebeau (1999) for college freshmen (30.6±14.4), and college seniors (40.4±13.6), but similar to scores they reported for students completing a professional degree (45.0±14.9) or doctorate level education (49.0±15.6). It is notable that there were no significant differences between the BHSc students and the students in the two physical therapy programs, because the BHSc students did not receive specific ethical training in their program. However, all programs required the students to evaluate information in making decisions.

Although the health care professional programs included many of the principles inherent in the concepts of ESI, caring, leadership and moral judgment, the participants did not show large changes in the measurement of these constructs. Perhaps very specific interventions are required to see major improvements. Graduate students receiving special ESI content in a general

management course in a public administration program had greater changes in EQ-i:S (mean changes ranged from 6.6 to 9.90) than students who did not receive this content (mean changes ranged from 0.07 to 2.12) (Jaeger, 2003).

Table 2

Time 1 and Time 2 scores for measures of Emotional-Social Intelligence, Caring, Leadership and Moral Judgment

Program	Time	EQ-i:S Total	CAI_K	CAI_C	CAI_P	SALI	N2 Score
BHSc	1	100.0	73.8	66.0	60.6	118.5	49.1
N=20		(12.6)	(8.9)	(6.7)	(4.8)	(16.1)	(9.0)
	2	106.0	79.5	66.8	60.7	120.5	52.1
		(10.2)	(8.3)	(7.7)	(4.3)	(17.1)	(9.9)
Nursing	1	100.5	76.5	63.9	59.7	113.6	
N=55		(13.5)	(9.2)	(9.5)	(5.6)	(19.0)	
	2	102.1	77.8	67.2	61.3	118.7	
		(14.5)	(9.1)	(8.7)	(4.2)	(16.9)	
McMaster	1	98.3	78.0	67.1	62.3	118.7	47.1
PT N=21		(11.5)	(5.7)	(8.9)	(5.6)	(13.8)	(11.0)
	2	103.5	80.8	66.9	62.2	123.8	51.8
		(15.2)	(6.8)	(10.4)	(3.6)	(15.1)	(10.3)
Ithaca	1	104.9	79.1	68.1	61.8	121.4	43.5
PT N=36		(9.7)	(5.4)	(8.4)	(4.2)	(17.6)	(13.9)
	2	105.9	79.5	69.7	62.0	122.2	49.6
		(11.0)	(5.3	(8.1)	(3.3)	(12.2)	(12.5)
Total	1	**101.3**	**77.1**	65.9	60.9	117.4	**46.0**
		(12.2)	**(7.9)**	(8.8)	(5.2)	(17.6)	**(12.1)**
	2	**103.9**	**79.0**	67.8	61.6	120.8	**50.8**
		(13.2)	**(7.8)**	(8.7)	(3.9)	(15.4)	**(11.3)**

EQ-i:S: BarOn Emotional Quotient Inventory Short; CAI_K, CAI_C, CAI_P: Caring Ability Inventory Subscales Knowing, Courage and Patience respectively; SALI: Self-Assessment Leadership Instrument; N2 Score: from Defining Issues Test; PT: Physical Therapy.
Results in bold – significant ($p<0.01$) time effect from 2-way ANOVA (program versus time).

Perhaps there were only small changes in ESI because of the relatively high baseline values of the students. The mean total EQ-i:S score of 101.3 was higher than that recorded by Dawda and Hart (2000) for university students (mean 93.5) and by Suliman (2010) for second year nursing students (mean 86). However, the EQ-i:S in the present study was similar to that found for physicians (100.3) (Wagner, Moseley, Grant, Gore, & Owens, 2002) and managers after a specific ESI intervention (100.8) (Slaski & Cartwright, 2003). The mean EQ-i:S scores at all of the time points were within the 'effective functioning' range of ESI as defined by Bar-On (2002) (see Figure 2). The health professions likely attract persons with effective ESI, that is, persons interested in the welfare of others. Moreover, individuals that successfully compete for admission may have higher ESI than those not accepted to health professional programs. The

BHSc students may also have had high ESI as the majority go on to apply to Medicine. In fact, higher scores in the total and three subscales of the EQ-i:S were correlated with higher cumulative grade point averages in first-year university students (Parker, Duffy, Wood, Bond, & Hogan, 2005).

If students are currently in an 'effective functioning' range, is there any advantage to increasing their EQ-i:S score to the enhanced functioning level? Bar-On (2002) has indicated that individuals with 'enhanced' ESI are exceptionally effective, both emotionally and socially, in all aspects of their lives, and are usually successful in achieving their goals. Although ESI of nurses and nursing students has been correlated with their clinical performance (Beauvais et al., 2011; Codier, Kooker, & Schoultz, 2008; Morrison, 2008), no studies have examined the added value of obtaining 'enhanced' ESI skills. It is possible that ESI will change more with work experience than with entry-level education. More research is required to identify what level of ESI is needed for effective practice, and whether specific educational experiences can enhance ESI.

There are limitations to our study related to the sample. Only 18.4% of the total cohort of students entered and completed the study, and all students were volunteers. The number of participants was slightly less than the sample size calculations required for the BHSc and McMaster physical therapy students. Thus the sample may not be representative of the majority of students in the programs. However, the inclusion of two higher education institutions, two health disciplines, and a non-professional program should increase the generalizability of our results. It is unlikely that a larger sample size would have provided more significant results because the effect sizes, as estimated by the partial eta squared from the ANOVA, were very small.

The measures used in this study will also affect the results. Three of the measures were self-report questionnaires, and thus only reflect the individuals' view of their own ESI, leadership and caring. The DIT-2, on the other hand, was a test that evaluates the students' ability in moral judgment and was not administered to nursing students. Results could be different if we used instruments that involved observation of behavior or opinions of others such as instructors, peers or clients. While the EQ-i:S tool is normalized for different age groups, the other measures are not. It is possible that age might make a difference to the scores for caring, leadership and moral judgment. On the other hand, there were no differences among groups at baseline, though the McMaster physical therapy students were older than the other cohorts.

This study was designed to examine the effects of different curricula on ESI, caring, leadership and moral judgment. Small changes occurred in three of these attributes, but we were unable to determine what curricular characteristics contributed to the changes because results were similar across the four student cohorts. Educators have a responsibility to prepare health care professional students for the emotional and social demands of their roles. Therefore, further research is needed to determine the optimal levels of ESI, caring, leadership and moral judgment required for effective health care practice. Then, educators need to examine specific educational strategies for their ability to help students develop their skills in these areas.

Conclusion

Health science students had small improvements in ESI, caring and moral judgment from the beginning to the end of their programs. The changes were similar in students from

professional and non-professional health science programs, in nursing and physical therapy disciplines, and in students from problem-based and conventional educational programs.

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Appendix

Appendix 1. Outline of tools to measure emotional-social intelligence, caring, leadership and moral judgment.

Concept	Measurement Tool	Definition	Sample Items from Measurement Tool
Emotional-Social Intelligence (ESI)	BarOn Emotional Quotient Inventory: Short (EQ-i:S)	"a multi-factorial array of emotional and social competencies that determine how effectively we relate with ourselves and other and cope with daily demands and pressures" (Bar-On, 2002)	*I believe in my ability to handle most upsetting problems.* *In handling situations that arise, I try to think of as many approaches as I can.*
Caring	Caring Ability Inventory (CAI)	Ability of a person to care for others (Nkongho, 2003)	
		Caring: Knowing (understanding of self and others)	*When I care for someone else, I do not have to hide my feelings.* *I accept people just the way they are.*
		Caring: Courage (ability to cope with the unknown)	*I feel uneasy knowing that another person depends on me.* *There is very little I can do for a person who is helpless*
		Caring: Patience (tolerance and persistence)	*I believe that learning takes time.* *I admire people who are clam, composed and patient.*
Leadership	Self-Assessment Leadership Inventory (SALI)	Process of influencing the behaviors of other persons in their efforts towards goal setting and achievement (Smola, 1988)	*Have group members share in the decision making.* *Alter your own behavior in order to meet a situation.*
Moral Judgment (MJ)	Defining Issues Test (DIT-2)	Process by which people determine one course of action is morally right and another course is morally wrong (Rest, Edwards, & Thoma, 1997)	Respondent rates the importance of statements related to decision making about social dilemmas described in scenarios.

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The impact of integrated student experiences on learning

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Abstract: In a cluster of courses called Food for Thought, seven faculty from different departments (including Biology, Economics, Sociology, Chemistry, Health and Wellness, and Foreign Language) teach students about food information, food consumerism, nutrition and health. The classes all have a shared learning outcome focused on developing the student as an informed consumer of food. Each semester, faculty teach a food-related course from their respective disciplinary perspective while also incorporating cross-course interactions that allow for both integration of disciplinary knowledge and student-to-student learning opportunities. Previous research demonstrated that this approach leads to student perceptions of learning gains (Wingert et al., 2011). Building on that work, this research directly assesses student learning in the Food for Thought cluster. The results demonstrate that exposure to multiple disciplines covering a shared topic enhances learning through greater student ability to integrate diverse forms of knowledge and to see an issue from multiple perspectives. These findings demonstrate the value of multidisciplinary learning opportunities for students.

Keywords: assessment of student learning, clusters, multidisciplinary learning, integrative learning, cross-course interactions, food

Integrative learning is a key element in liberal arts education and is often a university-wide student learning outcome at liberal arts universities. The American Association of Colleges and Universities' definition of integrative learning emphasizes both synthesis of knowledge and transference of learning to novel situations (Rhodes, 2010). Colleges and faculty have made a variety of attempts to provide contexts for encouraging integration during a student's education, including interdisciplinary colloquia, humanities and arts programs, interdisciplinary majors, and more recently, course clusters or learning communities. In this paper we assess a set of strategies for helping students integrate their learning in a liberal arts/general education context. In a cluster of courses called Food for Thought, we offer classes from disciplines in the natural sciences, health and wellness, the social sciences, and the humanities, that address disciplinary and cross disciplinary considerations of the biological, chemical, cultural, political, health and social impacts of food systems. Each semester, courses share cross-course projects and activities where students collaborate on joint endeavors and share common learning experiences. These projects provide a means to enhance knowledge of the subject matter and of learning skills. In

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this report, we extend our previous findings showing that students' *perceptions* of learning gains were improved using pre- and post-survey data to assess the *impact on integrative learning*. In this study, we tested whether the exposure to a focused, integrative learning environment (the Food for Thought cluster courses and activities), could result in superior achievement in comparison to a control group of students. We measure achievement by using rubric scores derived from written answers to prompts aimed to demonstrate the students' skills in critical thinking, in understanding food systems and their ability to integrate learning across disciplines and to make informed decisions about food choices.

Background

Previous research analyzing the effects of integrative learning often focuses on learning communities, or explicit attempts to use a cross-course structure to teach across disciplines. This research is useful in illuminating a number of the benefits of an interdisciplinary approach to teaching and learning. Studies using a variety of largely qualitative methods also report benefits of intentional integrative learning environments. Gray (2000) summarizes assessment results from a number of colleges and universities that document improvement in various indicators of success including retention, progress towards degree completion, measures of personal and intellectual satisfaction, and comparisons of student surveys with those from classes not part of a learning community. Tinto (2000) similarly reports increased retention among students in learning communities as well as an increased sense of responsibility on the part of the students for their learning as well as that of the other students. In a comparison of students enrolled and not enrolled in a learning community, students in a learning community reported an enhanced ability to transfer knowledge from one course to another (Inkelas, Vogt, Longerbeam, & Johnson, 2006). Stefanou & Salisbury-Glennon (2001) document improved motivation and cognitive development in learning communities and Avens & Zelley (1992) found improvement in an instrument called a "Measure of Intellectual Development." MacGregor, Tinto, and Lindblad (2000) reviewed seventy assessment studies of learning communities and determined that they facilitate interdisciplinary connections and more profound understandings of content. Stefanou & Salisbury-Glennon (2001) document improved motivation and cognitive development in learning communities.

In more recent reports survey data with Likert scores or student course evaluations have been used to measure the effects of intentional integrative learning strategies (Wingert et al., 2011, Cohen, 2010; Escribano, Agüera, and Tovar 2011; Mahoney & Schamber, 2011; and Melendez, Bowman, Erickson, and Swim, 2009). Although these studies present findings without a comparison control group, they describe a number of important innovations. For instance, Escribano et al. (2011) tasked physiology students with producing, as a group, a newsletter that compelled them to apply a number of new tools. The authors scored student work on a Likert scale and reported positive assessments, based on measures of writing, critical thinking, and oral skills. Mahoney & Schamber (2011) describe a pairing of a general education seminar course with a public speaking course to foster critical thinking and oral skills. They report finding an unusual level of sophistication in first year students and credit explicit connections between the two courses for this effect. Cohen (2010) joined students from two major divisions of the school (the design school and the liberal arts school) and engaged them in cross-divisional teaching in a new course that used student projects focused on urban food and agricultural systems. Mid- and end-semester survey data included mostly positive student comments with several complaints about group work. Melendez et al. (2009) reported combining

math, science, and engineering majors with humanities majors in a seminar. Students were tasked with designing mathematical models to describe biological, economic, and sociological phenomena and were supervised by faculty in these departments. The authors found more positive responses on end of course evaluations than were found the previous year before implementation of the multidisciplinary activities.

Using a number of qualitative methods, Mulligan, Taylor, Glen, Tomlin, and Gaul (2011) described a cross-disciplinary experience designed for chemistry and kinesiology majors. Exercise physiology and analytical chemistry students conducted electrolyte analysis of sweat from participants during exercise. Focus groups were used to gather data from the students. Transcripts from focus groups were coded based on topics that emerged as common themes among the focus groups. Students had positive comments about their interest and enthusiasm, the value of student interactions, the influence of this exercise on the course content, and applicability of this exercise to the real world. Students had negative feedback about the extra work required.

In previous work from this team of authors, using a 61-item entrance and exit survey for each class experience (n =106) in the Food for Thought cluster, strong student perceptions of learning gains were demonstrated. The learning outcomes questions were organized into seven categories: academic attitudes, civic engagement, informed consumer, food literacy, research literacy, information and communication skills, and understanding food systems. As a whole, the Food for Thought cluster had a statistically significant positive impact on student's perception of their learning with the strongest impacts on food literacy, understanding food systems and interest in civic engagement related to food systems. Questions related to food literacy (disciplinary and interdisciplinary skills), informed consumption and understanding food systems are all related to integrated learning. (Wingert et al., 2011)

The Intentional Integrative Learning Experiences

At UNC Asheville students take their general education distribution in natural science, social science, and humanities or arts in topical clusters centered on a common theme such as poverty and human capability, Black creative experiences, or globalization. Students participate in one of 15 clusters by completing three courses from three different disciplines, of which there is at least one natural science and at least one social science. Students must declare and complete one cluster in order to graduate but students can enroll in individual cluster courses without declaring the cluster and many of the courses in clusters may also fulfill general education or major requirements. This paper focuses on one of those clusters, Food for Thought: Engaging the Citizen in the Science and Politics of Food Information, Food Consumerism, Nutrition and Health (Food for Thought). Table 1 describes the 9 courses in this cluster in Academic Year 2011-2012.

Initiated in 2007, the Food for Thought cluster focuses on developing the student as an informed consumer of food by providing a platform for discussion of what we eat, why we eat, where our food comes from and its journey from production to consumption, and how food affects our bodies and health. As human beings, our bodies and our societies are interlinked by numerous processes, many of which can be understood by investigating the dynamics of food in chemical, biological, cultural and social systems. Our primary goal for students is an enhanced, interdisciplinary understanding of the interplay of these systems and a more attuned sense of how food is a civic issue.

Table 1

Food for Thought Cluster Courses

Discipline Course Title (and Number)	**Prerequisites**	**Number of students enrolled (semester)**
Plants and Humans (110)	none	18 (Spring 2012)
Biology of the Seed Plants (335)	8 hours of Chemistry; Intro. Botany; Intro. Ecology	12 (Spring 2012)
The Food of Chemistry (109)	none	16 (Fall 2011)
Economics of Food (245)	Intro. Macro or Micro Economics	21 (Spring 2012)
Nutrition and Lifestyle (225)	Intro. Wellness	38 (Fall 2011)
Pathophysiology of Chronic Conditions and Illnesses (455)	Anatomy and Physiology	40 (Fall 2011)
Food Politics and Nutrition Policy (333)	Intro. Wellness	26 (Fall 2011)
Sociology of Gender (280)	none	27 (Fall 2011)
Elementary Spanish II (120)	Elementary Spanish I	32 (Fall 2011)

Together, the seven faculty teaching in the Food for Thought cluster developed a set of shared learning outcomes that inform not only individual courses in the cluster, but shared learning opportunities among the courses. These outcomes included academic attitudes, civic engagement, informed consumerism, interdisciplinary and disciplinary skills (food and research literacy), information and communication skills, food systems and their interrelatedness with social processes, environmental systems, and individual health. Each semester faculty teaching in the Food for Thought cluster in any term during the year convene regularly to plan and implement an appropriate set of cluster activities for the courses that are being offered that term. Students engage with the cluster themes by participating in course-specific projects and activities, such as measuring the content of calcium and iron in foods and supplements (chemistry) or studying local food distribution systems (economics, health and wellness); *cross-course cluster projects* that engage students across cluster courses (such as creating and evaluating an urban community garden or critiquing media messages around weight management and food products) and *cross-course cluster activities* that are available to one or more courses in a given semester (such as farm tours and seminar series). This paper focuses on the novel dimensions of our cluster of courses in a general education program – those that involve engagement outside of traditional classroom configurations.

Cross-Course Cluster Projects are integrated, multidisciplinary projects that engage students from multiple Food for Thought cluster courses simultaneously. Many involve experiential learning, some engage students in service learning opportunities. See Table 2 for the cross course projects in 2011-12. The students must learn how the knowledge from one discipline relates to others in order to successfully complete the project. Through this process, students in a variety of disciplines in the natural sciences, social sciences and humanities interact with one another and benefit from a range of perspectives for addressing a single issue.

Cross-Course Cluster Activities vary by semester depending on the courses offered and resources available and include attending talks by guest speakers and lunch and learn seminar series, participation in food education activities such as Food Day--a nationwide celebration and a movement for healthy, affordable, and sustainable food events (www.foodday.org), organic farming conferences, touring farms, and working in a campus garden maintained by students or community gardens. For a more in depth explanation of the university context, cluster learning outcomes or cross-course cluster projects see Wingert et al., 2011.

Table 2

Food for Thought Cluster Projects and Activities AY 2011-2012

Term	Cross-Course Cluster Projects	Classes Involved
Fall 2011	Nutrient Sources: Truth in Labeling Project	Food of Chemistry Nutrition
	Latino Contributions to the Food System Project	Food Politics Elementary Spanish II
	Gendered Health: Sugars and Artificial Sweeteners	Sociology of Gender Pathophysiology
Spring 2012	Understanding the Economic, Botanic and Environmental Costs and Benefits of Urban Gardening	Plants and Humans Economics of Food

Study Purpose

Previous research demonstrated that the multidisciplinary cluster approach using cross-course interactions leads to student perceptions of learning gains (Wingert et al., 2011). While this is an important finding, in this paper we move beyond perceptions to assess directly how student learning about food is affected by experiences designed to integrate student learning across disciplines. We hypothesized that the various interactions of the students in the cluster have a positive impact on integrative student learning in the areas of food and research literacy, critical thinking about and understanding of food systems, and becoming an informed consumer of food. The purpose of this paper is to report on our process for and findings on whether participation in the Food for Thought cluster enhances integrative student learning. To do this we asked students to demonstrate their achievement in integrative learning by writing statements based on prompts about a *New York Times* article that explained the costs and benefits of the

popularity of quinoa (*Chenopodium quinoa*), a nutritious alternative to cereal grains (pseudocereal), which, although endemic to the Andes, has recently become popular in the U.S. due to its nutritional profile, forcing change onto the culture and economy of Bolivia. We tested whether the exposure to a focused, integrative learning environment could result in superior achievement in comparison to a control group of students based on rubric scores derived from written answers to prompts aimed to demonstrate the students' skills in critical thinking and integrative learning.

Methods

To test if integrative experiences impact student learning, an instrument and corresponding evaluation rubric was developed to assess student learning in the areas of food and research literacy, critical thinking about and understanding of food systems, and becoming an informed consumer of food. The instrument and rubric were loosely based on the Critical Thinking Value Rubric created by the Association of American Colleges and Universities (Rhodes, 2010) and on studies in which critical thinking is assessed by asking students to respond to a specific article or reading. Two studies that informed our protocol prompted students to read a designated article or reading and then to evaluate an issue in written form based upon the article or reading; these responses were then evaluated using a rubric designed to assess critical thinking skills (Miller 2004; Connors 2008). The research team vetted a number of news articles related to current food issues and identified an article, "Quinoa's Global Success Creates Quandary at Home" by S. Romero and S. Shahriari (2011) for the study. The article explores the relationship between the rising popularity of the high-protein grain quinoa in the American diet and the problems and opportunities this creates for the production, market economy, and culture of Bolivian growers of quinoa. After reading the article, students were prompted with the following questions:

> From your perspective, discuss the issue addressed in the article by answering the following questions.
> 1). In one sentence, state the main issue addressed in the article.
> 2). List two sources utilized in the article and evaluate the usefulness of each source to the reader for understanding the issue.
> 3). In one paragraph, discuss the interconnectedness of the issue identified in (1) with three of the following fields:
>
> - culture
> - health
> - environment
> - chemistry and/or biology
> - agriculture, food and/or nutrition policy
> - gender/social inequality
> - marketing/economics
>
> 4). How are your choices as a consumer influenced by this issue? Using material from the article and learned in your courses, explain the tradeoffs (pros and cons) that you face in making the decision. Limit your response to one paragraph.

The instrument and rubric were designed to be applied to any article, essay or paper describing a complex food system and requiring the reader to critically evaluate the information to make a decision as an informed consumer. The article on quinoa was specifically selected for this study because it is complex and interdisciplinary in focus, but the topic was not discussed in any of the Food for Thought cluster courses. Furthermore, the article was written for a general audience, and less than three pages in length, allowing the assignment to be completed within a single class period.

The assessment instrument was given to 161 students in 9 Food for Thought Cluster classes (listed in Table 1) and 177 students in 9 control classes [Health Promotion and Wellness (HWP 153, 2 sections), Women's Health (HWP 154, 2 sections), Quantitative Chemistry Laboratory (CHEM 145), Health and Sexuality (HWP 253), Principles of Macroeconomics (ECON 101), and Principles of Microeconomics (ECON 102, 2 sections)]. Control courses were selected because they enroll students from a variety of different disciplinary majors and year in college. The students were all asked to participate in an assessment project that may or may not have relevance to the course content. All course instructors implemented the assessment exercise with the following guidelines:

- Students had the opportunity to read the article "Quinoa's Global Success Creates Quandary at Home" by S. Romero and S. Shahriari (2011) before class and again during class before answering the exercise questions.
- The questions were given out and the assessment exercise was completed during class. Students had access to the article during the exercise and were given 45 minutes to answer the questions.
- So that students took the assessment exercise seriously, questions counted as some part of the course grade, although to what extent was up to the discretion of the course instructor.

The assignments were scored after the completion of the term using the rubric included in Appendix A. A score was assigned to responses for each question on a scale of 1 to 4 where 1 is the benchmark response, 2 and 3 are different degrees of milestone responses and a score of 4 was for a capstone response. The scores were compared based on individual questions and on a composite score, which is defined as the sum of the score of Questions 1 to 4. To preserve student anonymity during scoring, all exercises were given a numerical code and photocopied with the student name and class information blackened out. UNC Asheville Institutional Research compiled student information (year in school, declared cluster, cluster courses completed); this information was associated to each code after all responses were scored.

Student responses were scored by four cluster faculty and results were tabulated by numerical code. Two faculty reviewers (LM and DC) scored the answers to Questions 1 and 4, and two faculty reviewers (AL and KP) scored the answers to Questions 2 and 3. Prior to scoring all student responses, inter-rater reliability amongst the four faculty reviewers was determined on six randomly selected student responses. The Kappa level for the four faculty reviewers was 0.79, which is considered to represent substantial agreement.

Statistical Analysis

Only data from students who responded to all four questions were analyzed (n=338). Student responses were analyzed both as composite scores (the sum of the four questions) and individually for Questions 3 and 4. Questions 3 and 4 specifically questioned student learning in

food literacy, understanding food systems and interest in civic engagement related to food systems, which are the cluster learning goals with the strongest impact based on this team's previous perception study (Wingert et al., 2011). Questions 1 and 2 were not individually evaluated because they are focused on evaluating information rather than the learning goals of the cluster. One-tailed Mann-Whitney tests examined differences between groups of students who had 1) taken versus not taken Food for Thought cluster courses and 2) intentionally declared Food for Thought cluster courses versus those who had not. Spearman's correlation evaluated the relationship between composite response scores and the number of Food for Thought cluster courses taken. The Kruskal-Wallis test evaluated the relationship between composite response scores and students' year in school. The significance level was $p < 0.05$ and all analyses were conducted using GraphPad Prism 6.0 software (GraphPad Software, Inc.; La Jolla, CA).

Results

Demographic information on the set of student responders (as both number of responses, *n*, and percent of survey response) is listed in Table 3 and includes the level of college, the distribution of students in control and cluster classes, the number of cluster courses each student had completed or were currently enrolled at the time of conducting the assessment, and the declaration status of each student. The distribution of responses is relatively even across college level (18.9% freshman, 26.9% sophomore, 22.8% junior, 28.4% senior and 3.0% other, which includes non-degree seeking students) and was relatively even between the number of responses from cluster and control (i.e., non-cluster) students (47.6% and 52.4%, respectively) (Table 3).

Comparing students in cluster classes vs. control classes

Response scores were evaluated in several ways. The composite score is the sum of the scores for Questions 1, 2, 3 and 4 for each student and reflects the total performance of the exercise. In addition, individual responses specifically on Questions 3 and 4 were evaluated because these questions specifically targeted the following cluster learning outcomes: food literacy and understanding food systems (Question 3) and civic engagement and informed consumer (Question 4), which all involve integrated learning. Figure 1 displays the difference in (A) composite score and (B) scores for Question 3 and Question 4 between students enrolled in a cluster course (filled bars) vs. enrolled in a control course (open bars). The mean scores, standard deviations (SD) and mean differences are also listed in Table 4: composite score mean difference = 1.02, $p < 0.0001$; Question 3 mean difference = 0.25, $p = 0.002$; and Question 4 mean difference = 0.30, $p < 0.0001$. The mean differences are all statistically significant ($p < 0.05$).

The composite score is significantly correlated with the number of cluster courses taken, for the full student population assessed and with the control group taking 0 courses (Figure 2A, Table 6; Spearman $r = 0.23$, $p < 0.0001$). Therefore, students who take more cluster courses have higher response scores.

Table 3

Demographic information about students responding to the questionnaire

	n	% of survey responses
College Level		
Freshman	64	18.9
Sophomore	91	26.9
Junior	77	22.8
Senior	96	28.4
Other	10	3.0
Cluster Course vs. Control		
Cluster course	161	47.6
Control course	177	52.4
Number of Cluster courses		
None	177	52.3
One	98	29.0
Two	31	9.2
Three or more	32	9.5
Intentional Cluster Declaration		
Food for Thought Cluster	33	9.8
Other Cluster	137	40.5
No Cluster Declared	168	49.7
Total	**338**	**100**

Table 4

Score differences between groups, all students

	≥1 cluster course (n = 161) mean (SD)	**Control (n=177) mean (SD)**	**mean difference**	***P***
Question 3 score	2.61 (0.74)	2.36 (0.73)	0.25	0.002
Question 4 score	2.68 (0.70)	2.38 (0.74)	0.30	< 0.0001
Composite score	10.40 (2.05)	9.38 (2.01)	1.02	< 0.0001

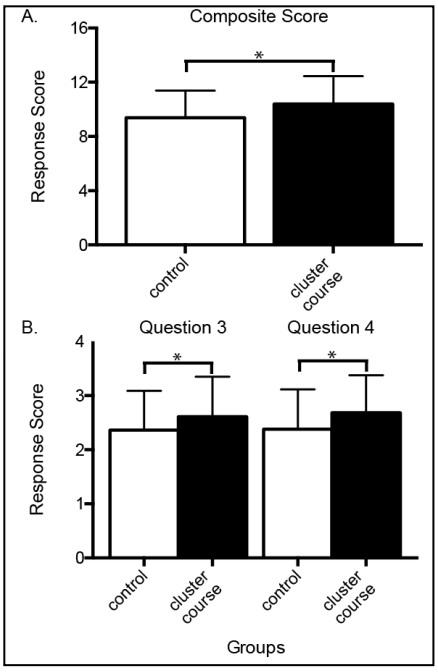

Figure 1. Differences in (A) composite score responses and (B) Question 3 and Question 4 score responses between students who have not taken a Food for Thought Cluster course (control, open bars, n = 170) and students who have completed at least one course in the cluster (cluster course, filled bars, n = 168). Mean score and standard deviation are shown. *P < 0.05.

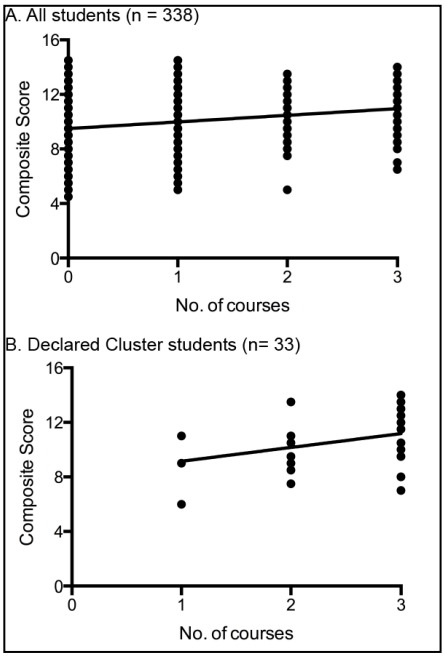

Figure 2. Spearman correlation between composite response score and the number of Food for Thought Cluster courses for (A) all study participants, and (B) only students who had intentionally declared the Food for Thought cluster.

Comparing students who have declared Food for Thought cluster vs. control classes

Responses were evaluated separately for students with intentional interest in the Food for Thought cluster by comparing the n=33 students who had declared the Food for Thought cluster with the control group. Statistically significant differences were measured. Figure 3 displays the difference in composite score (A) and scores for Question 3 and Question 4 (B) between Food for Thought declared students (filled bars) vs. enrolled in a control course (open bars); the mean scores, standard deviations (SD) and mean differences are listed in Table 5. The composite score difference for Food for Thought declared students vs. controls (mean difference = 1.32, p = 0.0008) is greater than the comparison of students enrolled in Food for Thought classes but not declared vs. controls (Figure 1, Table 4). But, similar differences were measured for Question 3 (mean difference = 0.26, p = 0.04) and Question 4 (mean difference = 0.30, p = 0.02).

The composite score was significantly correlated with the number of cluster courses taken by students who had intentionally declared the Food for Thought cluster (Figure 2B, Table 6; Spearman r = 0.32, p = 0.04). The correlation for cluster students is greater than for the group of all students (Figure 2A). There was also a significant positive correlation between response score and number of cluster courses for Question 3 (r = 0.42, p = 0.009) for declared cluster students. However, there was no such significant correlation for Question 4 (Table 6).

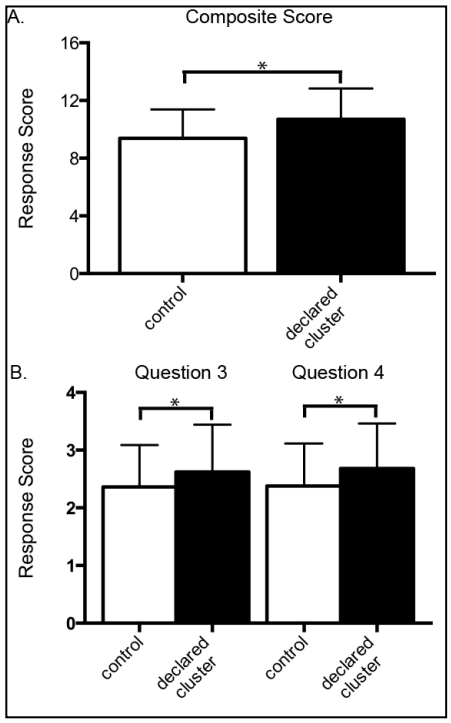

Figure 3. Differences in (A) composite score responses and (B) Question 3 and Question 4 score responses between students who have not taken a Food for Thought course (control, open bars, n = 170) and students who had intentionally declared the Food for Thought Cluster and completed at least one course in the cluster (cluster 9, filled bars, n = 33). Mean score and SD are shown. *P < 0.05.

Table 5

Response score differences between groups, declared cluster students vs. control

	Declared cluster (n = 33) mean (SD)	**Control (n=177) mean (SD)**	**mean difference**	***P***
Question 3 score	2.62 (0.82)	2.36 (0.73)	0.26	0.04
Question 4 score	2.68 (0.78)	2.38 (0.74)	0.30	0.02
Composite score	10.70 (2.14)	9.38 (2.01)	1.32	0.0008

Table 6

Correlation between response score and number of cluster courses taken

	All students (n = 338)		**Declared cluster students (n = 33)**	
	Spearman *r*	***P***	**Spearman *r***	***P***
Question 3 score	0.16	0.002	0.42	0.01
Question 4 score	0.19	0.0003	0.002	NS
Composite score	0.23	< 0.0001	0.32	0.04

NOTE: NS: not statistically significant.

Comparing students based on academic maturity

An alternative hypothesis was tested to determine if the positive Spearman correlation for student score vs. number of cluster courses could instead be due to academic maturity. Plotted in Figure 4 is the composite response score vs. year in school for students who have declared the Food for Thought cluster. A Kruskal-Wallis test assessing composite response score differences by year in school found that year in school was not a significant factor. However, year in school was a significant factor ($p = 0.012$) for the full population of students responding to the questionnaire (not shown here). For the larger sample, score response increased with advancing academic rank.

Discussion

These results demonstrate that the various interactions of the declared cluster students have a statistically significant positive impact on integrative student learning in the areas of food and research literacy, critical thinking about and understanding of food systems, and becoming an informed consumer of food. Students exposed to the Food for Thought cluster, even if only in a single course, performed better on our measures, and their performance increased with increasing exposure via additional courses. Students who declared the food cluster as part of their general education requirement also performed better, suggesting an important role in motivation for performance. Finally, the experience of the Food for Thought cluster enhances learning independently of student maturity. Previous studies reported similar benefits of integrative pedagogies, including the ability to transfer knowledge from one course to another,

increased motivation and cognitive ability, and increased responsibility of students towards their learning (Gray, 2000; Tinto, 2000; Inkelas et al., 2006; Stefanou & Salisbury-Glennon, 2001; Avens and Zelley, 1992; MacGregor et al., 2000). Our study contributes to this body of research by examining students' ability to apply knowledge and skills to new material and to do so in an integrative way. Substantive, discipline-based knowledge is mobilized by students to critically evaluate and creatively consider new problems brought to their attention. Our study shows this with regard to measures of exposure, student commitment, and student maturity. Our findings also suggest important strategies for successful integrative curricula.

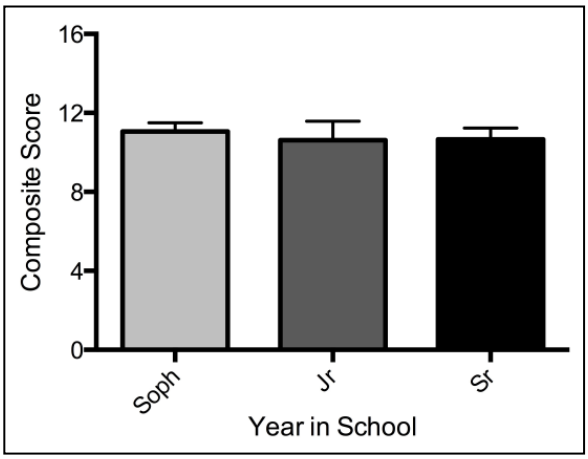

Figure 4. Response score differences across year in school for students who had intentionally declared the Food for Thought cluster.

Impact of exposure to the Food for Thought cluster

Students in the experimental group had statistically significantly higher composite scores on our assessment instrument than did students in the control group; this finding holds true when the scores of the two groups are compared only on assessment Questions 3 and 4, the essay portion of the assessment instrument (Figure 1). Taking a course in the Food for Thought cluster means that students were better able to critically evaluate a news article on a global food related issue than those who had not had a course in the cluster. It also means that the enrolled students were better able to identify interdisciplinary connections regarding a food issue and to better articulate a reasoned approach to how they consume food.

Moreover, the scores on our composite measure increase with increased exposure to the Food for Thought Cluster curriculum, as measured by number of courses taken (Figure 2A). This means that taking more cluster courses increases students' ability to identify interdisciplinary connections regarding a food issue and to better articulate a reasoned approach to how they consume food.

Impact of intentional selection of the Food for Thought cluster

Because some students are enrolled in Food for Thought courses without necessarily having the intent of completing the cluster of three courses, we also compared the scores of those who had declared the cluster and completed at least one course with those who had not declared

or enrolled in a Food for Thought course. The same trend holds here. It appears that students' commitment to the cluster as a part of their undergraduate education enhances their learning attainment in the cluster (Figure 2B); and the more courses that declared students take, the higher their composite scores and the higher their scores for assessment Question 3. A similar correlation was not found for Question 4, perhaps because the question is about consumer choices and students committed to the cluster may develop this sensitivity early on in the cluster or have some predisposition to consumer consciousness prior to enrollment in the cluster (Table 6). Our interpretation is that identifying the interconnectedness of disciplines is a skill that students develop over time as their exposure to multiple disciplines within the cluster grows.

Impact of student maturity

In the full sample of participants in our study, students with higher academic rank scored higher on the composite score than students with lower ranks. Among the sample of students who had declared the cluster, however, year in school did not have a significant effect on scores (Figure 4). We conclude that engagement in the cluster curriculum enhances student learning independently of student maturity.

Implications for curriculum planning

Our data support the notion that integrative learning strategies across courses yield positive learning gains. During the course of our first study and this second study, the specific cross-course projects changed—but positive results were found in both instances. The second set of course projects were adjusted to simplify the structure and coordination of tasks necessary to faculty, reducing the amount of faculty coordination time necessary. The lesson we take from this is that even relatively simple efforts at having students connect across courses are worthwhile for student learning. The recognition that even simplified and focused projects can create meaningful learning is especially important now, when budgets are tight. It is indeed possible to realize significant gains in student learning from less time-and money- intensive (but no less intentional) collaborations across classes. This is good for students (less time commitment for them, potentially fewer complaints about group projects), faculty (less time to coordinate), and administrators (smaller budget is needed to achieve similar learning gains) alike.

Conclusion

Our previous study measured students' perception of their learning gains; the study reported here confirms students' perceptions by measuring actual learning gains. Exposure to multiple disciplines covering a shared topic enhances students' ability to integrate diverse forms of knowledge and to see an issue from multiple perspectives—an essential goal of liberal arts education and interdisciplinary learning. Undergraduate curricula that allow for this kind of cross-fertilization provide for more holistic ways of identifying problems and strategizing solutions. They create more flexible thinkers in our students. At a time when the liberal arts is under attack for not being practical or leading to immediate job readiness, our findings suggest that the kind of employees sought by many business leaders (employees who can see things from multiple perspectives and who are problem solvers with multiple tool kits), our data is especially significant. The findings also support the notion that integrated learning requires some time in

the life of a student, and multiple exposures to practice approaching problems with multi-faceted strategies. In a world where multiple knowledge-bases need to be brought to bear on complex problems, such as those created by global food systems, integrated learning has an important role to play in the education of college students.

Acknowledgements

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Appendix

Appendix A. Rubric for Assessment Exercise Evaluation

	Capstone	Milestones		Benchmark
	4	3	2	1
Explanation of issues Question 1	Issue is stated clearly, fully and accurately.	Issue is stated clearly but with some detail missing.	Issue is stated, but partially misidentified or incomplete.	Issue is misidentified.
Evidence Question 2	Two sources are clearly identified. Usefulness of source is convincingly evaluated.	Two sources clearly identified. Usefulness of source is credibly evaluated.	Two sources identified but usefulness of source is only partially evaluated.	Less than two sources are identified. Usefulness of source is not successfully evaluated.
Understanding of Food and Food Systems Question 3	The writer displays a mastery of pertinent concepts and details related to food and food systems, synthesizes ideas from three fields, and organizes these ideas into a convincing argument.	The writer displays proficiency with concepts and details related to food and food systems, is able to relate ideas from three fields, and lays out a credible argument.	The writer displays partial knowledge of concepts and details related to food and food systems, attempts to relate ideas from two or more fields, and presents a partially successful argument.	The writer displays a weak understanding of concepts and details related to food and food systems, shows a very limited ability to relate ideas from two or more fields, and does not present a successful argument.
Informed Consumer	Tradeoffs for consumers are clearly and	Tradeoffs for consumers are described and	Tradeoffs for consumers are stated and	Tradeoffs for consumers are simplistically or

Question 4	comprehensively described, and convincingly reconciled. Student's choice is convincingly justified.	clarified so that understanding is not seriously impeded by omissions, and credibly reconciled. Student's choice is credibly justified.	partially described, and partially successfully reconciled. Student's choice is partially successfully justified.	obviously described, and not successfully reconciled. Student's choice is not successfully justified.

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US elementary preservice teachers' experiences while teaching students in Taiwan

Hsiu-Lien Lu and Lina Soares

Abstract: The idea to prepare prospective teachers to teach in increasingly diverse US schools still raises a number of questions about how an international student teaching experience can be important and beneficial to student learning. What do preservice teachers perceive to be the benefits from an international student teaching experience? What do preservice teachers perceive as challenges during an international student teaching experience? This paper shares findings from a phenomenological study of four U.S. elementary preservice teachers' experiences during a five-week international student teaching opportunity in Taiwan. The findings of this study support the scholarship of teaching and learning that is grounded in the quest to understand the connection between students' experiences and learning (Hutchings, 1999). The findings could further provide insights into the implementation process and the support that student teachers need in order to gain a successful experience from an international student teaching opportunity provided by the teacher education program.

Keywords: student teaching, international, preservice teachers, study abroad

It is not by accident that teacher education programs realize the critical need to prepare developing teachers to be more pluralistic in their thought, behavior, and affect. Due to global migration, international trade, and technological advances (Armstrong, 2008; Cushner, 2007), the world has become more interconnected and the need to train developing teachers who will understand and promote global perspectives is necessary for today's diverse classrooms. As a result, short-term international student-teaching programs have increasingly grown in teacher education programs in many universities and colleges around the globe. Some of the goals are to provide preservice teachers the opportunity to improve their pedagogical knowledge and to develop global perspectives and language proficiency by engaging in diverse settings (Bodycott & Crew, 2000; Olmedo & Harbon, 2010).

Kissock and Richardson (2010) state that "educators must move beyond their comfort zone to see their world from a different perspective, discover alternative solutions to problems they face and create new approaches or integrate appropriate ideas into their setting" (p. 92). With this thought in mind, the internationalization of student teaching programs can embrace a larger goal. International educational opportunities can be a journey to transformative learning; learning that permits a world view to emerge in a context that causes one to scrutinize their values and beliefs through continual reflection (Intolubbe-Chmil, Spreen, & Swap, 2012). It is the type of learning that requires students to step out of the normal or traditional mode of classroom learning (Stanton, 2008), and from this perspective, the internationalization of student teaching is experiential-driven (Robertson & Bond, 2005) and is best achieved when students move beyond the confines of classroom walls.

It is our position that an international student teaching program legitimates investigative questions and the subsequent findings can inform practice to improve student learning (Kreber & Cranton, 2000). We subscribe to a model of the scholarship of teaching and learning that

endorses inquiry and investigations for the purpose of understanding the connection between students' experiences and learning (Hutchings, 1999). From this perspective, this research was guided by the following inquiry questions: (1) What do preservice teachers perceive to be the benefits from an international student teaching experience? (2) What do preservice teachers perceive as challenges during an international student teaching experience?

To address these questions, we, the authors of this paper, planned and piloted a five week international student teaching program to promote an intercultural learning experience for four elementary and one middle grade preservice teachers Our intention in doing so was to offer our preservice teachers the opportunity to develop an appreciation for diversity, develop international perspectives, and to acquire the knowledge, skills, and attitudes necessary to work effectively with children and their families from diverse backgrounds in US schools.

In fall 2011, the Taiwan Student Teaching Opportunity (TSTO) was piloted with four of the original five preservice teachers aboard for a five-week practicum. The fifth participant (a middle/secondary candidate) dropped out due to personal reasons. Through conventional methods of qualitative data collection and analysis, our four preservice teachers discovered the benefits of an international student teaching experience, as well as the challenges of such an undertaking. Moreover, we learned that international student teaching extends the foundation for learning. From this perspective, we offer our findings for consideration by other programs who are involved in the planning of international field experiences while recognizing the findings of the TSTO pilot program may be professionally limited to our own teacher education program.

Literature Review

Due to a proliferation of immigration, global trade, and communication and technological advancements (Armstrong, 2008; Cushner, 2007), US schools have become increasingly more diverse. As a result, international student teaching programs have increasingly risen in an effort to prepare prospective teachers to create culturally sensitive classrooms (Mahon, 2006) as evidenced by the plethora of literature. Accordingly, the literature review examines the benefits and the challenges of a short term international student teaching program as a foundation for our inquiry.

Benefits

According to Heyl and McCarthy (2003), students who study abroad bring a higher level of discussion to the classroom that is framed by international knowledge and pedagogy. Research has further shown that student teaching abroad provides a first-hand view of the world at-large and the opportunity to build multiple points-of-view (Younes & Asay, 2003). Additionally, findings suggest that preservice teachers who participate in short term overseas teaching develop greater appreciations for cultural diversity (Pence & Macgillivray, 2008). Toncar and Cudmore (2000) posit that students who live and teach in another country return to their home country with "a wealth of knowledge and experiences that causes them to see their world differently" (p. 59).

Studies have shown that opportunities to student teach in international settings have the potential to enrich and expand both professional and personal development (Alfaro & Quezada, 2010; Heyl & McCarthy, 2003; Pence & Macgillivray, 2008; 2001; Younes & Asay, 2003). Roose (2001) posits that international student teaching allows US PTs to increase the necessary

skills and abilities to teach non-English speaking students in schools. Further findings have shown that international student teaching experiences can promote cross-cultural sensitivity (Quezada, 2004). Quezado expounds on this finding by offering that preservice teachers who have taught abroad develop an appreciation of what immigrant students encounter when they come to the US. Because they have experienced language and cultural difficulties first-hand, preservice teachers have a much better understanding of multicultural issues in US classrooms. Additionally, evidence suggests that international student teaching has an enduring effect on classroom practices (Mahon & Cushner, 2002) such that participating individuals develop a broader understanding of their classroom role. From overseas student teaching experiences, research has shown that cultural sensitivity informs all manners of professional practice from classroom management to lesson activities and to student and parent interaction (Mahan, 2006).

On a personal level, classroom teachers who have student taught abroad draw upon their world views and reject negative stereotypes, embrace other cultures, and have a true appreciation for diversity in their classrooms (Deardorff, 2006). Perhaps, Toncar and Cudmore (2000) sum up overseas internships most succinctly when referring to preservice teachers who have experienced this opportunity by simply offering "they are changed" (p. 59). Findings have shown that preservice teachers who have taught abroad have higher levels of self-confidence, are resourceful, patient, and are less prone to judge (Mahon & Cushner, 2002). Having confronted new and unfamiliar circumstances, Roose (2001) posits that overseas student teaching builds classroom teachers who are risk takers and are more creative in their teaching.

Challenges

While the literature is overwhelmingly positive regarding short-term international student teaching experiences, there are reports on some of the difficulties with international student teaching experiences. Quezada (2004) has reported that some student teachers develop a sense of isolation due to communication difficulties. Garii (2008) has echoed this point that some student teachers experience insecurity and harbor feelings of loneliness and frustration. Additionally, the literature shows that some student teachers have difficulty adapting to the curriculum and feel unprepared to deliver instruction (Romano, 2007).

Research Methodology and Theoretical Framework

Central to the theoretical orientation of this pilot study was the interpretive meaning of the participants' lived experiences as perceived by the participants in the Taiwan classroom social setting and the surrounding environment. Based on this theoretical premise, our study relied primarily upon what educational researchers Denzin and Lincoln (2003) refer to as phenomenology – an interpretive theory. We adopted a natural inquiry – a hermeneutic phenomenology - that permitted us to search for the meaning of the preservice teachers' experiences and challenges in the learning context, what the students learned from their experiences, and the communicative tools they used to describe their experiences (Denzin & Lincoln, 2000). In order to attend to the larger social and cultural contexts in which this study was situated and the importance of the interpretive meanings from the participants' lived experiences, a variety of qualitative methods were utilized (Denzin & Lincoln, 2000; Merriam, 1998).

As part of the interpretive methodology, our study was grounded in the constructivist theory. The constructivist theory acknowledges that meaning making is constructed through exchanges of social processes; knowledge is derived collectively among people (Vygotsky, 1978). Social constructivists place significance on communities of learners versus individual learners in regards to the attention of knowledge (Lave & Wenger, 1991) and thus, the constructivist theory provided the necessary lens to analyze the important shared learning experiences. This sort of collaborative learning is continuously emphasized during study abroad.

The Participants and Settings

The participants involved four elementary preservice teachers who attended a university in the Southeastern region of the US and who had fulfilled the state's requirements for teacher licensure in a ten-week accelerated schedule for the semester. Additionally, all four participants met the required grade point average for international study abroad and received high marks from a faculty interview panel. Of the four participants, one had studied abroad in a summer program, one had participated in international mission trips, one had lived in many different states within the US, and one had never left her home state until time to leave for college. All four participants were eager and motivated to become globally- minded, to experience life from a minority perspective, to be challenged both personally and professionally, and to build an appreciation for language and cultural differences. The preservice teachers received three orientations within half a year working on topics that prepared them for the trip. These topics included introduction of Taiwan history and geography, culturally responsive pedagogy, basic TESOL theory and methods, and travel and life in Taiwan. Additionally, the preservice teachers were required to prepare lessons on American culture and traditions, the geography and important features of their home state, and provide many activities to support learning English as a Second Language (ESL) using technology.

The public schools selected for this opportunity were introduced by our partner university in Taiwan who offered multiple school settings for our selection. Based on the consideration of safety and lodging provision, we chose to work with a Tainan public high school principal who was passionate and supportive about this opportunity. The high school principal became our point person and was instrumental in arranging elementary classroom placements in the district, as well as her own high school. The principal also assigned two Tainan teachers who spoke English to become key contacts with the researchers and participants throughout this opportunity. As a result, the classroom settings were one high school (Grades 7-12) and five small-scale elementary schools (Grades 1-6) that required the four preservice teachers to rotate among the school settings while student teaching in Taiwan. This rotation schedule proved to be challenging and is addressed in the research findings.

Data Collection

Prior to the start of the TSTO pilot program, approval to conduct the research study was obtained from the Institutional Research Board at our home university. Also, each participant signed an informed consent form. Subsequently, a pre-program interview was audio-taped and transcribed to capture personal information (teaching experience and travel experience) and gain insight into the participants' motivations for teaching in Taiwan. During the pilot program, the four preservice teachers were encouraged to reflect and record their experiences in weekly

reflection journals. In addition, a post program survey questionnaire was administered to capture the preservice teachers' overall evaluations of the student teaching experience. We also conducted a post group interview that was audio-taped and transcribed to provide an additional data set. The group interview allowed for a free flowing open discussion in order for the four preservice teachers to share their lived experiences as close as possible. Because our five-week TSTO program was a pilot study, the four preservice teachers provided a group presentation to the faculty and administrators in the College of Education. During the presentation, the four preservice teachers shared what they did, saw, and thought within and beyond the schools. The presentation was captured on video and subsequently supplied a final source of data.

During the planning of and throughout the TSTO pilot program, we created multiple documents that became a source for data collection. The creation of course materials, the syllabus, questions for reflection, and our own reflective journals became a valuable source of data from which to seek alternative perspectives and to check interpretations.

Data Analysis

In agreement with hermeneutic phenomenology, the production of meaning was a process of co-creation between the researchers and participant involvement, whereby the construction of meaning occurred in a cycle of interviews, reflective writing, and interpretations. The use of our own reflective journals allowed us to move back and forth between the data sets and our own reflections. We further subscribed to Hertz's (1997) call for an on-going cycle of self-reflexivity. Because inquiry is a human activity, we rejected the possibility of a value-free, objective human science (Lincoln & Guba, 1985). Accordingly, we assumed the responsibility to be reflexive and continually reflect upon research practices, decisions, and personal values (Richlin, 2001).

Ongoing data analysis occurred by means of an inductive data analysis approach to code, categorize, and to search for themes. Using a constant comparative method (Creswell, 1998), all interview transcripts, reflective journals, and survey questionnaires were reviewed in order to validate, clarify, and reframe analyses of the data. The analysis was conducted as a joint effort; however, each investigator sorted and coded data individually to identify initial themes. We met regularly to exchange, read, and sort through all data sources to collectively identify possible themes, independent of previous individual interpretations. This was an important part of data analysis to observe how consistent the emerging themes were when each data set were examined. To begin the final process of data analysis, we met to finalize our individual preliminary findings and a dialogue over commonality and differences of interpretation occurred.

Results

From data analysis, three categories emerged. For purposes of this article, we have used the participants' comments as evidentiary evidence to support each category. All participants' names are pseudonyms.

To provide an overview, Table 1 organizes the questions, data sources, and categorical results of the study.

Table 1

Overview of Questions, Methods, and Results

	Inquiry Questions	Data Sources	Findings - Categories
I.	Benefits	- WRs - PPS - PFGI - EP - Survey	1. Professional development 2. Personal growth
II.	Perceived challenges	- WRs - PFGI - EP	3. Challenges and difficulties

WRs=Weekly Reflections; PPS=Post program survey; PFGI=Post group interview; EP=Exit presentation.

Professional Development

Throughout this immersion opportunity, the results from data analysis indicated that the TSTO preservice teachers became more pedagogically prepared to teach ESL students, culturally responsive, professionally assertive, and they became more aware of the educational differences between the US and Taiwan. From analysis of weekly reflections, post group interviews, and the exit presentation, sub-categories and key expressions emerged and are organized in Table 2.

Pedagogically prepared to teach ESL students. During the post group interview, the TSTO preservice teachers came to a collective consensus about being "more equipped to teach ESL students" (Fanny). It was because of "the experience of not being able to use their language and the challenge of learning their language" (Helen). Lillian also described her experience, "A lot of time I turned off my brain when I was there not being able to understand what they are saying. So if your ESL students are not listening, you know why." Having taught in English speaking classrooms in the US, "[t]his experience made me realize how different it is to be an ESL teacher: Students have different needs and there should be a lot of flexibility in the teaching agenda based on the student's progression," Helen stated.

The TSTO preservice teachers perceived they benefitted from developing stronger instructional practices for ESL students. They believed that an ESL teacher should "use different approaches, instead of teaching to everyone in general" (Helen). In this experience, they used varied strategies, materials, and aids, such as slowing down, acting, rephrasing, visual aids, and charades. In addition, they "found that repetition was very important" (Stacy). As Stephanie explained, "We use new techniques, instead of just saying it." And working in pairs helped, because they were able to "work over each other to make them understand" (Lillian).

Culturally responsive. The TSTO preservice teachers perceived an additional benefit from the experience was that they became "more open to diversity" and "more understanding of diverse needs and to students from different cultures" (Helen, Lillian, Stacy, Fanny). All four participants responded in the survey that they had an expanded world view, were more qualified teacher candidates, and had a greater level of personal ambition. Additionally, they believed the program had prepared them to teach culturally diverse students. On the other hand, they acknowledged that prejudice and bias were challenges they must overcome to teach culturally

and linguistically diverse students. “This trip is very helpful for teachers to teach ESL students and should be required for ESOL class,” suggested Stacy.

Professionally confident. All four of the TSTO preservice teachers agreed that “being the minority just changed you,” as Helen stated. This experience seemed to have ‘boosted their confidence enormously,” as Fanny affirmed. “Once you can do this in a different culture, you can do anything in America,” a statement echoed by Lillian. “You can use the experience in a different culture to a future situation,” said Stacy.

Table 2

Categories and Key Expressions under Professional Development

Category	Key Expression
Pedagogically Prepared to Teach ESL Students	Not teaching to everyone in general
	Different to be an ESL teacher
	Repetition is needed
	Varied instruction is key
	Use visual aids and acting
	Slow down when you talk
	Say things in different ways
	Chinese needed to check for understanding
	Some games and chants would fit well in American classrooms
	Older students do not like games
Culturally Responsive	More open to diversity
	More understanding to students with diverse needs and from different cultures
	Know why ESL students are not listening
	More patient with people
Professionally Confident	Changed being the minority
	More confident in teaching
	Most comfortable with elementary students
Increased Awareness of Educational Differences	Different concepts in classroom management
	Could balance between the two extremes
	Different schedules
	Actual school day not longer
	Students’ creativity and intelligence
	Brought change to kids

From data analysis, the findings consistently showed the four preservice teachers perceived the experience allowed them to become more professionally committed to elementary students. After teaching wide-ranging grades, all of them were happy to confirm that they felt most comfortable working with elementary students. Helen believed that “teaching kindergarten

in America had prepared for this experience." She also became, as Helen stated, "more thankful for the things that I often forgot to give thanks for while in America, including students, teachers, and mentors."

Increased awareness of educational differences. Comments in Helen's weekly reflection mirrored she had developed a heightened awareness for differences between the two countries' educational systems.

The comparison between schools in America and in Taiwan is almost impossible. The setup, teaching techniques, learning styles, content and schedule is so completely different that it is hard to describe to someone who has never seen both situations.

From their time in Taiwan classrooms and working with the students, the TSTO preservice teachers voiced their comparisons between Taiwan classrooms and their own state's classrooms. They realized that "behavior management in the Taiwan classrooms is not as strict as that in America; at least not in their state. This is a cultural difference," said Fanny. Lillian believed that, "there would be a good balance to set between the two extremes I have been exposed to." Additionally, they compared the school routines in the two countries. They noticed that schools in Taiwan appeared to "have a longer day with breaks and an hour long lunch/nap and a good planning period. But the actual school day does not end up being much longer," said Stacy. When working with kids, they found themselves "impressed with students' creativity and intelligence" (Stacy) and that "kids enjoy having us because of the change we brought to them" (Fanny).

Personal Growth

The findings from data analysis indicated that this experience provided enormous opportunities for the TSTO preservice teachers to grow personally. Based on the post survey, the exit presentation, and the post group interviews, four categories and key expressions emerged and are shown in Table 3.

Interactions with people. The TSTO preservice teachers were able to interact with numerous people inside and outside of schools. They appreciated that in addition to taking time to help, the Taiwanese people provided "a great amount of hospitality," as stated Helen. She continued to comment, "We felt welcome and wanted by everyone." They were invited to multiple social events that included participation in a PTA barbeque, school archery and softball practices, and they visited a salt museum and tree house. Additionally, Lillian described, "They invited us to a Thanksgiving dinner in Tainan City. Many personnel from school were there. We felt just at home surrounded by friends and wonderful food."

Personal adjustment. The TSTO preservice teachers experienced "many adjustments personally and with schools" (Helen). The four TSTO preservice teachers were far from home in an unfamiliar country with a different language and culture and this setting required them to make personal adjustments, sometimes on a daily basis. The adjustments included trying new foods, relying on others for everything because of language barriers, and navigating around the area, according to Lillian and Stacy. They learned to balance independence and dependence.

Table 3

Categories and Key Expressions under Personal Growth

Category	Key expression
Interactions with People	Great amount of hospitality
	Friendly and helpful people
	Participating in school sports activities
	PTA providing BBQ
	Taken to a Thanksgiving dinner
Personal Adjustments	Many adjustments personally and with schools
	Relying on people with everything
	Trying new foods
	Navigating through the area
	Figuring out the bus, train, and transit
Recreational Events	Seeing temples, tree house, and salt museum
	Exploring Kaohsiung and Taipei city
	Convenient public transportation
	people took time to help us
Character Development	More appreciative about things
	Gained diverse viewpoints on things
	More risk taking

Recreational events. The four participants visited multiple sightseeing areas during leisure time by themselves and explored metropolitan cities. From these events, they had "the sense of accomplishment," because they "figured out things" on their own (Lillian, Fanny, Stacy, Helen). "It was good cultural experience because we don't have it here in Georgia" (Lillian, Fanny, Stacy, Helen). Even when traveling, we got to "meet new friendly people who are willing to help" (Helen). "We never feel scared walking in the street at night," commented Stacy.

Character development. The international student teaching experience helped the TSTO preservice teachers develop their characters quickly. As Stacy stated, it "pushed you to grow." Helen stated, "You have more patience dealing with people you might not want to deal with…You become to appreciate things you have. And you gain different outlook on all different things." Stacy expressed that the experience "made confirmation what you believe." Helen was glad that "you were separated and not to worry about your phones." Stacy concluded that "We [referring to the four TSTO preservice teachers] know each other and have become friends."

For a future adventure like this, all four of them responded without hesitation, "We will do it again." Stacy further stated, "I like it. I would teach out of America again. I could do not only a month. I could do longer than a month in somewhere else."

Challenge

In addition to the new learning experiences, this experience presented a few challenges due to some predetermined conditions stemming from communication and school settings. From weekly reflections, the exit presentation, and post group interviews, the following categories emerged in support of the theme of challenges (see Table 4).

Scheduling challenges. The adjusted schedule that was established when the one middle candidate dropped out of the opportunity caused major challenges for the four TSTO preservice teachers who taught in Taiwan. They were required to cover teaching schedules pre-designed for multiple grade levels in both high school and elementary school settings. This mixed schedule brought forth tremendous challenges. As Fanny stated, "Switching schools and students was difficult for us to become adjusted to teaching." Stacy also complained, "Our schedule changed every day." Additionally, Lillian stated, "We had too many students from different schools." Helen added, "The time was too short. We didn't get to build relationship with the students."

Language barriers. Communication difficulties became apparent once the school settings were established. This university-school model of communication situated the four preservice teachers in an environment whereby they interacted with people who had a different language and this experience brought about many difficulties. Moreover, the two Tainan teachers who spoke English and were assigned as contacts for our four preservice teachers had their own classrooms and this limited their availability.

As a result, the four preservice teachers perceived that language differences were a barrier and a challenge. For example, they struggled to find translation or guidance when students did not understand them. In addition, they experienced miscommunication with school personnel about weekend activities and found it difficult to get their message across. As Fanny explained, "We wanted to have a say, but they thought it had been cancelled" for a cultural event they would have enjoyed. Finally, while they hoped to rely on an American teacher in the high school, the TSTO preservice teachers felt ignored by the American teacher to the point that Lillian remarked, "She was not helping." As a result, the four preservice teachers had to "give up independence and rely on someone else for everything."

Table 4

Categories and Key Expressions under Challenges/Difficulties

Category	Key Expression
Scheduling Challenges	Need better planning
	Too many students from different schools
	Different schedule every day
Language Barriers	Giving up independence
	Miscommunication about weekend activities/expectations
	Need Chinese to help in a lesson
School Location	Far from city
	Food within biking areas is not diverse enough

School location. School location became an issue in relation to the distances from the preservice teachers' lodging. Lodging provisions were chosen because of the dormitory layout; however, the schools were in a more remote area and this presented many challenges with daily routines. Each of the TSTO preservice teachers were given a bicycle for daily transportation and therefore, they biked to school, to grocery shop, to do laundry, and to get meals in the neighboring areas. The preservice teachers were thankful for the use of the bikes, but they all agreed that this mode of transportation presented a challenge. As Stacy said, we found we were "getting used to ride a bike." Nonetheless, the problem was that "food within biking areas is not diverse enough" (Lillian), so "eating becomes our daily issue" (Helen). The four teachers all agreed that biking to grocery shopping and laundry was challenging especially in the evening.

Discussion

In response to the first research that inquired what the four preservice teachers perceived as the benefits of an international student teaching experience, the results concluded that they developed professionally and personally in multiple areas. On a professional level, the results are consistent with the literature that opportunities to student teach in international settings permits students to grow in multiple areas (Alfaro & Quezada, 2010; Pence & Macgillivray, 2008). Specifically, through this opportunity, the TSTO preservice teachers became more pedagogically prepared to teach ESL students. This finding aligns with research that student teaching in international settings increases the necessary skills and abilities to teach non-English speaking students in US schools (Roose, 2001). The preservice teachers developed a repertoire of key pedagogical practices that are critical in teaching ESL students, such as using repetition, varied instruction, visual aids, acting, slowing down, rewording, games, and chants. All of these are indicators advocated by Sheltered Instruction Observation Protocol to help enhance the learning of ESL students (Echevarria, Vogt, & Short, 2012). Additionally, the four TSTO preservice teachers developed a heightened awareness of diverse learners' needs and became culturally responsive to students from different cultures. Overall, the four preservice teachers benefitted from the experience by developing sensitivity and greater capability in teaching culturally and linguistically diverse students. This finding is supported by research (Alfaro & Quezada, 2010) that found that international student teaching needs to be a critical programmatic mission of teacher education in the US.

The four preservice teachers became more professionally confident through this experience (Mahon & Cushner, 2002). They gained knowledge of the needs of different aged learners through the experience by teaching multiple grade levels and student groups. Yet, they all confirmed they enjoyed teaching elementary students. They also learned firsthand how educational aspects between both countries could be different. These abovementioned understandings and insights are invaluable and can only be obtained through international immersion in the profession.

On a personal level, the international opportunity allowed the TSTO preservice teachers to grow and mature in varied ways. They learned to interact with total strangers inside and outside of schools in varied activities, and they learned to be flexible and appreciative of others' traditions, foods, and way of life. Additionally, they became resilient and developed survival techniques while trying new things, navigating neighboring areas, and figuring out transportation means and routes. The overall experience helped them build personal character and more self-

confidence. In addition, they developed more diverse viewpoints (Mahon & Cushner, 2002) and at times, they grew to be risk takers (Roose, 2001).

In response to the second inquiry question regarding what the four TSTO preservice teachers perceived to be challenges, the findings consistently showed the four preservice teachers believed the schedule arrangement, the language barrier, and the schools' locations were all challenges. These findings are consistent with other studies that found international experiences are not always positive. For example, researchers find that communication difficulties (Garii, 2008) and instructional challenges (Romano, 2007) can leave participants feeling frustrated and insecure.

Implications for Practice

The results from this study imply that teaching in a culturally and linguistically diverse setting brings forth benefits and challenges for US preservice teachers. The overall benefit, and to a degree a challenge, is that practicing teachers get to experience the cultural and linguistic difficulties themselves as a teacher and learner simultaneously. This in turn gives them a glimpse into how their future ESL students might feel as minority students whose language and culture are different from the mainstream norm; the experience enables them to become more culturally and linguistically understanding and empathetic. As a result, the findings from our TSTO program further imply that international student teaching extends the foundation for learning (Richlin, 2001). Just as the icing is to the cake, so is the international student teaching opportunity to the student teaching experience. After completing the licensure requirements, this opportunity allowed the four preservice teachers the ability to build awareness and increase the capacity to teach culturally and linguistically diverse students in a relatively short period of time. The experience promoted the opportunity for the preservice teachers to practice what they had learned about culturally responsive pedagogy in our teacher education program. The need to become culturally responsive became real and for the first time teaching was no longer about content and pedagogy, but more about the connection between culture, and language, and students. All four preservice teachers gained confidence and believed in their ability to teach linguistically diverse students. This implication is supported by research that has shown that when practicing teachers have been placed in contexts that caused them to be the minority, those prospective teachers became committed to disallowing their students to feel isolated and insecure (Roose, 2001).

Implications may be made in relation to the challenges our TSTO preservice teachers faced; challenges that could have been avoided with some modification in the platform of communication. The communication to establish and international student teaching program first began between our US university and our partner university in Taiwan. However, once the city of Tainan was selected for school settings, the communication platform shifted to the principal of the participating high school and the principals of the elementary schools in Tainan. This communication platform created problems (Lu & Soares, 2012) for several reasons, such as corresponding with very limited English speakers with whom to negotiate school locations, teaching expectations, and scheduling confusion. According to Glickman (2004), it can be very difficult to get the language and culture communicated and understood at two different levels of institutions, especially when it happens in two different countries. Therefore, these challenges present one final implication for future international student teaching opportunities in our teacher education program. In other words as we move forward, out future efforts will communicate

directly with a partner university to maximize the effect of an international student teaching experience (Authors, 2012).

A Final Word

The 21st century schooling in the US requires alternative perspectives to address the needs of culturally and linguistically diverse students in today's classrooms (Asia Society, 2008). Reflecting on the four preservice student teachers' international experience in a non-English speaking country, we are in a better position to understand the benefits and challenges that yield learning for preservice teachers during practice abroad (Martin, Benjamin, Prosser, & Trigwell, 1999). The study is significant in multiple aspects. First, the results from this study have provided a fresh and invigorated lens from which to improve student learning. The experience altogether has laid the groundwork from which to internationalize our courses that focus on conceptual frameworks and instructional methodologies to build cultural learning and global awareness. Moreover, the findings from the TSTO research study allow our College of Education to reevaluate and restructure future endeavors with international student teaching opportunities. Because our university is interested in internationalization, this experience has provided precious insights into future collaboration with international institutions. Finally, the results of the study are professionally informative for a larger learning community, including teacher education programs, as well as those who are involved in planning international field experiences.

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Predicting supervisor capacities to foster higher forms of learning through undergraduate medical student research

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Abstract: The credibility of short-term undergraduate research as a paradigm for effective learning within Medicine has been recognized. With a view to strengthening this paradigm and enhancing research-teaching linkages, this study explores whether particular types of research supervisor are pre-disposed to providing supportive learning environments. Correspondingly, a novel solution is offered to addressing clinical governance concerns about failings in preparing students for a supercomplex world. While recommendations for addressing these concerns have previously focused on curriculum delivery and assessment, this study affords a fresh perspective through consideration of research supervisor attributes, behaviours and experiences. Using statistical analyses of response data from a large cohort of experienced research supervisors who completed an online survey, evidence is found to suggest that staff involvement in personal research ought to enhance student learning through research. In turn, the supervisor factors which are most supportive of this effect may vary according to how we measure higher forms of learning. Supervisors are advised to design successive follow-on research projects to facilitate cross-disciplinary research. In preparing medical graduates for survival in a super-complex world, more needs to be done, however, to investigate why supervisors who see their students more regularly are more likely to provide cross-disciplinary research opportunities. By contrast, potential to engage in risk-taking behaviours and maintain or progress to an advanced stage of learning may originate more precisely with the student.

Keywords: *cross-disciplinary research, research-teaching linkages, short-term research, supercomplexity, transitional learning, undergraduate medical students*

If undergraduate medical student experiences of supervised short-term research are to reflect those of more senior researchers, it is inevitable that there will be considerable variation in the practices of their supervisors, both in terms of extent of involvement in the project and more specifically, with respect to how they design the research environment for the student. In the latter respect, the role of the supervisor "as an educator responsible for designing the research process to optimize student learning" (MacDougall & Riley, 2010) is noteworthy insofar as this points to the potential for research supervisors to enhance research-teaching linkages.

The primary aim of the current study was to investigate, within the context of short-term research projects, the statistical evidence that specific supervisor factors have the potential to predict good supervisory practice, defined in terms of facilitating higher forms of student learning.

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Using survey data from supervisors of the above projects, this aim was addressed using the following approaches to hypothesis testing:

i) By means of a range of potential predictor variables, representing supervisor behaviours, characteristics or experiences, a number of study hypotheses were tested of the general form,
There is an association between the given potential predictor variable and given indicator of opportunity for higher form of student learning.

ii) Supervisor ratings of to what extent student research findings are revolutionary were compared according to a range of potential predictor variables representative of supervisor behaviours, characteristics and experiences. In this case, the study hypotheses were of the form,
   a) *there is a correlation between the given potential predictor variable and supervisor rating*
   or
   b) *there is a difference in supervisor rating across the categories of the given potential predictor variable*.

The potential predictor variables to be considered were: *number of students supervised to point of project completion* (Q. 2), *importance of research to supervisor's own PPD* (Q. 23), *how often supervisor meets with student* (Q. 26), *supervisor gender* (Q. 29), *supervisor age* (Q. 30) and *nature of supervisor's employment* (Q. 35). In the case of ii), these were extended to include the outcome variables, considered under i). These outcomes variables comprised the following intended indicators of higher forms of learning, where 'PPD' denotes 'Personal Professional Development': *whether supervisor has experience of supervising cross-disciplinary SSC4 projects* (Q. 17), *evidence of progression to or maintenance of advanced stage of learning as depicted by Baxter Magolda's Epistemological Reflection Model* (Q. 19), *extent of contribution of student to research life of department or team (Q. 22*) and *extent to which supervisor would encourage student to take risks* (Q. 25). For the correlations investigated under a), the specific supervisor-focused potential predictor variables were *number of students supervised to point of project completion*, *importance of research to own PPD* and *supervisor age*.

A secondary aim of the current study was to test two particular cases of the study hypothesis *time spent with student is associated with supervisor's degree of involvement in research.* This involved the use of each of the importance of research to the supervisor's own PPD and the nature of the supervisor's employment as indicators of supervisor degree of involvement in academic research.

The incentive for the latter aim was that of addressing derogatory views expressed separately by Gibbs and Hughes with respect to the relationship between staff research activity and the quality of the student learning experience. Gibbs advocates the conventional view that staff being research active is a barrier to time spent with the student at an educational level. (Gibbs, 2002) This view is in turn reinforced by Hughes's cynical comments regarding the existence of a research-teaching nexus. Here, he portrays academics as defending the research-teaching nexus with a "vested interest" which can be traced to any one of the following explanations: "a Machiavellian desire to secure resources: a desire to protect an interesting piece of academic work; and self-interest of a small number of unrepresentative academics." (Hughes, 2005) Clearly, such cynicism invites a rejoinder.

The above aims are grounded on the idea of recognizing the potential for the student research environment to be enhanced as a pedagogical tool in the hands of the research supervisor. The results of this investigation should therefore assist medical educators in evaluating their own pre-conceptions of which types of individual are best placed to optimize the quality of learning encountered through undergraduate medical student research. Such findings ought to be of interest to those involved in undergraduate research programmes more generally, particularly in the light of awareness that "research into undergraduate dissertation supervision is patchy" by comparison with that found in relation to postgraduate supervision. (Todd, Smith, & Bannister, 2006) More specifically, however, these results should also inform programme organizers in recruiting suitable candidates for supervising future research projects.

This is a survey-based study and question numbers corresponding to the study questionnaire are referred to in brackets throughout this paper. The reader should also note that the questionnaire itself is included with this paper as an additional file under Appendix 1.

Introduction

Context for student research

Supervisor recommendations for initiating undergraduate medical students as fledgling researchers into the research culture of a team and as such, into what was perceived in this context as a research community of practice have already been explored. MacDougall & Riley, 2010) As in the current study, the model of student research was that encountered by all survey respondents within the Year 4 Student Selected Component (SSC4) programme at the University of Edinburgh, Scotland. This mandatory programme involved clinically related projects, each of which typically ran over a 14-week period. Each project involved the submission of a project report of about 3,000 words. Two (possibly non-consecutive) weeks of the SSC4 period were allocated exclusively to SSC4 work. For the remainder of the time, students were expected to manage time spent on both SSC4 work and other curricular activities, including exam preparation. (MacDougall & Riley, 2010) These projects were also recognized explicitly within the course materials as having the potential to increase student research skills and as counting toward summative assessment, with the project mark being assigned a weight of 14% in deciding end-of-year marks.

Pedagogical Rationale for Choice of Indicators of Higher Forms of Learning

Experience of Supervising Cross-Disciplinary Research and Extent to Which Supervisor Would Encourage Student to Take Risks. Within professional degree programmes, learning skills gained through enhanced learning experiences ought to be transferable to the workplace. This observation is consistent with Barnett's understanding of the University as carrying a responsibility to prepare its students for a phenomenon which he calls supercomplexity and represents in the following way:

> …professional life is increasingly becoming a matter not just of handling overwhelming data and theories within a given frame of reference (a situation of complexity) but also a matter of handling multiple frames of understanding, of action and of self-identity. The fundamental frameworks by which we might understand the world are multiplying and are often in conflict. Of the

> multiplication of frameworks, there shall be no end. It is this multiplication of frameworks that I term supercomplexity. It increasingly characterizes the world in which we all live. (Barnett, 2000)

As such, supercomplexity is closely affiliated with Illeris's transformative learning concept of *accommodation*, according to which "one breaks down (parts of) an existing scheme or pattern and transforms it so that the new situation can be linked in." (Illeris, 2004) Here the need to "relinquish" and "reconstruct" is in keeping with the idea of forming alternative frames of reference, found within Barnett's notion of supercomplexity. Illeris also notes that for the learner, the above process can be both "demanding" and "painful" due to the initial experience of disorientation through loss of identity in what one knows, thus preparing educators for the pedagogical challenges that should arise in introducing students to situations of supercomplexity.

In the language of social identity theory, disorientation may also arise due to an ongoing need for the individual to redefine the categories which they have previously constructed to define their social identity as the member of a particular group. As Tajfel would have it, "we do not act as isolated individuals but as social beings who derive an important part of our identity from the human groups and social categories which we belong to, and we act in accordance with this awareness." (Tajfel, Jaspars, & Fraser, 1984)

However, the development of supercomplexity gives rise to the need for such categories to be more pliable. Correspondingly, while from the perspective of social psychology, the natural tendency is for an individual's behaviour to be "ingroup stereotypical" (Hogg, 1996), this tendency needs to be conquered, as do the prejudices which reinforce intergroup boundaries. More specifically, as is particularly evident in Medicine, it is no longer possible to adopt the standpoint of social identity theory and self-categorization theory that "Correctness ... is a product of social agreement with others who are perceived as similar to self in the particular context." (Hogg, 1996) Likewise, while on the one hand, proponents of social identity theory argue that "people strive to positively differentiate their group from another as a means of further maintaining a positive self-esteem", (Fox, 1996) 21st century medical graduates must be ready to define their personal professionalism in a less protectionist manner. The perception of physicians as "professionals of the establishment" inconvenienced by the objections of their "radical critics" (Schön, 1999) now belongs to a bygone age, which has been surpassed by that of public accountability. The physician must respect the patient voice. They must strive, therefore, to offer a credible evidence base for clinical decision-making which sheds new light on personal insights that patients bring to consultations.

The above challenges illustrate that supercomplexity is alien to the human psyche. As such, they lend weight to Barnett's conviction that within higher education, students need to be prepared for a supercomplex world. In particular, he identifies *promotion of interdisciplinarity* as one of two main conditions of the university in meeting its "responsibility to enable individuals to prosper *amid* supercomplexity through proliferating "frames of understanding." (Barnett, 2000, 2007)

To add to this, in the report of their most recent consultation of strategic options for undergraduate medical students the General Medical Council (GMC) express concerns about deficits in key features which can be seen as integral to preparedness for a supercomplex world. For example, they acknowledge the need "to make sense of the rapidly changing understanding of disease processes and treatment" together with the corresponding value of more training in basic science, as though the latter ought to serve the development of more robust frameworks of understanding for patient care. Likewise, they concede that in the UK, "We do not do enough to help students learn about dealing with uncertainty either for themselves or for their patients … nor do we

help them develop a repertoire of attributes to enable them to lead and contribute to change as well as to experience it." (GMC, 2006)

This evidence of medical governance support for preparing medical graduates for supercomplexity is reinforced by the intended outcomes for medical graduates recommended by the GMC and Royal College of Physicians and Surgeons of Canada (RCPSC). These include the capacity to consolidate multiple perspectives arising from patients, families and multi-disciplinary healthcare teams (GMC, 2009) and to play a leading role in collaborative decision making in the face of uncertainty (RCPSC, 2005). Given that supercomplexity is an expanding international phenomenon, these concerns should not be limited to the UK. Also evident, however, is a lack of concrete recommendations as to how the above intended outcomes could be achieved. It is therefore intended that the current study should contribute to addressing this area of need, specifically within the context of supervision of undergraduate medical student research.

In establishing markers for higher forms of learning, Barnett's second condition for the university of *fostering student capacity to live with uncertainty through risk-taking behavior* is also of interest. This condition is closely tied with his concern that learners should be emancipated from the "conspiracy of safety" with its focus on "entrenching existing frames of understanding" (Barnett, 2000). Indeed, it is in response to this concern that exemplar supervisor practices to facilitate responsible risk-taking behaviour within undergraduate medical student research have recently been provided. (MacDougall, 2012)

In recognition of Barnett's above two conditions for supercomplexity, the queries raised through the study questionnaire were as follows:

Have you had the opportunity to supervise any cross-disciplinary SSC4 projects? (Q.17)

and

During their SSC4 experience, to what extent would you encourage a given SSC4 student to take risks in exploring new areas of your subject and thus enter the unknown? (Q. 25)

Progression to or Maintenance of Advanced Stage of Learning. While supervisor responses to the above survey questions may serve as markers of enhanced student learning experiences, if they are to be authentic, such experiences also ought to involve transition to or maintenance of existing advanced approaches to learning. This indicator for higher forms of student learning can be assessed by Baxter Magolda's epistemological reflection model. (Baxter Magolda, 1992) Encouragingly so, the recent application of this model within the novel context of senior undergraduate medical student research has revealed that even short-term research, over 14-week periods, is associated with progression to higher forms of learning. (MacDougall, 2012) The supervisor responses that informed the above finding were collected according to a matrix of progression (Q. 19) comparing student learning stages immediately prior to and on completion of their SSC4 experiences. A natural next step was to consider which supervisor factors might contribute to the more positive of those responses.

Extent of Contribution of Student to Research Life of Department or Team. Communities of practice have gained popularity in teaching and learning theory under the recognition that they provide an environment for deep learning through the learner engaging in knowledge construction and negotiation. Correspondingly, evaluation of the quality of students' learning experiences in their roles as researchers ought to include assessment of evidence for their participation in research communities of practice. This need was recognized in the above questionnaire through including *Output from SSC4 projects tends to make a constructive contribution to our knowledge of specific subject areas within one or more research programs* among the available options for supervisors to choose from in expressing the contribution which their students tended to make to the research life of their department or team (Q. 22).

Quality of Student Research Findings as Represented by Supervisor Ratings. Participation in communities of practice and preparedness for surviving in a supercomplex world should not, however, only be considered in isolation in assessing student learning experiences; rather, where research communities of practice are operational and the need for building student capacities to live with supercomplexity is recognized, there is also a call for an evaluation of the extent to which the learner is challenging existing frames of understanding within their community of research practice. A helpful model in this respect involves the representation of student research findings on a spectrum from norm endorsing to revolutionary, as in the follow question stem from the study questionnaire:

> *If the research findings of your SSC4 students were to be represented on a spectrum, from norm-endorsing (reinforcing what is already known) to revolutionary, how would you rate them overall? Use the drop-down menu below to record your answer, where a score of 1 represents 'norm-endorsing' and a score of 10 represents 'revolutionary'.* (Q. 20)

This approach to recognizing enhanced learning is consistent with Barnett's observation that "[i]t is the revolutionary elements [of research] that are the motor of knowledge growth through the new frames of understanding that they bring." (Barnett, 2000)

Research Supervision as Teaching

In keeping with Connell's call for re-perception of research supervision as "a form of teaching" (Connell, 1985), the aims of this study are grounded on the idea of recognizing the student research environment as being enhanced as a pedagogical tool in the hands of the research supervisor. Connell's more recent retrospective account of how PhD supervision has traditionally been perceived is also pertinent, particularly her observation that "No one really thought this [PhD supervision] involved a form of education". (Connell & Manathunga, 2012)

Nevertheless, Connell's emphasis on the one-to-one educational interchange between student and supervisor, particularly through the provision of feedback on student work, is quite distinct from the community of practice model which has served as a forerunner to the current study. Thus, for example, while Connell portrays her contribution to the pedagogy of (postgraduate) research as a "call to conversation" *between the student and their supervisor (*Connell & Manathunga, 2012), the idea of the supervisor designing a research environment as a pedagogical tool for the fledgling researcher, as in this study, is more holistic.

This more holistic approach arises, not merely from a philosophical but also, from a practical perspective. It is likely that within an SSC4 research environment, where student performance affords a modest contribution to end-of-year marks, the stakes for the supervisor and student are considerably less. Correspondingly, students may typically have more freedom to roam and establish connections with other team members which are at least as significant for higher forms of learning as the supervisor-student relationship. Thus, Connell's observation that PhD supervision is "extremely difficult to do in a team" (Connell, 1985) is unlikely to be transferable in a general sense to the variety of student research experiences considered here.

Methods

Conduct of Survey and Data Preparation

The current study is a follow-on study from two previous studies on research-teaching linkages. More comprehensive details of these particular studies, including full details of the conduct of the survey leading to the response data for the current study and of the relevant data preparation can be readily accessed through earlier papers. (MacDougall, 2012; MacDougall & Riley, 2010)

Statistical Analysis

The data for this particular study were analyzed using IBM SPSS 19.0 (SPSS inc).

Associations between categorical variables were tested using the chi-square test of association, with Yates's continuity correction applied for two-by-two cases. The chi-square test of linear trend was also used to test for evidence for monotonic trends in:

i) proportion of supervisors with experience of supervising cross-disciplinary SSC4 projects according to number of students supervised to point of project completion;

and

ii) each of *extent of contribution of student to research life of department or team* and frequency of meetings according to *importance of research to supervisor's PPD*.

Where the proportion of expected counts of value less than 5 exceeded 20%, Fisher's Exact test was used instead of the chi-square test of association. In such cases, the corresponding p-values are tagged with a '*' in the results section. Differences in supervisor ratings of student research across categories were examined using the Mann-Whitney U-test, while Spearman's rho ("*rho*") was used to assess the strength of correlation between *supervisor rating of student research* and each of *number of students supervised to point of project completion* and *importance of research to own PPD*. A statistical significance level of 0.05 was assumed throughout and a value for the square of *rho* of at least 0.3 was viewed as representative of a marked correlation.

Results

Response Rates

Out of a total of 324, the number of respondents pertaining to the analyses for the current study ranged from 204 to 211, thus representing 63.0 - 65.1 % of the target population. Collectively, these respondents had SSC4 supervisory experience within the range of 125 - 129 clinical specialties.

Experience of Supervising Cross-Disciplinary SSC4 Projects

There was a lack of statistical evidence for a true association between *experience of supervising cross-disciplinary SSC4 projects* and any one of *supervisor gender* (χ^2 = 0.000,

p = 1.000, n = 205) and *nature of supervisor's employment* (χ^2 = 0.041, p = 0.839, n = 205), with 35/132 (26.5%) males versus 20/73 (27.4%) females responding positively and 36/130 (27.7%) from (the category) *non-academic or academic teaching* versus 19/75 (25.3%) from (the category) *academic research or academic research and teaching* responding positively. By contrast, a statistically significant association was found between *how often supervisor meets with student* and *experience of supervising cross-disciplinary SSC4 projects* (χ^2 = 4.196, p = 0.041, n = 207), with 33/96 (34.4%) of supervisors who met 4 or 5 times versus 23/111 (20.7%) of supervisors who met 2 or 3 times responding positively.

The relationships between *experience of supervising cross-disciplinary SSC4 projects* and each of the remaining potential predictor variables are represented in Figures 1a) to c), below. In consistency with the relatively modest differences across categories evident from Figures 1b) and c), there was a lack of statistical evidence for a true association between the above outcome variable and any one of *supervisor's age* (χ^2 = 2.824, p = 0.588, n = 205) and *importance of research to supervisor's PPD* (χ^2 = 1.265, p = 0867, n = 207). By contrast, there was a highly significant association between this outcome variable and *number of students supervised to point of project completion* (p < 0.0005, n = 211). The positive monotonic trend in *experience of supervising cross-disciplinary SSC4 projects* according to number of students supervised evident from Figure 1a) also proved to be highly significant (χ^2 = 27.719, p < 0.0005, n = 211).

Progression to or Maintenance of Advanced Stage of Learning

There was a lack of statistical evidence for a true association between *evidence of progression to or maintenance of advanced stage of learning as depicted by Baxter Magolda's Epistemological Reflection Model* and any one of *supervisor gender* (χ^2 = 0.018, p = 0.893, n = 204)*, nature of supervisor's employment* (χ^2 = 0.000, p = 0.988, n = 204) and *how often supervisor meets with student* (χ^2 = 0.970, p = 0.325, n = 206), with 102/132 (77.3%) males versus 57/72 (79.2%) females responding positively, 100/129 (77.5%) from *non-academic or academic teaching* versus 59/75 (78.7%) from *academic research or academic research and teaching* responding positively and 78/96 (81.3%) of supervisors who met 4 or 5 times versus 82/110 (74.5%) of supervisors who met 2 or 3 times responding positively.

Likewise, there was a lack of statistical evidence for a true association between the above outcome variable and any one of *number of students supervised to point of project completion* (χ^2 = 10.131, p = 0.072, n = 210), *importance of research to supervisor's PPD* (χ^2 = 2.593, p = 0.628, n = 206) and *supervisor's age* (p = 0.748*, n = 205).

Extent of Contribution of Student to Research Life of Department or Team

There was a lack of statistical evidence for a true association between *extent of contribution of student to research life of department or team* any one of *supervisor gender* (χ^2 = 1.055, p = 0.304, n = 205) and *how often supervisor meets with student* (χ^2 = 1.081, p = 0.298, n = 207), with 35/132 (26.5%) males versus 20/73 (27.4%) females responding positively and 45/96 (46.9%) of supervisors who met 4 or 5 times versus 43/111 (38.7%) of supervisors who met 2 or 3 times responding positively. By contrast, a *highly* significant association was found between *nature of supervisor's employment* and *extent of contribution of student to research life of department or team* (χ^2 = 8.050, p = 0.005, n = 205), with 42/75 (57.8%) from *academic*

research or academic research and teaching versus 45/130 (34.6%) from *non-academic or academic teaching* responding positively.

While there was a lack of statistical evidence for a true association between the outcome variable *extent of contribution of student to research life of department or team* and any one of *supervisor age* (χ^2 = 6.693, p = 0.153, n = 205) and *number of students supervised to point of project completion* (χ^2 = 7.370, p = 0.195, n = 207), this same outcome variable demonstrated a *highly* significant association with *importance of research to supervisor's PPD* (χ^2 = 31.265, p < 0.005, n = 207).

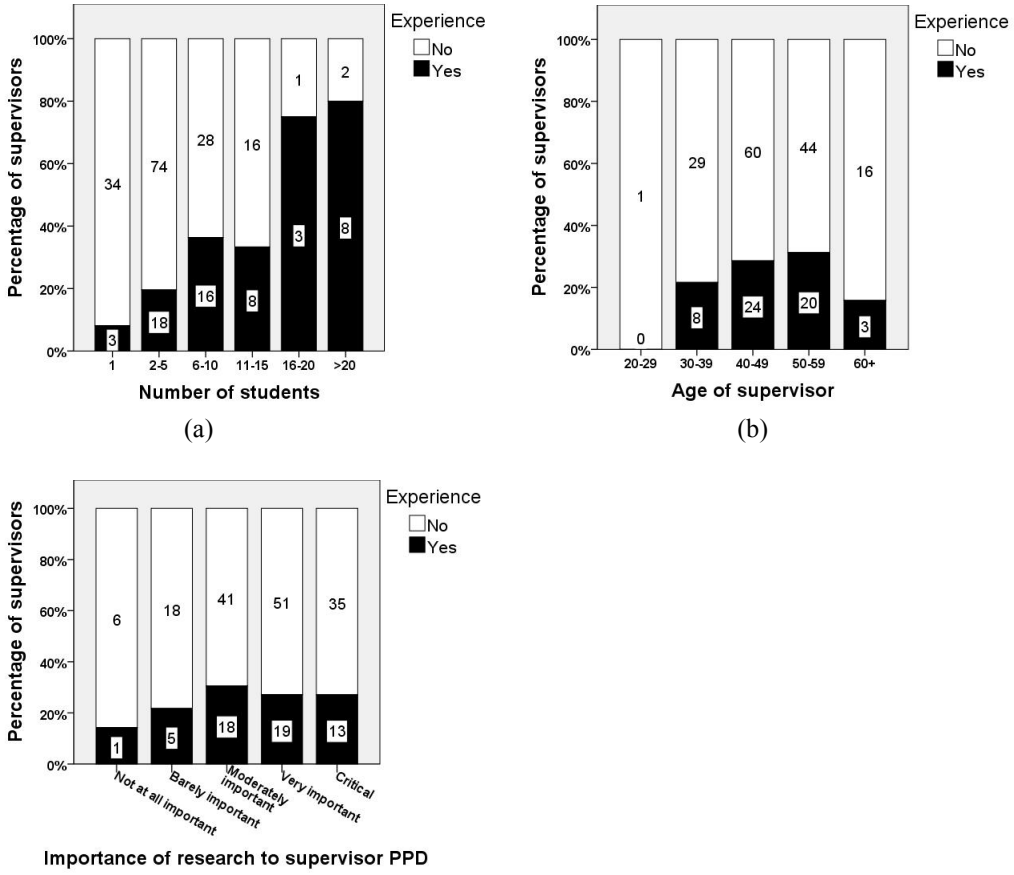

Figure 1. Supervisor experience in cross-disciplinary research according to (a) number of SSC4 students supervised to point of project completion, (b) supervisor's age and (c) importance of research to their personal professional development. Data are derived from responses to Q.'s 2, 17, 23 and 30. 'SSC4' denotes 'Year 4 Student-Selected Component'.

Indeed, in consistency with the distribution of the data in Figure 2, evidence was found for a positive monotonic trend in *extent of contribution of student to research life of department or team* according to level of importance of research to supervisor's PPD (χ^2 = 29.657, p < 0.0005, n = 207).

Extent to Which Supervisor Would Encourage Student to Take Risks

There was a lack of statistical evidence for a true association between the outcome variable *extent to which supervisor would encourage student to take risks* and any one of *supervisor gender* (χ^2 = 0.025, p = 0.875, n = 205)*, how often supervisor meets with student* (χ^2 = 0.101, p = 0.751, n = 207) and *nature of supervisor's employment* (χ^2 = 0.066, p = 0.797, n = 205), with 117/132 (88.8%) of males versus 66/73 (90.4%) females responding positively, 87/96 (90.6%) of supervisors who met 4 or 5 times versus 96/111 (88.3%) of supervisors who met 2 or 3 times responding positively and 115/130 (88.5%) from *non-academic or academic teaching* versus 68/75 (90.7%) *from academic research or academic research and teaching* responding positively. There was also a lack of statistical evidence for a true association between the above outcome variable and any one of *supervisor age* (p = 0.326*, n = 205), *number of students supervised to point of project completion, (*p = 0.293*, n = 207) and *importance of research to supervisor's PPD* (χ^2 = 5.203, p = 0.267, n = 207).

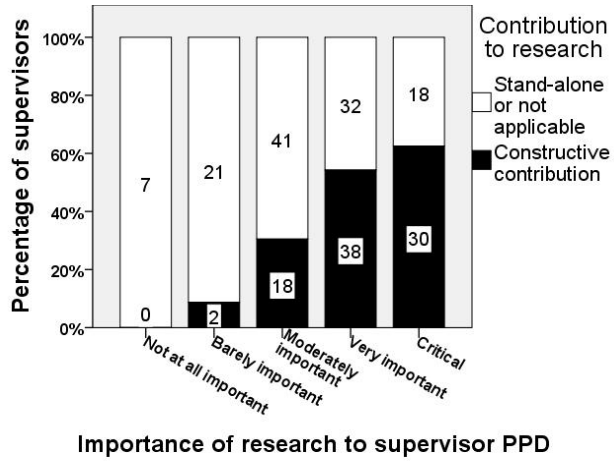

Figure 2. Contribution of student to research life of department or team according to importance of research to supervisor PPD. Data are derived from responses to Q.'s 22 and 23

Quality of Student Research Findings as Represented by Supervisor Ratings

There was a lack of statistical evidence for a marked correlation between *supervisor rating of student research* and any one of *number of students supervised to point of project completion* (rho = 0.092, p = 0.186, n = 209), *importance of research to own PPD* (rho = 0.048, p = 0.496, n = 207) and *supervisor age* (rho = 0.243, p < 0.0005, n = 205).

The results of the group comparisons for quality of research findings based on the remainder of the extended list of potential predictor variables are provided in Tables 1 and 2.

Challenging Critical Perspectives of Staff Involvement in Personal Research

The data in Figure 3 represent the distribution of regularity of supervisor-student meetings according to importance of research to supervisor's PPD.

With the exception of an initial dip, these data display a positive monotonic trend in frequency of meetings according to *importance of research to supervisor's PPD*, which was in turn found to be statistically significant ($\chi^2 = 4.500$, p = 0.034, n = 210). However, there was a lack of statistical evidence for a true association between *nature of supervisor's employment* and *how often supervisor meets with student* ($\chi^2 = 0.000$, p = 1.000, n = 205) with 60/130 (46.2%) from *non-academic or academic teaching* versus 35/75 (46.7%) from *academic research* or *academic research and teaching* reporting a tendency to meet with students 4 or 5 times.

Table 1

Group comparisons for supervisor ratings of research findings according to supervisor characteristics or behaviour.[a]

	mean rank	range[b]	p-value
How often supervisor meets with student			
4 or 5 times (n = 96)	112.69	(1, 10)	
2 or 3 times (n = 111)	96.49	(1, 9)	0.049
Supervisor gender			
male (n = 132)	105.12	(1, 10)	
female (n = 73)	99.16	(1, 9)	0.486
Nature of supervisor's employment			
Non-academic or academic teaching (n = 35)	99.18	(1, 9)	
Academic research or academic research and teaching (n = 75)	109.63	(1, 10)	0.219

a. Data are derived from responses to Q.'s 20, 26 and 29.
b. Range pertains to raw data

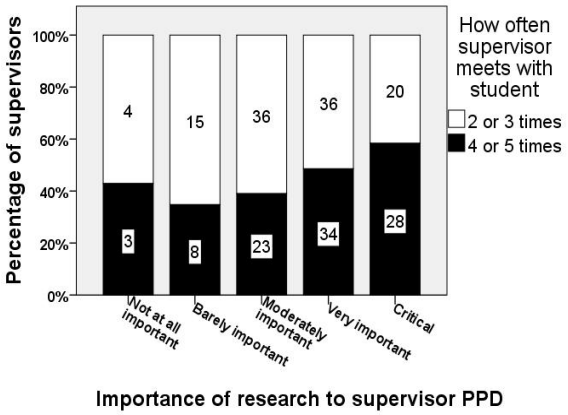

Figure 3. Number of times supervisor meets with student according to importance of research to supervisor's own PPD. Data are derived from responses to Q.'s 23 and 35.

Table 2

Group comparisons for supervisor ratings of research findings according to evidence for higher learning.

	mean rank	Range	p-value
Progression to or maintenance of advanced learning			
Yes (n=162)	111.65	(1,10)	
No (n=46)	79.80	(1,7)	0.001
Supervisor has experience of supervising cross-discipline research			
Yes (n=56)	108.99	(1,8)	
No (n=153)	103.54	(1,10)	0.560
Extent to which risk-taking encouraged			
At least somewhat or depends on the student (n=185)	108.37	(1,10)	
Not al all or barely (n=22)	67.27	(1,7)	0.002
Extent of student research contribution			
Contructive contribution (n=88)	124.31	(2,10)	
Stand-alone or not applicable (n=119)	88.98	(1,8)	P<0.0005

a. data are derived from responses to Q.'s 23 and 35.
b. Range pertains to raw data

Discussion

General Observations

Given the competing demands which are placed on clinicians, the relatively high proportion of respondent data available for the current study is encouraging, there being in excess of 60% for each statistical analysis. The lack of statistical evidence for supervisor gender contributing to opportunities for higher forms of learning is noteworthy. While male and female supervisors may differ in their tendencies toward particular styles of supervision, (Hammick & Acker, 1988), there is no reason to assume from this study that such differences reflect a supervisor gender bias in rating of the revolutionary dimension of student research or indeed, of capacity to assume the role of the effective educator.

Experience of Supervising Cross-Disciplinary SSC4 Projects

The finding of this study that there was a significantly greater tendency for supervisors who met more often with their students to have supervised cross-disciplinary research provides a useful basis for qualitative research. In particular, longitudinal data might strengthen and explain the possibility that choosing to supervise cross-disciplinary research places an extra burden on supervisors. The increasing monotonic trend in experience of this type of supervision according to number of students supervised to point of completion (Figure 1a) may provide further groundwork in this respect. In particular, there is a need to explore whether cross-disciplinary projects attract more students or whether a greater level of supervisory experience, both in terms of number of students and time spent with individuals, empowers the research supervisor to design cross-disciplinary research. The relatively modest proportion of approximately 27% of supervisors having supervised cross-disciplinary research (Figure 1) together with the relative consistency of this statistic across levels of importance of research to supervisor PPD (Figure 1c)) would appear to suggest that supervisor perceptions of their own PPD as researchers do not involve giving precedence to cross-disciplinary work. This finding may be a reflection of the tension between balancing the demands of clinical practice with the additional time involved in developing interdisciplinary research partnerships and grant applications. However, from a pedagogical perspective, supervisors need to be better placed to provide opportunities for students to develop skills for managing supercomplexity in the workplace.

There is a particular call for tailoring student research opportunities to involve competing frameworks so as to ensure that undergraduate medical students are exposed to further opportunities to engage in cross-disciplinary research. This invites a closer examination of how clinical research profiles are defined at the recruitment stage and what incentives and innovations may need to be introduced to promote cross-disciplinary research within Medicine. Future work addressing this need should also involve clinicians who do not supervise student research. This would help in verifying whether it is more precisely the case that clinicians who are most engaged in cross-disciplinary research tend to be too busy to take on the role of supervising undergraduate research. Such questions demand an answer if we are to identify successful strategies for creating cross-disciplinary research opportunities for tomorrow's doctors.

There is a lack of adequate statistical evidence from this study that supervisor age is likely to influence their involvement in supervision of cross-disciplinary research. Nevertheless, given that the corresponding group sizes according to age are relatively unbalanced (Figure 1b),

statistical power is likely to have been attenuated considerably in assessing this particular association. This being the case, the differences in the proportions evident from this figure should not be discounted; rather, they promote further investigation in a larger study which can accommodate more data to represent the extreme age-groups.

Progression to or Maintenance of Advanced Stage of Learning

Interestingly, while none of the potential predictor variables considered in this study were able to differentiate between research supervisors according to student *progression to or maintenance of an advanced stage of learning as depicted by Baxter Magolda's Epistemological Reflection Model*, there was a highly significant difference in supervisor ratings of research findings according to this outcome variable (Table 2). In particular, there was a tendency for supervisors who responded positively in terms of Baxter Magolda's model to rate research findings more closely to revolutionary (Table 2). This suggests that while supervisor characteristics, behaviours and experiences may not feature highly in facilitating maintenance of or progression to advanced learning in Baxter Magolda's sense, the latter indicator of high-quality learning is closely connected with a movement away from norm-endorsing approaches to research. As such, it is affiliated with Barnett's ideals of "knowledge growth" and "building of new frames of understanding", thus equipping the medical graduate to thrive in a world of supercomplexity. (Barnett, 2000)

To further support research in learning development, a longitudinal study in which student and supervisor response data are linked could explore the student factors associated with students being perceived by their supervisors as having progressed to or maintained advanced stages of learning.

Extent of Contribution of Student to Research Life of Department or Team

The results of this study reveal that the nature of supervisors' employment may have an important role to play in capacity to facilitate student participation in research communities of practice. In particular, supervisors who view themselves as academic researchers may be more likely to be prolific in opening opportunities for student contributions to knowledge construction. In terms of promoting deeper learning experiences for students, clinicians who recognize their employment roles as non-academic may therefore need to negotiate with their management teams in allowing protected time for personal research. Progress in this area ought to enable 'non-academic' supervisors to gain sufficient insight into the constituents of a given research field to provide constructive learning opportunities for their students.

The potential for adaptation of 'non-academic' career roles to reap benefits for student learning in the above sense is reinforced by additional findings from this study. In particular, once research involvement becomes an integral component of what supervisor's perceive as legitimate PPD, students may be better placed to join communities of research practice. This is evident from the high level of statistical evidence for:

a) an association between *extent of contribution of student to research life of department or team* and *importance of research to supervisor's PPD*

and

b) a positive monotonic trend in likelihood of student making a constructive contribution to research life of department or team according to *importance of research to*

supervisor's PPD.

In terms of improving research supervision skills to enhance student learning, there is a clear challenge in persuading medical graduates with a heavy clinical workload to take time out for training in pedagogical theory designed to make them more effective educators. However, while clinicians continue to take on opportunities to supervise undergraduate research opportunities the pedagogical role of these responsibilities needs to be driven home. Of interest here, are the relevant staff development workshops or distance learning materials available within the UK. Depending on the needs expressed by the particular university, these are provided for supervisors of science or medical students at the undergraduate or postgraduate level at Universities of Birmingham; Cranfield; Leeds; Newcastle; Nottingham and Southampton and St George's, University of London. These pathways for mapping research supervision to pedagogy expose staff to a range of supervisory scenarios, while preparing them for defining staff-student boundaries and avoiding students having false starts due to poor research design. (Kate Exley, personal correspondence) Furthermore, Epigeum (http://www.epigeum.com/) is a recognized leading publisher of online courses for enhancing the quality of research with a mission to "transform the way in which universities and colleges support their core activities of research, teaching and learning." Given adequate funding, much could be learnt from merging ongoing activities associated with the above initiatives with the practical ideas forthcoming from the current study.

Extent to which Supervisor Would Encourage Student to Take Risks and Quality of Student Research Findings as Represented by Supervisor Ratings

As an indicator of higher forms of learning, *extent to which supervisor would encourage student to take risks* shares some common ground with *progression to or maintenance of an advanced stage of learning as depicted by Baxter Magolda's Epistemological Reflection Model*, there being a lack of statistical evidence for an association between this variable and any of the corresponding potential predictor variables. This is partly a reflection of the result that most supervisors reported that they would encourage a given student at least somewhat to take risks, irrespective of the category to which the supervisor belonged. The above two indicators of higher forms of learning were also compatible in relation to their role as potential predictors of *quality of student research findings as perceived by supervisor*. Here, higher mean ranks and maximum raw scores occurred for supervisors who responded positively and statistically, these results were found to be *highly* significant.

These findings are consistent with the idea that there may be inherent attributes of the student researcher which make them more predisposed to being recognized by their supervisors as potential risk takers or transitional learners over and above the behaviours, characteristics and experiences of their supervisors. A clearer understanding of what student factors could lead supervisors to encourage student to take risks and promote maintenance or progression to an advanced stage of student learning may help in identifying those students who are likely to be rated most highly within a given research setting. Through analysis of pre-existing student survey response data, this work is to be pursued in relation to risk-taking opportunities in particular. The outcome of interest in terms of opportunity for higher form of learning will be the student's own response to a comprehensive question pertaining to the extent to which their supervisor(s) encouraged risk-taking. Potential predictive factors for which data have already been collected include, among others, *prior research experience of student*, *specialisms covered*

by student in SSC4 research project and *extent of mutual trust between student and at least one more experienced colleague that the student would make a valuable contribution to the project*. For the purpose of future research, it is also of interest to note that the capacity of a particular student to engage with risk-taking opportunities may be dependent on their inherent readiness to trust the orchestrator – in this case, the supervisor – and their perception of self-efficacy.

The findings in Table 1 suggest that supervisor rating of student research is dependent on regularity of student-supervisor meetings, with supervisors who tended to meet more regularly with their students being significantly more likely to rate their students higher. This certainly makes sense in terms of less contact hours being a potential barrier for students aspiring to more revolutionary forms of research. The highly significant finding in terms of supervisors being more likely to score students highly if they were perceived as making a constructive contribution to their community of research practice (Table 2) is consistent with the idea that supervisors perceive knowledge construction on the part of the student as challenging existing norms. This would suggest that either the supervisors involved in this study have high expectations of what is entailed by knowledge construction or students who engage in knowledge construction tend do so in a revolutionary manner. These alternatives may need to be teased apart through qualitative research examining the nature of individual student research projects in conjunction with supervisor ratings.

Supervisory experience of cross-disciplinary research did not feature as an important factor in predicting supervisor research ratings of their students. Possibly, the extra time involved in the collaborative element of interdisciplinary projects, including establishing connections between the student researchers and significant others, (MacDougall & Riley, 2010) restricts the scope for progressing to a revolutionary endpoint within the time-frame of a short research project. Correspondingly, perhaps such projects could be more optimally designed with considerable foresight and planning as follow-on projects for students in succession. Thereby, endpoints of a more revolutionary nature ought to be attainable and students involved in the early stages of the research advised of the potential importance of their input to cutting-edge research, albeit much further down the line.

Challenging Critical Perspectives of Staff Involvement in Personal Research

The results arising from an investigation of the relationships between supervisor involvement in personal research and time spent with the student are instructive and encouraging. In particular, they reveal evidence that time spent with the student increases with importance of research to supervisor's PPD. Taking undergraduate research to constitute an effective medium for deep learning, this finding provides evidence for the existence of a learning context where there is a positive synergy between supervisor research productivity and availability to meet student learning needs. Also noteworthy is the very pronounced lack of statistical evidence for a true difference in time spent with the student according to nature of supervisor's employment. Such findings suggest that Gibbs's and Hughes's perspectives on the research-teaching nexus may be biased. Nevertheless, there is also a need for further qualitative research exploring the nature of student learning during supervisor-student contact hours so as to verify that student learning needs are being prioritized above those of the supervisor's personal research agenda.

Limitations

Since 165/206 (80.09%) of respondents specified their ethnicity as White British and remaining respondents were thinly divided across other ethnicity categories, the response data did not support the investigation of *supervisor ethnicity* as a potential predictive factor in relation to *extent to which supervisor would encourage student to take risks*; otherwise, this would have been an interesting relationship to explore, recognizing that culture may be associated with openness to risk-taking.

Conclusions

The maintenance of enhanced student learning experiences in undergraduate medical student research cannot simply be taken for granted but must be continually worked on. A key element of this responsibility as it presents itself to course organizers is that of recognizing, highlighting and promoting supervisor attributes, behaviours and experiences which are supportive of these experiences. While this study reveals that these factors may vary considerably according to how we choose to define higher forms of learning, there is also a call to explore the relevance of student attributes in determining whether such learning is possible for any given student.

The findings of this particular study also contribute a pragmatic element to addressing clinical governance concerns about failings in preparing students for a supercomplex world. In particular, investigation of the types of supervisor best suited for preparing students for a supercomplex world has led to the identification of possible links between amount of supervisory experience and student openings for cross-disciplinary research and a call for a closer examination of how these links are established.

Inclusion of risk-taking opportunities for students in the above investigation has revealed a lack of evidence that particular categories of supervisor are more predisposed to designing the research environment to enable students to encounter risk. The replication of this finding on considering student capacity to maintain or progress to an advanced stage of learning, as defined by Baxter Magolda's epistemological reflection model ought to be viewed positively in terms of equality of opportunity for students to engage in higher forms of learning. On the other hand, there appears to be substantive evidence from this study to suggest that the determinants of higher forms of learning as defined by the above two outcome variables may originate more precisely with the student.

The scope for students to make constructive contributions to their research communities of practice appears to be positively linked with level of involvement of supervisor in research both as defined by their job role and by the extent to which they recognize research as important to their PPD. In terms of the capacity for deep learning, this result highlights the importance of supervisor participation in personal research for ensuring that undergraduate medical student research can serve as a successful paradigm for effective learning.

In promoting this finding as a basis for reform in supervisor training, it is encouraging to note that the results of this particular study are unsupportive of the view that student learning experiences are likely to be compromised on account of the research activities of their educators. This does not rule out the possibility, however, that staff who opt out of supervising undergraduate research on grounds of personal research commitments spend less time with their students in mandatory teaching roles, nor can we be sure that increased supervisor-student

contact hours in the case of research-orientated supervisors is symptomatic of greater attentiveness to student learning needs. Such observations have paved the way for future research in enhancing the quality of student learning.

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Appendix

Appendix 1. Research Supervisor Questionnaire.

The full survey can be found at http://josotl.indiana.edu/article/view/3245/4661.

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Public deliberation as a teaching andragogy: Implications for adult student learning from a doctoral higher education policy course

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Abstract: Public deliberation provides an inclusive and robust mechanism for making shared decisions in community and political settings; however, its application to teaching and learning remains underutilized (McMillan & Harriger, 2007). This manuscript reports on a case study of the use of public deliberation as a teaching andragogy in a doctoral-level course in higher education policy, which showed that public deliberation creates greater ownership of the course, fosters critical thinking and student agency, and implicates taking action.

Keywords: Public deliberation, adult learners, andragogy, graduate students, higher education policy

Introduction

Public deliberation allows participants to make shared decisions about complicated societal issues in community and political settings. Models for public deliberation vary, but developing citizens' voices and creating a shared sense of responsibility and action are central to the process. *The Deliberative Democracy Handbook* (Melville, Willingham, & Dedrick, 2006) posits five characteristics of public deliberation: (1) including all voices, not just experts, (2) equal opportunity for participation, (3) creating or using choice work to make decisions, (4) including diverse stakeholders, and (5) seeking common ground. These characteristics distinguish public deliberation from other forms of discussion, which may have similar or contrasting attributes or aims. Public deliberation specifically differs from the other forms of discussion by first promoting understanding of complicated topics where unclear agreement currently exists and then collectively deciding what action should be taken. By finding and building upon the strengths, rather than the weaknesses within the opinions expressed by others, participants suspend judgment in favor of finding common ground, consider the tradeoffs of proposed actions, and decide how to act.

While there are many forms of public deliberation, the specific form of public deliberation used in the current study most closely mirrors the National Issues Forum (NIF) model (nifi.org). The NIF is a non-partisan network of individuals and organizations that advocate for increased citizen participation in public deliberation. The NIF model requires the creation of an issue book to engage stakeholders in a deliberation around a topic or issue of public concern. Issue books contain two main parts – naming and framing. The naming portion of the issue book requires the authors to *name* an issue of public concern in a way that requires citizens to act. The *naming* section provides an overview of the problem, contains several strategic facts, and articulates the parameters of the problem. Issues for public deliberation lack

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clear answers or technical solutions; rather, they require thinking about issues in complex ways and broad-based action.

Once an issue is *named*, three or four options to address the problem are created, in the *framing* section. Each option is distinct from the others and represents a set of related possible actions to address the issue. Additionally, each approach contains a set of related tradeoffs that might accompany action items. During the subsequent issue forum to deliberate the topic using the issue book, trained moderators, who act as neutral parties, guide participants through the issue guide by asking questions and encouraging participants to think critically about the issue and possible approaches suggested. Moderators help pace the deliberations so that each approach receives equal consideration. Moderators also facilitate group follow-up and potential future meetings.

The lead author of this paper, a higher education instructor in a graduate program, was familiar with public deliberation in community settings, but less familiar with its applications to the classroom. In preparing to teach a doctoral-level higher education policy course, two dynamics were important in considering the course's design. First, he wanted students to have a sense of ownership and responsibility over the myriad, complex issues inherent to higher education policy. He sought to avoid focusing only on the role of state and federal policymakers and intellectualized learning about higher education policy. Second, he wanted to engage the affective domains embedded in higher education policy alongside the cognitive domains that tend to dominate policy discourse. Higher education is a deeply held value in American society, and people often have strong emotions toward issues of access, cost, choice, aid, and accountability. For these reasons, he decided to use public deliberation as an andragogy (i.e., teaching strategies for adult learners) in the course. A more thorough description of the course and study are presented in the methods section.

Literature Review

Public Deliberation Overview

Melville et al. (2006) described public deliberation as a process encouraging reflection and critical discourse through civic engagement. Participants in public deliberation work collaboratively toward solutions as the deliberative process informs and inspires voice and consensus building (Muse, 2009). Promoted by the National Issues Forum since 1981 as a form of democratic action, public deliberation is an effective method to resolve community issues that require participant involvement in order to influence change (nifi.org).

Public deliberation provides a framework to resolve issues in which participant involvement generates interest in sustainable change. The deliberative process emphasizes participant action rather than reaction and, when used in public forums, develops openness to the views of others. Deliberation also promotes informed consensus, when applied to local environmental issues (Daniels & Walker, 1996; Harris, Nielsen, Becker, Blahna, & McLaughlin, 2012), participant involvement in community healthcare forums (Downey, Anyaegbunam, & Scutchfield, 2009; Lehoux, Daudelin, & Abelson, 2012) and developing standards for emerging technologies (Hamlett, 2003).

The use of public deliberation in higher education requires a shift from a teaching paradigm to a learning paradigm (Barr & Tagg, 1995). This transition requires teachers to move from simply providing instruction and delivering content to the more complex endeavor of

facilitating learning and empowering students to take charge of their learning (Barr & Tagg, 1995). Adopting a learning paradigm in the classroom has been shown to increase student engagement and student outcomes (Brank & Wylie, 2013; Nikitina; 2010). Public deliberation as a teaching andragogy aligns with the learning paradigm as the teacher acts as a guide through the public deliberation process as opposed to delivering content about the process to students. Students undertake a process of discovery and have significant latitude to name and frame options about a public issue in the deliberation process (Melville et al., 2006). In the deliberation process, students work alongside teachers to engage in reflective, often transformational, dialogue in which they gain self-awareness and discover multiple possibilities for collective action (Diaz & Gilchrist, 2010; Waghid, 2006).

Deliberation on College Campuses

The use of public deliberation on college campuses is not widespread (Dedrick, Grattan, & Dienstfrey, 2008), despite its implicit connections to the learning paradigm (Barr & Tagg, 1995) and demonstrated effectiveness as a tool for making decisions (Walters, 2008). Those institutions utilizing public deliberation tend to concentrate deliberations within campus programs, between the campus and the community, or within administrative and governance structures (Diaz & Gilchrist, 2010). Diaz and Gilchrist contend that, within these settings, public deliberation addressed timely issues of diversity and social justice, encouraged peer mediation, resulted in more inclusive procedural processes, and promoted active civic engagement. Through this collaborative and inclusive approach, student perspectives are shared and promoted which facilitates conversation toward understanding. By modeling democratic processes, students gain understandings and experience in mutually resolving real world problems, rather than debating them (McMillan & Harriger, 2007). Diaz and Gilchrist (2010) add that this type of dialogue is the foundation for public deliberation and that such dialogue promotes student participation and empowerment through shared experiences and exposure to a variety of perspectives, not just those of experts. McMillan and Harringer (2007) emphasized that, through deliberative activities, students learn to become active and engaged participants in the democratic processes that occur on campus and nearby communities.

Walters (2008) added that public deliberation can assist institutions of higher learning in transformational change when embedded throughout the college experience. His study revealed a campus-wide shift from *teaching* to *learning* following the implementation and expansion of deliberative practices over an eight-year period. Students demonstrated greater flexibility, engagement, and community skills, and were more likely to challenge themselves and others. While not entirely attributable to public deliberation on campus, Walters noted an enhanced learning environment and increased enrollment and public recognition.

Within the classroom, deliberation has been shown to be an effective mechanism to achieve higher-order critical thinking skills (McMillan & Harriger, 2007; Waghid, 2006). Through deliberation in classroom settings, students are forced to consider conflicting opinions, diverse options for action, and must synthesize multiple voices (Diaz & Gilchrist, 2010), which have been shown to bolster student learning (Broadbear, 2012). Public deliberation allows students to experience real world situations from within the classroom setting. Through the public deliberation process, students reflect upon educational problems, gain a better understanding of complex problems, and work toward making informed choices about possible lines of action to solve educational problems (Waghid, 2006).

In a comprehensive study of 30 undergraduate students using public deliberation over four years at Wake Forest University, McMillan and Harriger (2007) offer the most comprehensive data on how deliberation affects college students. Their longitudinal study showed that students were more involved in traditional venues of political action outside of service, attuned to the responsibilities of active citizenship, analytical and critical of political processes and their role in them, efficacious in their political attitudes and language, communal in their political language and outlook, and imaginative in recognizing possibilities for deliberation and applying deliberative knowledge and skills to a broad range of situations. They also note that despite initial hesitation concerning the deliberative process, students experienced a profound change in their attitudes about the process.

Other research on the impact of public deliberation in the classroom has shown that public deliberation led to gains in students' interpersonal awareness and connections with others (Diaz & Gilchrist, 2010), content knowledge of issues (Daniels & Walker, 1996), ability to make informed decisions (Blomquist & Ostrom, 2008; Burgh and Yorshansky, 2008), connections to public issues (Diaz & Gilchrist, 2010), and group collaboration (Dedrick et al., 2008). An important limitation of these studies is that traditional-aged college students were the primary sample, thus limiting its applicability to non-traditionally-aged populations.

Andragogical Considerations

The National Center for Educational Statistics (NCES), in their most current completed data, reported the enrollment of adult students over the age of 25 to be nearly nine million of the total 21 million students in higher education, equaling 43% of all enrolled college students (NCES, n.d.). Since 2000, the number of adults pursuing a postsecondary education has increased by two-and-half-million students after a decade of consistent enrollment, a nearly 30% increase (NCES). Soares (2013) revealed that only about 15% of current undergraduates are "traditional" college students; students who are 18-22 years old, attend a four-year college full-time, and reside on-campus. Soares (2013) adds that adult learners are predominantly part-time students and have significant familial, work, and time commitments outside of taking courses. Consequently, the necessity of catering to adult learners' needs is increasingly important in higher education.

Lindeman (2011) distilled several key assumptions about adult learners from the literature, which constitute the foundation of adult learning theory: Adults are motivated to learn as they experience needs and interests that learning will satisfy, adults' orientation to learning is life-centered, experience is the richest source for adult's learning, adults have a deep need to be self-directed, and individual differences among people increase with age. These key empirical tenets of adult learners, originally conceptualized by Knowles (1984), serve as the foundation for understanding adult learners in the classroom. The use of public deliberation is a useful andragogy because it focuses on what people hold valuable, highlighting everyone's voice, honoring personal experience, and creating opportunities for self-directed learning (Melville et al., 2006).

Methods

The research question guiding this study was, "What are students' experiences using public deliberation as a teaching andragogy in the classroom?" To better understand students'

experiences using public deliberation as a teaching andragogy, a qualitative case study was employed (Stake, 1995). Case studies focus on a unit of analysis in a real-life, contemporary setting (Yin, 2008). The purpose of this study was to examine adult learners' experiences using public deliberation as a teaching andragogy in a single course, which suggests the presence of a bounded system (Stake, 1995). Eleven students were part of the course, of which nine elected to participate in the study. Students were part of a doctoral program in higher education administration at a mid-sized, public, four-year university in the Midwest. Students were a mix of full-time and part-time doctoral students. Each student identified as an adult learner. The course was taught by an Assistant Professor of Educational Leadership. Constituting the sole assignment for the course, students were charged with creating a deliberative issue book reflective of the NIF issue books that named and framed a higher education policy issue for public deliberation. Students worked in self-selected small groups, two to four students, designing the issue book on a higher education topic of their choosing. The students addressed timely issues such as college access, internationalization, and undocumented students. Each group produced a 10-17 page issue booklet that presented, in detail, a definition of the problem (naming), possible courses of action, and the potential tradeoffs of each (framing). As doctoral students, connecting to the scholarly literature in the naming and framing was required. Upon completion of the issue booklet, students facilitated a public deliberation forum in class. Steps for the deliberation process were provided by the instructor and based upon National Issues Forums moderator guides (www.nifi.org). These guides outline the role of the moderator, provide steps to moderating a forum, and offer helpful tips on how to moderate a forum to keep the discussion moving and focused on the issue. At the end of the semester, the instructor administered an open-ended, five-question survey (see Appendix) to the students through a survey tool on Blackboard Learn. Surveys were anonymous to encourage honest feedback about students' experiences. The survey asked students to retroactively assess their initial attitudes toward the course and the public deliberation process as the primary teaching andragogy in addition to the project and their final overall experiences using public deliberation in the course.

Data Analysis

To analyze the survey data, two members of the research team independently coded the transcripts using both open and axial coding (Strauss & Corbin, 1990), which allowed for an in-depth examination of each line of text. Similar concepts and ideas from those initial open codes were then grouped to form themes. To develop analytic triangulation, Patton (2002) argued that when more than one researcher codes data, researchers should first work independently to develop codes and then meet as a group to compare and contrast their interpretations. When independent axial codes were combined into themes, two members of the research team met to build consensus on themes and findings. Additionally, participants also served as authors in this manuscript, which provided a source of member checking (Patton, 2002). Students were encouraged to correct misinterpretations of data in the manuscript. Inductive analysis (Patton, 2002) was used to forefront students' experiences using public deliberation. Letting the patterns, themes, and categories emerge from the data allowed for a more robust understanding of students' experiences.

Results

Results of this study yielded five important themes regarding adult students' experiences using public deliberation in the classroom: students experienced initial nervousness, hesitancy with group projects, an understanding of multiple perspectives, an ability to weigh tradeoffs, and an increase in student agency. Each theme is discussed individually, followed by implications for practice and research.

Initial Nervousness

When students learned about deliberation on the first night of class, each expressed a cautious excitement that contained some elements of nervousness. Since deliberation was unfamiliar to them, their nervousness was palpable. One student remarked, "I was nervous, and what was going through my mind all through the class period was 'how different this assignment would be.'" Another student admitted a strong feeling of being "overwhelmed." Since the class used a public deliberation andragogy throughout the semester, students were concerned with an unfamiliar andragogy as the basis for the entire course. More than simply the foundation of the course, public deliberation would also constitute the primary source of students' grades. Many students remarked that because this process was so unfamiliar to them, and that it would determine their entire grade, they were uneasy. "To be completely honest, there were some mixed emotions about having this project be the foundation for my entire grade," one student admitted. Unfamiliarity with the andragogy coupled with the group nature of the public deliberation project caused trepidation and nervousness for each student. These feelings may be interpreted in the light of Knowles' (1984) principle that adult learners must see the utility in their learning to be motivated to learn. An unfamiliar andragogy, such as public deliberation, initially challenged students' ability to see its utility.

While all of the students indicated some level of anxiousness, some students welcomed the innovative andragogy. "I think what excited me most was hearing that using public deliberation as a learning tool had not been attempted before in the program. I love taking part in new learning methodologies and this sounded exciting," one student expressed. Another student expressed being "up for the challenge," which indicated that, for at least some students, a level of excitement lurked below the surface of their anxiousness.

Hesitancy with Group Projects

Perhaps not surprisingly, students were concerned about public deliberation because of the immense amount of group work involved. Naming and framing an issue for public deliberation and creating an issue book so others can deliberate the issue requires sustained interaction with a group. Many students confessed to having relied on the "divide and conquer" method of tackling group projects, in which students divide the workload into smaller pieces, work individually, and then bring their pieces back to the collective to be integrated into the larger project. This tried and true method did not work well for public deliberation and presented a challenge for the students due to the extensive commitments outside of the class typical of adult learners (Soares, 2013). As one student plainly stated,

> With every group member having other obligations outside of the classroom, it was sometimes difficult to properly collaborate on ideas. For example, if one member set

> aside four hours on a Saturday evening to work only on the project but needed input from the other members before he/she could proceed, but the other members were taking care of other obligations and couldn't respond, it could be very frustrating for the member trying to utilize what little free time that was available.

This student's remarks illustrate how challenging public deliberation can be with adult learners. Another student reflected, "I always find group work the most challenging. It is difficult to get so many people together, function as a machine and produce a quality product in such a short time." These two comments show that as adult learners worked to balance multiple commitments, spending prolonged time with group members to work through the intricacies of naming and framing an issue for public deliberation became challenging.

An Understanding of Multiple Perspectives

The public deliberation process allowed students to see multiple perspectives and to discern the grey areas in policy matters more clearly. Public deliberation issue books usually have three or four possible approaches to address a particular problem, which inherently presents multiple perspectives and avoids the illusion of "one right answer." As one student summarized, "By using public deliberation, people can meet in the middle on issues rather than feeling obligated to choose sides." Students were able to see multiple points of view, what values were associated with those views, and what courses of action were associated with those views. Hearing multiple perspectives made for an enjoyable experience, as students were excited to be part of an inclusive, thoughtful process. One student commented, "I always find it intriguing to hear others' points of view and question why they feel that way especially when I don't see things from that point of view. It helps broaden my perspective."

Additionally, students remarked on how deliberation provided a "civil" way to discuss issues – likely contrasting dominant models of discussing policy, which can be uncivil. As one student noted,

> [Public deliberation] can really allow people to understand the importance of the policy issues, and allows for civilized discussion of the possible actions that could be taken, as well as any trade-offs of those actions. It provides a way for communities to realize the values that people hold surrounding higher education and do so in a way that makes people want to continue to talk about them.

Another student commented, "Public deliberation is very different from group work or large group discussions where the loudest, most persuasive voice usually dominates the group, or a paper that furthers the writer's perspective." Public deliberation fosters civil discussion about issues, which helped promote students' learning.

As students deliberated civilly about higher education policy, they were more apt to hear multiple voices. Hearing multiple perspectives pushed students' thinking about higher education policy issues out of dichotomous thinking to more nuanced understandings. As students heard others' views, and had the opportunity to carefully weigh others' thoughts alongside their own, students could arrive at a more sophisticated understanding of higher education policy issues. Students attributed public deliberation andragogy to their increased understanding of higher education policy. "It allowed me to internally absorb information that I had researched and then apply the knowledge through my writing. I felt like this allowed me to master the material in a way I otherwise would not have been able to." Because students had to present "all sides" of an issue for the issue book, they had to actively take on those perspectives and seek

understanding. This resulted in an increased consideration of the content material, which all of the students in the study noted.

Although the research design did not allow for longitudinal outcomes, two students alluded to the enduring impact of deliberation. "Once a student has participated in conducting their own deliberation, it is difficult to see issues from only one perspective with little regard for the consequences of those decisions." Another student remarked, "This process has me thinking about how I can use public deliberation in other areas of my work." These comments suggest that the impact of students' participating in public deliberation may be long-term.

An Ability to Weigh Tradeoffs

In addition to presenting multiple perspectives, public deliberation forces participants to consider tradeoffs associated with various courses of action – a part of deliberation that every student in the study found valuable. For instance, for students who might be in favor of increasing the amount of student aid for college students, they are forced to think through the likely tradeoff of paying more taxes, which may or may not be a tradeoff they are willing to accept. Considering likely tradeoffs made students think more deeply about the material and who might be affected by various decisions. This gave students a broader perspective from which to operate and understand higher education policy.

Each of the nine students in the study mentioned the value of weighing tradeoffs associated with action steps. One student reflected, "Spending the time to really think through both the positive and negative consequences of each potential action, through many different lenses, helped reinforce the gravity of the issue." Another opined, "Public deliberation can really allow people to understand the importance of the policy issues, and allows for civilized discussion of the possible actions that could be taken, as well as any trade-offs of those actions." This student continued, "Weighing tradeoffs makes the issue real because it requires a sacrifice of some sort." These students' comments highlight the importance of weighing the costs when considering proposed courses of action. Doing so helped students' see the issue(s) in a more nuanced way and provided them with a clearer understanding of proposed action steps or solutions.

Increased Student Agency

As students became more involved in the public deliberation project, they developed a sense of ownership and agency. Students reported feeling a sense of ownership over the process and content of the project. They felt as though what they were doing was building their self-efficacy and confidence to engage in higher education policy. One student stated, "Public deliberation as a teaching method encourages participation as opposed to traditional teaching methods such as lecture, group work, or an academic paper." Another remarked, "Having simply discussed this in class, or written a paper on the process wouldn't have given me confidence I now have to go through the process in a real-life situation." Another student remarked, "While there is a place for lecture within the classroom, it never encourages the development of the student's perspective, a valuable piece obtained through deliberation." Developing students' self-efficacy in understanding and acting upon higher education policy issues is a difficult feat, but public deliberation offers an andragogy to build these capacities. One student even remarked, "It

felt like students were turned into teachers," which provides even greater evidence of how public deliberation creates a sense of ownership and fosters student agency.

The nature of the course is particularly important to consider. Students commented that higher education policy can seem distant and unapproachable. Federal and state policies on student loans, immigration, financial aid, or affirmative action can feel unapproachable unless one works in policy making. Deliberation helped students identify ways they could affect these issues by focusing the onus of action on them and other stakeholders. One student simply stated, "I had the agency to engage what concerned me most." Since public deliberation engages what people hold valuable about higher education (e.g., keeping college affordable, equality in education), students felt more connected to the issue and were better able to identify action steps they could take to affect policy. One student found value in this aspect of public deliberation:

> I appreciated the opportunity to focus on topics of direct interest to me and others in my group. This allowed [us] to master the material and decide what we could do. We could establish common ground and ways we could proceed.

Finding one's place and identifying steps for action are important aspects of public deliberation and students echoed their importance.

Discussion and Implications

The results of this case study hold several implications for practice. First, public deliberation carries considerable promise for fostering the learning of adult students. Instructors would likely agree that three of the five themes from this study constitute vaunted learning outcomes (i.e., understanding multiple perspectives, increasing student agency, evaluating tradeoffs associated with action). Public deliberation was shown to help achieve these learning outcomes, which is corroborated by other studies (Dedrick et al., 2006; McMillan & Harriger, 2007).

In particular, public deliberation was shown to increase student agency – an important aspect of adult learning theory (Knowles, 1984; Lindeman, 2011). As Knowles (1984) argued, adults have a deep psychological need to be self-directed learners. Public deliberation inherently requires self-directed learning, as students are responsible for naming and framing an issue for public deliberation. Doing so requires students to take charge of their own learning and mutually construct an issue book based on their groups' understanding of the issue. Public deliberation as an andragogy is therefore an appropriate fit for adult learners based on Knowles' characteristic of self-direction in adult learners.

Another implication for practice is that public deliberation may be an important vehicle for making complex content more accessible and practical for students. Higher education policy can feel inaccessible to students because policy is often viewed as something elected officials or prominent college administrators do. A new professional or graduate student in higher education may feel as though they do not have a role in policy matters. As one student remarked, "Policy is something that happens at 30,000 feet." Public deliberation can help students conceptualize an issue and determine their roles in taking action. In essence, public deliberation can be an effective tool for affecting change and taking collective action because it helps students better understand the issues and places them within the issues, therefore making action more likely. This finding relates to Knowles' (1984) characteristic of adult learners possessing vast life experiences that serve as the richest source for their learning. Public deliberation invites students to bring in personal experience (Melville et al., 2006), which may help students feel more

connected to the issue. By leveraging adult learners' significant life experiences, public deliberation provides a rich opportunity to foster student learning.

Educators may find that public deliberation provides a framework for meaningful and engaging group projects. As students indicated, public deliberation requires an immense amount of group coordination and dialogue, which fostered some initial resistance. How does one counter students' apprehension of a group project, which several adult learning theorists, such as Brookfield (1991) and Cranton (2006), have identified as an important pedagogical component? These theorists suggest considering asynchronous group projects, where students do not have to work on a group project at the same time. Public deliberation presents a challenge to this suggestion because public deliberation andragogy usually requires people synchronously working together. Since adult learners tend to have significant familial and career obligations outside of school (Soares, 2013), exploring ways to facilitate synchronous group work in public deliberation would enhance its utility and application for adult learners. In this study, the instructor set aside time for students to plan, discuss, and work together on their project. The instructor was available to answer questions, provide direction, and assess group dynamics during this time.

Educators should also consider how to evaluate students' work on a public deliberation project. Students in this study described considerable apprehension about an unfamiliar andragogy and project as the sole basis of their grade. Further, the instructor made the determination that students would not receive individual grades for their work; rather, students would receive a group grade. Public deliberation requires group work at all levels—naming, framing, deliberating, deciding what to do next—which begs the question of how to separate grading considerations. Unless there is a problematic group member, how does one assign different grades to students when the finished product (i.e., the issue book) is a reflection of hours of intense discussion and reworking of the naming and framing? Educators could seek to add individual reflection components or action plans to help offset the issues that often accompany a group grade.

Related to the prior implication of considering public deliberation as an andragogy, a few cautions should be heeded. First, understanding public deliberation requires a thorough research and reflection of the intent, process, and design. Those interested in adopting public deliberation in their classrooms should familiarize themselves with the theory and process. While the process of public deliberation helps participant's finds common ground for action when working with complicated societal topics, this process may not be useful in all classroom situations. Second, according to a Kettering Foundation report (2011), the deliberative process is only appropriate when participants are aware of a problem but are unsure or unable to identify exactly what is at stake. Issues that are too broad, or decisions have already been made, or the issue requires technical or managerial solutions are also not a good fit for the deliberative process. A sound issue for deliberation typically centers around perspectives with a moral or value based foundation; such issues cannot simply be solved through traditional classroom or community discussion or debate. In this manner, public deliberation is distinct from dialogue, debate, and other forms of discussion typically used in educational settings. The National Issues Forum (www.nifi.org) provides a host of resources for educators interested in public deliberation. After gaining a more nuanced understanding of public deliberation, educators should then determine if public deliberation is an appropriate fit for their intended learning outcomes.

Limitations

Readers should consider several limitations when reflecting on the results and implications of this study. First, data about students' experiences in the course were gathered at the end of the course. Students were asked to retrospectively assess their initial reactions to the instructor's use of a public deliberation andragogy and their subsequent learning. This practice is common in research (Creswell, 2007), but detailed reflections throughout the course would likely have produced more robust data. Second, two of the eleven students in the course declined to participate for undisclosed reasons in the research study. Having their voices reflected in this research would have provided a more complete picture of our collective experiences, and perhaps even provided a negative case (Stake, 1995). Finally, the fact that time constraints did not permit students to deliberate with members of the larger campus or regional community limited the impact of our collective work. Doing so would have broadened the impact of our work and more accurately reflected the true nature of public deliberation (McMillan & Harriger, 2007).

Conclusion

This study explored the use of public deliberation as a teaching andragogy. The instructor used public deliberation as a teaching andragogy in a doctoral higher education policy class and this model gave students voice, agency, ability to weigh tradeoffs, and the opportunity to make informed contributions to important higher education issues. This andragogy helped students to see themselves not just as *passive* students, but as stakeholders, actors, and participants whose views and contributions were central in the educational decision-making process. When students are given agency to explore their own academic inquiries, they tend to produce more quality outcomes and report greater learning than being passive recipients of knowledge (Knowles, 1984). Public deliberation provides an environment to build student agency and foster student learning. Although the participants of this study expressed initial nervousness because public deliberation was unfamiliar to them as a teaching andragogy, the overall results indicated that students were able to see multiple perspectives, weigh tradeoffs, and experienced increased student agency in the process. Public deliberation is thereafter a promising andragogy that enhances student learning.

Furthermore, the importance of public deliberation in the twenty-first century classroom is crucial given the multi-faceted nature of knowledge in the present digital age and the increasing number of adult learners (Soares, 2013). Technologically and demographically, students are more aligned to instructional contents that allow them play active roles in the formation of knowledge. Hence, there is a paradigm shift in how knowledge is constructed (Barr & Tagg, 1995) as adult learners are more interested in an education that allows them have autonomy and freedom to pursue their inquiries in areas that interest them most (Lindeman, 2011). Our experience with public deliberation showed that public deliberation creates greater ownership of the course, fosters critical thinking and student agency, and implicates taking action. Public deliberation may hold the key to creating an adult learning environment rich with these attributes.

Appendix

Appendix 1. End of Semester Student Survey

1. What were your initial reactions when you learned that the main assignment for this course would be on naming and framing a higher education policy issue for public deliberation?
2. What did you find to be most rewarding about the public deliberation project?
3. What did you find most challenging about the public deliberation project?
4. What benefit does public deliberation have for addressing higher education policy issues?
5. What did public deliberation as a teaching method do to benefit your learning as opposed to other teaching methods (e.g., lecture, traditional academic paper)?

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Examining the literacy histories of doctoral students in an educational studies program through surveys and interviews: A mixed methods study

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Abstract: The purpose of this mixed methods sequential explanatory study was to explain the relationship between literacy experiences over time and the literacy identities of the doctoral students in a teacher education and higher education program. The quantitative phase, surveying 36 participants, revealed a positive correlation between participant's present and past literacy experiences, suggesting that past literacy experiences impacted their present perception of themselves as successful doctoral students. In the qualitative follow up multiple case study analysis, four major themes emerged from the interviews and participants' visual representations: (1) past literacy experiences; (2) present literacy experiences; (3) support systems; and (4) social experiences. The findings suggest that early feelings of success in literacy contribute to strong literacy identities in higher education programs. Implications for the faculty of higher education will be discussed.

Keywords: literacy identity, doctoral students, literacy experiences, teacher education, higher education

Introduction

Within the field of education, doctoral student attrition rates are estimated at 50% (Ivankova & Stick, 2007). High attrition of doctoral students is costly to the learning institution, to the faculty, and to students (Gardner, 2009a). Scholars have looked at various factors to determine reasons for persistence in doctoral programs from student characteristics, academic records, and advising and support structures (Gardner, 2009b). Researchers have found that strong literacy identities, as well as support systems, are connected to students' ability to succeed in master's and doctoral programs (Mullen, 2001; Onwuegbuzie, 1997).

Graduate programs require extensive reading and writing for success and persistence. Many graduate students often face challenges adjusting to the academic rigor of advanced coursework. Hall and Burns (2009) discussed the identity transformation of students coming into doctoral programs. Often students enter a program with perceived literacy capital that holds little value in doctoral studies. These students must negotiate their identities in order to become valued readers and writers of research. Wao et al. (2009) found that perceived time restrictions and reading vocabulary were factors in a doctoral student's ability to consume and process research. Mullen (2001) discussed how doctoral students often struggle with their self-perception as writers and researchers. Knowledge and understanding of factors contributing to doctoral students' past, present and future literacy identities may help academic institutions better meet

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the graduate students' needs, improve the quality of their academic experiences, and reduce graduate program attrition rates.

The purpose of this explanatory mixed methods study was to examine how doctoral students' literacy identities shape their experiences in the program. Our assumption prior to beginning the study was that experiences in a doctoral program are influenced by students' literacy identities. We believe that past experiences with reading and writing shape how doctoral students see themselves, thus impacting their literacy identity. That identity in turn shapes their experiences and success in the program. Specifically, this study explored how past and present literacy experiences contributed to participant's identities as readers and writers within a teacher education and higher education (TEHE) program.

Literature Review

This study is grounded in a sociocultural perspective. Language and learning are socially constructed and situated experiences, embedded in the cultural context in which we live (Vygotsky, 1978). For the purposes of this study we draw from the work of Gee (2006) and define literacy identity as a co-constructed and socially situated sense of self which shapes the individual's perceptions of their world over time. This definition implies one's literacy history – past experiences with literacy – as critical in shaping one's literacy identity. Moreover, Holland, Lachicotte, Skinner, & Cain, (1998) assert that identity is historically dependent, socially enacted and culturally constructed understandings or objectifications of the self or a group. These understandings are produced from the interaction of individuals' personal worlds with collective spaces and social relationships. They call these collective spaces figured worlds.

Institutions are active in the process of individual identity construction (Holland et al., 1998). The home, the community and the school are distinct but overlapping figured worlds in which people develop reading and writing identities. These identities develop over time, are influenced by numerous social and cultural experiences, and expressed according to social and cultural norms (Skerrett, 2012). Identity is socially constructed and is often tied to group membership (Moje & Luke, 2009). Individual's identities are shaped and reshaped within the context of their figured worlds. Because of this, identity is neither static nor singular (Lave & Wenger, 1991).

An individual's sense of self, or identity, can be understood through stories (McAdams, 1993) and visual representations (Bustle, 2004). Drake, Spillane, & Hufferd-Ackles (2001) used literacy stories as representations of participants' literacy identities. The stories shared were set both at school and home and served as the lens through which participants understood themselves personally and professionally (Drake et al., 2001). Williams (2003) has looked at literacy narratives that students created highlighting their prior literacy experiences and their general feelings towards reading and writing. Hayik (2012) asked students to create visual representations in the form of collages to represent identities. Narratives and visual representations can be used to communicate the identities that students construct.

Many studies have been done to understand student literacy identities (Guthrie & Alvermann, 1999; McCarthey, 1998, 2001; Skerrett, 2012; Williams, 2003). The findings of these studies reveal that students' literacy identities are fluid, shaped by contexts, tasks, and family and cultural expectations. There are additional studies that examine doctoral student success in graduate programs. Ivankova and Stick (2007) found five external and internal factors to be predictors of students' success and persistence – environment, program, student support,

faculty, and self motivation. Gardner (2009b) discusses the difficulties defining success at the doctoral level, and identifies the various indicators that have been used to demonstrate success, such as retention, academic achievement, graduation, and professional socialization. Drawing on Gardner's work, for the purpose of this study of current doctoral students, we defined academic success using the following indicators: retention, academic achievement, and professional socialization. Despite research in the fields of literacy identity and doctoral education, a gap in the literature remains linking students' literacy identity to their experiences in a doctoral program.

Research Questions

Based on the review of the literature, we posed the following research questions to guide our study, which examined the literacy histories of doctoral students in an educational studies program. The quantitative question that guided phase one was: How do doctoral students rate their past literacy experiences and the impact of these experiences on their current literacy identities? The qualitative question that guided phase two was**:** What are the perceived literacy identities of doctoral students in a TEHE program? The question that guided the mixed methods section was: How do past literacy experiences impact the literacy identities of doctoral students in a TEHE program?

Method

Study Design

This study used a mixed methods sequential explanatory design with two distinct phases (Creswell & Plano Clark, 2011). The rationale for using this design was to first collect quantitative data that would inform the selection of interview participants in order to be able to explain and expand on the results from the quantitative data. The mixed methods approach also provided an opportunity to triangulate data (Bryman, 2006; Greene, Caracellli, & Graham, 1989; Johnson, Onwuegbuzie, & Turner, 2007), and was implemented in order to gather numerical data and include rich, thick descriptions of participants' literacy experience in their own voices. Although typically priority is given to the quantitative data in a mixed methods sequential explanatory design (Creswell, & Plano Clark, 2011), in this study the priority was placed on the qualitative data. Ivankova, Creswell, and Stick (2006) asserted that priority can be determined based on study goals and the particular design of each phase. In this study, our goals were to understand the "hows and whys" (Yin, 2009) of doctoral students' identities and experiences and amplify their voices through interviews and visual representations.

Participants

At the time of this study, the participants were enrolled in the TEHE Ph.D. program offered by a university in the Southeast region of the United States. All 74 current doctoral students were invited by the research team to participate via email. The email contained details of the study, a consent form including potential risks and benefits, contact information, and a link to the survey. Of the 36 consenting participants, 11% were in year one, 36% in year two, 22% in year three, 19% in year four, 8% in year five, and 3% in year six. Forty two percent of these

students had a concentration in higher education, and 58% in teacher education. There were 24 females and 12 males. Ages ranged from 25 to 63 with the mean age of 40.

Instruments and Procedures

The survey instrument used in phase one was developed by the researchers guided by the existing literature on literacy identity (Gee, 2006; McCarthy, 2001; Moje & Luke, 2009). To increase the validity of the survey, it was shared with three expert reviewers in the fields of literacy and/or identity prior to distribution. Based on feedback from the reviewers, the survey was revised to more precisely address the research questions. Thirty-six participants completed the survey, yielding a 48.6% response rate. The survey instrument asked 10 questions which were answered on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). These questions elicited information regarding participants' past and present literacy perceptions and attitudes (See Table I). The reliability of the survey was .84 according to Cronbach's alpha.

Descriptive statistics and an independent t-test were used to analyze the survey data. The descriptive statistics were used to measure mean scores on the ten survey responses. An independent t-test was utilized to determine if there was a significant difference between participants' perceived past literacy identity. Participants were divided into two groups based on their responses to question five, "Growing up, I was a successful reader and writer". Those who reported 1 or 2 on the Likert scale retrospectively identified themselves as less successful readers and writers (low literacy identity group), while those who reported 3 or above on the Likert scale self-identified as more successful readers and writers (high literacy identity group). In order to examine participants' past and present literacy experiences and compare how these experiences differ among participants' with higher verses lower literacy identity as determined by their responses to question five, an independent t-test was utilized.

Phase two used an explanatory multiple case study design, with each participant representing a separate case (Yin, 2009). This phase sought to explain the "hows and whys" of doctoral students' identities and experiences. In-depth data collection was conducted involving multiple sources of information reporting case descriptions and case-based themes (Creswell, 2003). Two cases from the larger study will be shared in this article. In order to provide a broader lens to examine literacy identity and contrasting perspectives, one participant was chosen from each concentration – higher education and teacher education. In addition, participant one was selected based on high survey data scores, whereas participant two demonstrated below average scores on the survey.

The data were collected from multiple sources (Yin, 2009) in order to provide an accurate understanding of doctoral student's perceived identities and how past literacy experiences impacted these identities. The data included: (1) semi-structured interview questions (Schensul, Schensul, & LeCompte, 1999), (2) visual representations. The interview protocol – grounded in literacy identity research (Gee, 2006; McCarthy, 2001; Moje & Luke, 2009) and reviewed by three experts in the field – was used to obtain the participants' literacy stories. Members of the research team independently conducted interviews that ranged thirty minutes to an hour long with each participant. The interview asked eight questions. Example questions included: "How did your school literacy practices impact how you read and write today?" "How does literacy (reading, writing, speaking, listening) impact your daily life?" "How have your literacy histories shaped your experiences in the doctoral program?" Participant stories were

constructed as they shared about and reflected upon their past experiences with reading and writing and how these experiences shaped their current literacy identity in the TEHE doctoral program.

Participants were asked to create a visual representation prior to the interview that illustrated their literacy identity. The term visual representation is used purposefully to include a wide range of visual meaning and making devises as well as symbols (Bustle, 2004). This activity was created as a tool (Shephard, 1993) for both the process *for* and a representation *of* doctoral students' understanding of their literacy identities. The prompt for this activity was intentionally open ended to allow participants to express themselves in whatever way they saw most appropriate. The visual representation allowed researchers another opportunity to view students' perceptions of their literacy identities without the pressure of providing standard responses to questions posed in the survey and interview to illustrate their literacy identities. A researcher met with each participant and asked them to explain their visual representation.

Each interview was audio recorded and transcribed by researchers. One interview was coded individually by all four researchers. Researchers collaborated to compare and discuss the results of independent coding. From this process nine initial descriptive themes (Miles & Huberman, 1994) emerged: past home, past school, past professional, present school, present home, present professional, social/support experiences, beliefs, and future professional. Using the initial codes each researcher reexamined the originally coded interview to develop and revise interpretations of the data using constant comparative analysis (Strauss & Corbin, 1998). In this process, researchers made comparisons of initial data analysis to reduce, display, and draw conclusions from data (Miles & Huberman, 1994). Following this analysis and discussion among researchers, the nine themes were collapsed into four: past literacy experiences, present literacy experiences, support systems and social experiences. Each researcher independently reviewed and coded the remaining transcribed interviews using the four themes. Coding agreement among researchers exceeded ninety percent and discrepancies were settled through discussion. Member checking (Lincoln & Guba, 1985) was used to confirm and verify the findings from each interview and the interpretations of the visual representations. Case study write-ups were shared with participants and feedback was solicited. Once the themes were established, each visual representation along with notes from the participants' explanation was analyzed for evidence of the themes thus providing triangulation.

Results

Quantitative Findings

The findings from this phase answered the quantitative research question, regarding how students rated their past literacy experiences and their current literacy identities. The mean scores from the survey indicate that on average, people rated their past literacy experiences highly. In addition, they also highly rated the impact of their past experiences on their current identities (See Table 1).

The Inter-Item Correlation Matrix indicated a significant positive correlation ($p<.05$) between two questions; question five "Growing up, I was a successful reader and writer," and question nine "I am a successful doctoral student in part because of my previous experiences with literacy." In contrast, although not significant, a negative correlation was found between question five "Growing up, I was a successful reader and writer," and question eight "My

previous writing experiences have been useful to my work as a doctoral student." Although these results suggest that participants believed previous literacy experiences prepared them for the doctoral program, they did not feel as prepared for academic writing.

Table 1

Survey Questions with Means

Question	N	Mean	Standard Deviation
Q1. I have always enjoyed reading.	36	4.23	1.17
Q2. I have always enjoyed writing.	36	3.57	1.33
Q3. Growing up, reading and writing were encouraged in my home.	36	4.00	1.11
Q4. Growing up, reading and writing were modeled in my home.	36	3.42	1.42
Q5. Growing up, I was a successful reader and writer.	36	4.31	.99
Q6. My previous literacy experiences impacted my decision to pursue a graduate degree in my field.	35	3.31	1.32
Q7. My previous reading experiences have been useful to my work as a doctoral student.	36	4.17	1.07
Q8. My previous writing experiences have been useful to my work as a doctoral student.	36	4.22	1.01
Q9. I am a successful doctoral student in part because of my previous experiences with literacy.	36	4.14	.94
Q10. I believe that my previous literary experiences will positively impact my future career.	36	4.31	.83

An independent *t*-test was run to compare the means of question five with the rest of the questions. To prepare the data for this *t*-test, the sample scores were collapsed into two groups and compared across groups. Group one represented the lower half of the Likert scale, and Group two the upper half. The *t*-test found no significant differences between Groups one and two when comparing past literacy identity (question five) and the other variables (questions 1, 2, 3, 4, 6, 7, 8, 9), showing that previous literacy identity did not necessarily determine present experiences with literacy in the doctoral program ($p > .05$) Means for Group one were higher than those for Group two in questions four, eight, and nine, indicating that for these questions the survey respondents saw their previous literacy experiences yielding slightly smaller influences on their current literacy identities (See Table 2). The highest margin of difference was for question eight, "My previous writing experiences have been useful to my work as a doctoral student," with a mean of 4.71 (SD .76) for Group one, and a mean of 4.13 (SD 1.0) for Group two. Group one, who self identified as less successful in their previous reading and writing experiences, actually reported that these experiences were more impactful on their work as a doctoral student than participants from Group two who self identified as more successful in their previous reading and writing experiences. A possible explanation for this finding results from the identity transformation that doctoral students undergo throughout their program, which may be greater for those students that enter with high literacy capital and feel as if their previous success is not valued.

Qualitative Results

The findings from this phase illustrated the perceived literacy identities of doctoral students. The results of this phase yielded four themes representing these perceptions and the factors that shaped them. The four themes were past literacy experiences, present literacy experiences, social experiences, and support systems. While using these themes to analyze and discuss the findings, the researchers recognized that these themes were not necessarily discreet. The following are descriptions of the themes and how they were used in the study. Past literacy experiences were defined as occurring prior to entering the doctoral program. Present literacy experiences referred to experiences during the period of time in which the participant is enrolled in the doctoral program. Social experiences involved others in a meaningful way. Support systems were individuals or groups who supported the participant's literacy experiences in the doctoral program. The following two cases highlight the four themes. Pseudonyms have been used to protect the identity of participants.

Catherine, the first case study, was a third-year full-time doctoral student in the department of TEHE. Her focus area was teacher education, with her interests concentrated on middle grades and literacy. When she finished the program she hoped to have a tenured track position as a professor. The three words Catherine used to describe herself as a reader were curious, a detective, and dedicated. In describing herself as a writer, Catherine chose the words: versatile, communicative, and a way to help her think. Catherine created a magazine cover as a visual representation of her literacy identity (see Figure 1).

Table 2

Group Statistics

Question	LI	N	Mean	SD	SE
I have always enjoyed reading	1	7	4.14	1.21	.46
	2	9	4.28	1.16	.22
I have always enjoyed writing	1	7	3.71	1.25	.47
	2	29	3.55	1.35	.25
Growing up, reading and writing were encouraged in my home.	1	7	4.14	1.10	.40
	2	29	4.00	1.13	.21
Growing up, reading and writing were modeled in my home.	1	7	3.14	1.35	.51
	2	29	3.52	1.43	.27
My previous literacy experiences impacted my decision to pursue a graduate degree in my field.	1	6	2.50	1.38	.56
	2	29	3.48	1.27	.24
My previous reading experiences have been useful to my work as a doctoral student.	1	7	3.71	1.60	.61
	2	29	4.31	.89	.17
My previous writing experiences have been useful to my work as a doctoral student.	1	7	4.71	.76	.29
	2	29	4.13	1.03	.19
I am a successful doctoral student in part because of my previous experiences with literacy.	1	7	4.30	.95	.36
	2	29	4.13	.95	.18
I believe that my literacy previous literacy experiences will positively impact my future career.	1	7	4.14	1.07	.40
	2	29	4.34	.78	.14

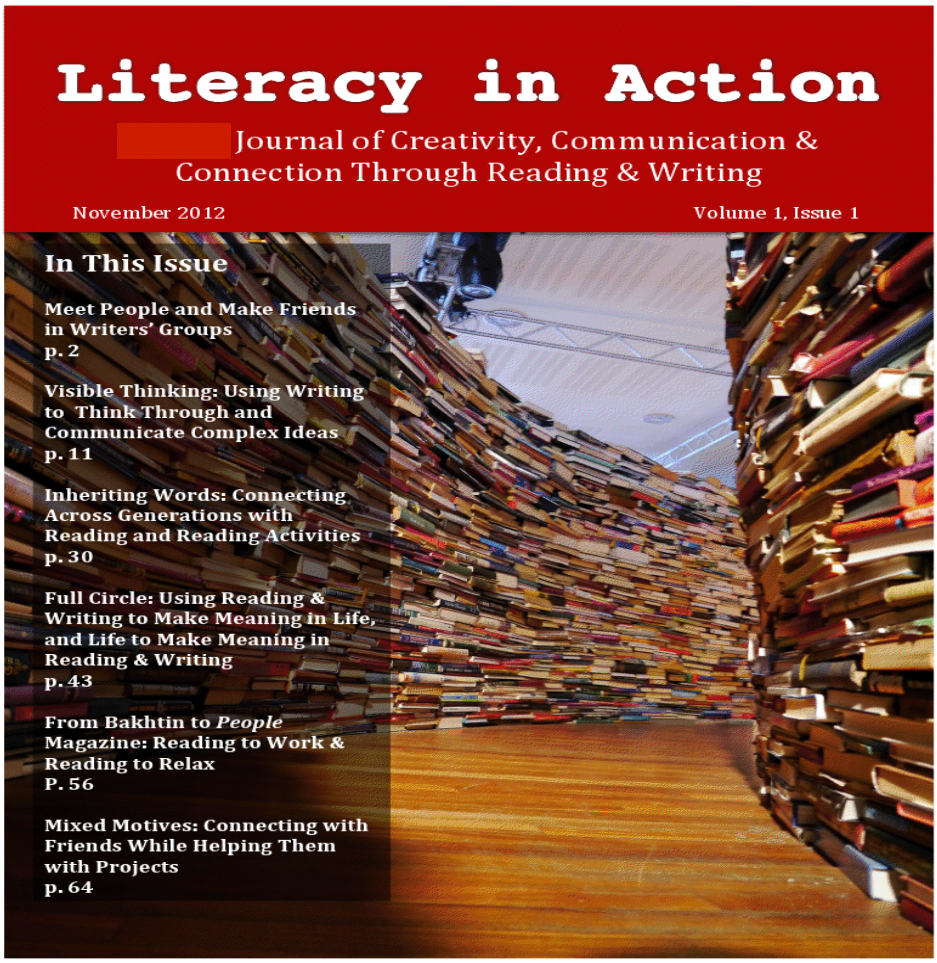

Figure 1. Catherine's visual representation.

Literacy played a large role in Catherine's life growing up, both at home and at school. She spoke about how her father loved books and was always reading. Catherine described visiting the library with her father as a child as an important home literacy experience by saying, "So I read, I think I read everything they had at the Chapel Hill library. So that really shaped my experience. You know it connected me to my dad. It gave me something that I could do that was free and I was good at." Catherine actively sought out reading and writing experiences that put her in the social circles she wanted to be a part of. She told about joining the yearbook staff in high school, which involved writing feature articles and required a writing sample to become a member. In college, Catherine was involved in a creative writing club. Also during college, Catherine worked at a bookstore. She and a co-worker started a reading series for writers to share original work with an audience.

Much of Catherine's present literacy experiences centered on her work in the doctoral program. Reflecting on her transition into the program, Catherine recalled feeling frustrated stating, "I did take it personally that the kind of literacy experiences I had or the kinds of writing I had done was not only not valued, but actively devalued." Catherine explained feedback she had received on her first paper completed in the program by stating, "I got a lot of critique that I needed to make sure all of my claims were warranted with evidence from published, academic,

peer-reviewed, scholarly research." She explained that it took her time to build up literacy in the field and that she has had to "compartmentalize the parts of my literacy identity more since I have started this program."

Catherine explained two critical support systems that have helped her experience in the program. The first was her peers and in particular a writing/dissertation group that she was a member of and had organized. She noted, "I know it is going to be very useful to me to give me feedback, that is just to support me, to help me, that is not to evaluate me." The second support Catherine discussed was her advisor. Catherine described this relationship by stating, "I feel like she has really pushed me, but also really encouraged me in something that at first could have been very overwhelming to me."

Throughout the interview, Catherine continually highlighted the social nature of her literacy experiences. She explained, "I like to write to communicate with people, I don't necessarily like to craft something that no one else is ever going to see. Like even when I did a lot of creative writing, I was always in sort of a writer's workshop setting, so I was motivated by the deadline, knowing I had class coming up or knowing that I was going to be sharing it with my peers and I wanted it to be something they would like and I wanted it to be good." Many of the article titles on Catherine's visual representation also highlighted the social nature of Catherine's literacy experiences. From her early experiences of visiting the library with her father and writing letters with her camp pen pal, to her later experiences with the creative writing club and bookstore readings, Catherine sought out opportunities to co-construct her literacy knowledge and identity in a social context. This case illustrated the three indicators of academic success as previously discussed: 1) Retention: Catherine is still enrolled in the doctoral program; 2) Academic Achievement: Her discussion of taking critiques and using them to build her literacy in the field. In addition, Catherine has successfully completed her coursework, exam requirements and is currently working on her dissertation; 3) Professional socialization: Organization and participation in the writing group and critical conversations with her advisor.

Tabitha, the second case study, was a third year doctoral student in the department of TEHE. Her focus area was higher education and when she finished the program she hoped to be an administrator at a four-year institution in academic support systems. Tabitha scored in the below average range of survey responses. When asked to pick three adjectives to describe herself as a reader, Tabitha picked proficient, slow and inquisitive. As for adjectives to describe herself as a writer, she chose slow, effective and frustrated. Tabitha created her visual representation (see Figure 2) on a PowerPoint slide with eight different images of books.

While explaining her past literacy experiences, Tabitha took a walk back in time to remember how she first learned to read with help from her grandmother. She also vividly remembered being able to read before entering kindergarten and she shared that she experienced feeling like the "other" due to her advanced reading ability throughout her K-12 school experience. Her parents did not read for pleasure while she was growing up, but they provided access to reading materials. Tabitha described a shift in her attitude toward reading when she entered middle school where reading was required. She explained, "I saw reading as a barrier sometimes like when you get assigned reading like a punishment – a hoop to jump through so that definitely impacted my approach to reading and writing." This continued into high school and she no longer read for pleasure. However, in college, reading helped her deal with issues of racism and identity struggles around her culture. She remembered, "When I went to college that was time for me to explore through reading and I was introduced to a lot of philosophers and

writers that wrote about things that I had been feeling. I learned how to articulate my thoughts through their texts."

Figure 2. Tabitha's visual representation.

In describing her present literacy experiences, Tabitha shared that most of what she read was online and related to her studies. "I read for the purposes of getting information and I write for the purpose of communicating knowledge." With her peers in the doctoral program, she felt a sense of acceptance and belonging. "My reading and writing abilities in the past made me feel alienated, now I feel assimilated." Tabitha described herself a critical consumer of information and was proud of the fact that she can read and write with this type of perspective.

When asked what had impacted her literacy development in the doctoral program, Tabitha mentioned two specific support systems. The first support structure, created by her dissertation chair, met biweekly to work on their writing and was comprised of the chairs' advisees. The second group was called the DIVAS. This group of women came together to help each other prepare for comprehensive exams by reading and critiquing each other's writing.

In her interview, Tabitha did not describe many social experiences specifically related to literacy, however, she expressed tension that she often felt navigating between what she called her "two circles" which were comprised of her family/community and her academic colleagues. "I can speak and read and understand and deal with topics the same way that my peers do and so that makes me legitimate but in my community that makes me different because I speak differently. I speak the way I read and I speak the way I write." Tabitha added, "It makes me an elitist at home and kind of shapes the different ways I have to play around in my community." For Tabitha, her present literacy identity impacted her social experiences regardless of which "circle" she was in at a particular moment. This case illustrated the three indicators of academic success as previously discussed: 1) Retention: Tabitha is still enrolled in the doctoral program; 2)

Academic Achievement: She described herself as a critical consumer and producer of information. In addition, Tabitha has successfully completed her coursework, exam requirements and is currently working on her dissertation; 3) Professional socialization: Participation in the writing group and biweekly discussions with her committee.

Mixed Methods Findings

The quantitative and qualitative data revealed participants' perceptions of their literacy identity and the impact of their past experiences on their present experiences as doctoral students. While they shared common themes, their individual experiences varied. In both case studies, participants discussed the role of family in their early literacy identity development. Catherine discussed shared reading experiences with her father and unlimited access to texts as meaningful and positive. On the survey, Catherine selected 5, the highest rating on the Likert scale, on reading and writing being encouraged and modeled in her home, whereas Tabitha selected 2 and 3 respectively. Although Tabitha expressed having access to reading materials, reading was not necessarily encouraged nor was it seen as a shared experience in her home and community. In response to question 1, "I have always enjoyed reading," and 2, "I have always enjoyed writing," Catherine rated both as a 5, Strongly Agree, while Tabitha rated these same items as a 1, Strongly Disagree. This is also evident in Catherine's desire to seek out reading and writing social groups, and Tabitha's disengagement with reading during middle and high school. Despite expressing different levels of enjoyment with reading and writing, the two participants self identified as successful readers and writers in the survey and interview data. In response to question five, "Growing up, I was a successful reader and writer," Catherine rated her experience as a 5 and Tabitha a 4. They both shared stories of successful schooling experiences.

Despite varied literacy histories, both participants rated their previous reading and writing experiences as useful to their doctoral work and felt that they were successful in the program in part because of these experiences. In relation to these items they both agreed (4) or strongly agreed (5). Catherine and Tabitha also felt that previous experiences impacted their future career. Both participants expressed challenges in adjusting to the academic expectations of the doctorate program, such as reading scholarly research and writing in their discipline. However, they were able to overcome these challenges and contribute to their field as critical scholars. Both participants discussed positive experiences and increased confidence in their abilities as readers and writers in the Ph.D. program. They also shared specific stories of academic experiences that shifted their perceptions of their literacy identities in the doctoral program. For example, Tabitha revealed that her doctoral program made her feel legitimate because she "can speak, and read, and understand, and deal with topics the same way that [her] peers do."

The meaning participants attached to their literacy experiences were co-constructed in social settings (Vygotsky, 1978). All participants shared stories that illustrated social learning and literacy experiences. Catherine specifically talks about literacy as cultural capital, whereas Tabitha at times saw literacy as a limiting factor in social situations. During their doctoral program, participants noted additional literacy experiences which allowed them to communicate and collaborate with others including writing groups, and critical friends.

Participants described a range of support systems throughout their literacy development in the doctoral program; citing support from peers and university professors. These systems helped to shape participant identity and progress in numerous ways including providing critical feedback, creating learning communities and building confidence affirming the participants'

persistence in the PhD program. These results are consistent with Gardner's (2009a) findings regarding the importance of support systems for doctoral students' persistence and success. Peer support was found to be a critical part of support systems for doctoral students.

Discussion

This study found that many graduate students begin their program with a successful literacy identity. The results of the survey indicate that most participants perceived themselves to be successful readers and writers in their past and felt that their past literacy experiences contributed in part to their success in the program. On average, the surveyed doctoral students rated question nine, "I am a successful doctoral student in part because of my previous experiences with literacy" as 4.14 on a scale of 1 to 5 indicating that previous literacy experiences contribute to success in higher education programs. Both Catherine and Tabitha discussed having a difficult transition into the doctoral program due to increased demands for reading and writing. Reading empirical research and theoretical works was new to Tabitha and Catherine as well as other new graduate students (Wao et al., 2009). Catherine explained that her literacy identity "took a hit" when she started the program. Both participants needed time to adjust to the rigorous demands of graduate work by learning to read and write in new ways for different purposes and audiences. Tabitha discussed having a sense of pride in the idea that she was able to generate new knowledge in her field. In addition, both participants expressed the importance of support systems in the doctoral program in the form of peers and feedback from professors. These support systems helped the participants feel more confident in their success as doctoral students.

We acknowledge that our findings are based on participant and researcher perceptions linking past literacy identity to current literacy experiences. While there is no statistical causal evidence, our qualitative findings suggest that past literacy experiences contribute to doctoral success as we define it: retention, academic achievement and professional socialization in doctoral programs. Knowledge and understanding of factors contributing to doctoral students' past, present and future literacy identities may help academic institutions better meet the graduate students' needs, improve the quality of their academic experiences, and reduce graduate program attrition rates. Researchers discuss the importance of students having feelings of success while engaged in the more challenging tasks of graduate education (Lavelle & Bushrow, 2007; Shaw, 1999). It is also important for higher education to foster students' literacy identities as contributors to scholarship (Mullen, 1999; Wadsworth, Halfman, & Upton, 2002) and professional fields (Faigley, 1981). As student identities and needs are examined and supported in doctoral programs, students may be better prepared to meet the demands of higher education and become better prepared for their future careers.

Implications and Future Research

This research highlights the impact of past and present literacy experiences on perceived student literacy identities and addresses a gap in the literature on literacy identity by emphasizing graduate students' need for continued support of academic experiences throughout their graduate career. In addition this study contributes to previous research by linking the literature on literacy identity and doctoral students. The study helped draw out the additional themes of social experiences and support systems which could impact attrition rates. The fields of teacher

education and higher education will benefit from these findings in several ways. First, teacher education and higher education programs may profit from understanding doctoral students' self-perceptions and current literacy practices. The survey instrument and visual representation could be used as tools for university faculty to gain a better understanding of students' literacy identities and experiences. Utilizing results may allow staff to provide scaffolding for student learning. Second, these tools could be used by students as self-assessments for examining their literacy identities and the trajectory of their literacy development. This information could be used by students to determine the level of support from faculty and university support services. Third, students may benefit from a strong support system comprised of peers and/or faculty members who scaffold their academic literacy acquisition. Programs could foster the development of these support systems through writing groups, cohorts and mentors. If doctoral students feel supported and successful, attrition rates may be positively impacted. In addition, if faculties have a sense of doctoral students' literacy identities they may be better able to support them in their studies. Additional research could further explore the impact of doctoral students' literacy identities in their program and beyond. Future research could also examine social experiences and support systems in relation to doctoral students' persistence in higher education.

Conclusion

Limitations of this study include: a small number of participants, data collection within one doctoral program, and lack of data on student attrition. Nevertheless, this study addresses a gap in the literature that focuses on the combined fields of literacy and identity by linking them to success in higher education, underscoring the need for educational institutions to examine doctoral students' literacy experiences. Studies exploring literacy identities in other education programs as well as other disciplines should be conducted to more fully understand the role of literacy identity and support systems in graduate programs. In addition, this study could be replicated at the master's level.

While early literacy experiences were found to be important, based on the differences between Tabitha and Catherine, it is clear that early home literacy experiences do not necessarily dictate future success. Previous and present experiences that supported participants in higher education were found to be critical and consistent across the two case studies. This study shows the impact of support systems and how these systems continue to shape doctoral students' literacy identities. As students are supported in their doctoral programs they become better equipped and more confident in their abilities to be a critical consumer of scholarship and create new knowledge that contributes to their field. Furthermore, they are better positioned to enter the academe.

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Book Review

How Learning Works: 7 Research-Based Principles for Smart Teaching

Launa M. Gauthier[1]

Citation: Ambrose, S., Bridges, M., Lovett, M., DiPietro, M., & Norman, M. (2010*). How learning works: 7 research-based principles for smart teaching.* San Francisco, CA: Jossey Bass. ISBN: 978-0-470-48410-4

Publisher Description: Distilling the research literature and translating the scientific approach into language relevant to a college or university teacher, this book introduces seven general principles of how students learn. The authors have drawn on research from a breadth of perspectives (cognitive, developmental, and social psychology; educational research; anthropology; demographics; organizational behavior) to identify a set of key principles underlying learning, from how effective organization enhances retrieval and use of information to what impacts motivation. Integrating theory with real-classroom examples in practice, this book helps faculty to apply cognitive science advances to improve their own teaching.

How Learning Works: 7 Research-Based Principles for Smart Teaching meshes the art of effective teaching with the process of student learning. The authors' aim is to explore how students learn best and how instructors can appropriately foster their learning. Ambrose, Bridges, Lovett, DiPietro, and Norman argue that many faculty, as experts in their fields of study, underestimate certain aspects of students' learning such as how much structure students need in order to organize new content, and students' understanding of the learning goals that instructors may have for them as part of a course. On the other hand, faculty also overestimate students' abilities in the classroom, or their level of desire for performing certain tasks. *How Learning Works* is a comprehensive guide for instructors to help them explore how learning is happening in their classrooms. The authors designed the seven research-based principles for teaching to introduce faculty to approaches that support more integrated and engaged student learning.

Ambrose, Bridges, Lovett, DiPietro, and Norman bring a wealth of practical knowledge about teaching and research expertise to the subject of supporting faculty teaching. The authors write with a diverse teaching audience in mind—including college faculty, graduate students, and K-12 educators—who may be interested in knowing more about how students learn and how to apply this knowledge to instructional practices. With this book, the authors successfully bridge the gaps between research and practice and also amongst teaching and learning. In this volume they take the reader through a series of seven learning principles, distilled from a colossal collection of empirical research, which can be applied to instructor teaching practices in a variety of classrooms.

Ambrose, Bridges, Lovett, DiPietro, and Norman introduce *How Learning Works* by sharing their developmental and holistic perspective on learning. According to the authors,

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learning is a process that involves change (in knowledge, beliefs, behaviours, or attitudes), and it is something students *do* rather than something that is transmitted to them (p.3). They continue with outlining the central tenents of the seven learning principles that comprise the seven core chapters of this book. They close with a short, but useful, concluding chapter that suggests instructors apply the principles to themselves in order to continue to learn about themselves as teachers. Eight detailed appendices filled with instructional strategies that the authors refer to throughout the body of the book round out the end of the book. Each chapter opens with an appropriate narrative of a concrete teaching and learning scenario in a college classroom in order to exemplify the principle covered in the chapter. The majority of each chapter elaborates on the underlying research evidence that supports the principle, discusses examples of practical instructional strategies for classroom practice, and culminates in a brief, but helpful, chapter summary. The seven principles cover the role of students' prior knowledge, motivation, and developmental level, as well as opportunities for the student to practice and receive feedback, and learn to become self-directed learners.

Principle 1: Students' prior knowledge can help or hinder learning. This first principle speaks to the necessity of professors working with students to leverage accurate knowledge in order to promote learning. The author's main premise in this chapter is that if student have gaps and insufficiencies in their prior knowledge it may not adequately support new knowledge. Furthermore, if prior knowledge is applied in the wrong context it may lead to students making faulty assumptions or inappropriate comparisons to other situations.

Principle 2: How students organize knowledge influences how they learn and apply what they know. The authors focus on instructors helping students to gain a depth and breadth of knowledge through building effective knowledge organizations. Here, they acknowledge the difference between sparse and superficial novice knowledge structures and expert knowledge structures which tend to be more richly connected and meaningful. The main take-away points for instructors are helpful suggestions as to how to uncover their own methods for making conceptual connections. The authors suggest that when faculty understand how they organize knowledge, they are better prepared to model strategies for developing deeper, more meaningful knowledge structures for students.

Principle 3: Students' motivation generates, directs, and sustains what they do to learn. With this principle, the authors discuss the concepts of value and expectancy for success as competing factors that can increase or decrease student motivation. Chapter three is comprehensive in its discussion of how instructors influence student motivation. The authors define motivation; describe connections between student motivation, and three types of learning goals, three key levers of value, efficacy expectancies, and supportive classroom environments. The key point for instructors is to use the strategies suggested in the chapter to help students to establish value in the goals and activities they encounter in their learning and to build positive outcome expectancies to pursue learning goals. Instructors can also enhance student motivation by creating a positive and supportive environment for learning.

Principle 4: To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned. The premise of this fourth principle is for instructors to consider the tasks they expect students to accomplish. Instructors need to consider three elements of mastery that the authors claim are required for student learning: acquisition of component skills, practice in integrating these skills, and knowledge of when to apply the skills. The authors suggest that instructors break down complex tasks into their

component parts and offer students opportunities for targeted practice either through isolated practice, whole task practice, or a combination of the two.

Principle 5: Goal-directed practice coupled with targeted feedback are critical to learning. Here instructors are reminded of a fundamental purpose of feedback: to keep learners' practice moving forward and toward improvement. Furthermore, feedback should be targeted to learning goals, timely, and frequent. The authors make a salient point about assisting students' efforts in focusing on what they need to learn rather than what they already know. When instructors help students to set performance goals at a reasonable and productive level of challenge, they also make their own instruction more efficient and focused. This is an important result when considering most faculty face time constraints in the courses they teach.

Principle 6: Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning. Ambrose, Bridges, Lovett, DiPietro, and Norman bring an important point to the forefront of their discussion of this principle: students are holistic beings and classrooms are encapsulated by intellectual, social and emotional dynamics that influence their learning experiences. To understand individual student development better, the authors discuss the various stages of a research-based model of identity development. They use this model to give examples of different stages of identity development and in relation to student learning. The key feature for instructors is to encourage individual student development through shaping classroom contexts with consideration for the various sociocultural factors, stereotypes, and tone influence learning.

Principle 7: 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. The authors include this principle based on their assertion that one of the main intellectual challenges that students face upon entering college is managing their own learning. As such, this seventh principle is centered on the key metacognitive processes that are critical to being an effective self-directed learner. These skills are highlighted in a useful diagram called "The Cycle of Self-directed Learning" (p. 193). The processes in the cycle for students to follow include: assessing the task at hand; evaluating their strengths and weaknesses; planning appropriate approaches to accomplish tasks; and applying strategies for learning and monitoring performance. A take away for instructors is that students do not always apply metacognitive skills well. The authors suggest that instructors need to make development of metacognitive skills a focal point of the course goals.

At many points throughout the text the authors highlight various cognitive and developmental learning processes. However, the book lacks any adequate attention to social learning that, invariably, shapes student academic development and personal development (including identity and sense of agency) alongside of cognitive processes. One example is in chapter 6 where the authors stress the social and emotional dynamics that impact the classroom and can complicate learning. The authors engage in a broad discussion on various social forces that effect learning and highlight sociocultural factors, stereotypes, classroom climate, and faculty-student interactions. The authors maintain a strong focus on the influence of such social forces on cognitive aspects of learning; however, this focus seems to be somewhat contradictory of their professed holistic view of students. At any point in the text the authors could have entered into a brief conversation about social learning theory to explain the interplay of social interactions that are present in the classroom and how the individual learns with others, through others, and from others.

Finally, the arrangement of information in certain chapters in this volume needs consideration. For example, chapters four and six contain foundational information that frames the authors' position on education and learning. Readers would benefit from having this information much sooner in order to get a sense of the tone of the book and of the author's undergirding perspectives on education and student learning. For example, in chapter four, the authors point to the concept of transfer or "the application of skills (or knowledge, strategies, approaches, or habits) learned in one context to novel contexts" (p.108). They distinguish between near transfer (when learning context and transfer context are similar) and far transfer (when contexts are dissimilar). The authors then state that far transfer is the chief goal of education. With this statement they clearly accentuate their perspective on the purpose of education; however, it comes far too late in the book. In addition, chapter six covers students' level of development, which is, arguably, a crucial starting point for teaching and creating supportive contexts for learning in the classroom. However, if the authors are starting from the notion of the learner in order to better understand how learning works, then examining how learners develop is key information for instructors to have order to plan more effective classroom instruction.

Overall, *How Learning Works* is well written, extensively researched, and an informative read. The numerous empirical studies related to learning that are described in the book are relatively jargon-free, and complemented by familiar everyday examples thus enhancing their accessibility to numerous teaching audiences. Chapter sections entitled *Implications for this Research* are essential pieces that help to contextualize the theoretical portions of the authors' argument into practical applications of the classroom. The authors also weave regular reminders into the body of the text of the practical instructional strategies that are contained into the appendices of the book. Moreover, in terms of a tool for faculty development, this volume is a sound conceptual and practical launch pad for critical reflection on practice for instructors. Finally *How Learning Works* would lend itself well to a workshop series based on each individual learning principle that the authors present.

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

John Dewey[1] **and Marie Curie**[2]

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

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

General Guidelines for the Manuscript

Submissions should be double-spaced. The final manuscript should be prepared in 12-point, Times New Roman, and single-spaced. All margins should be 1 inch. Justify lines; that is, use the word-processing feature that adjusts spacing between words to make all lines the same length (flush with the margins). Do not divide words at the end of a line, and do not use the hyphenation function to break words at the ends of lines. The title (in 16 point bold) and author's name (in 12 pt. bold) should be at the top of the first page. The author's name should be followed by a footnote reference that provides the author's institutional affiliation and address. Please use the footnote function of your word processing program; there are a variety of instructions available online for each program. The abstract should be indented 0.5" left and right from the margins, and should be in italics.

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

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

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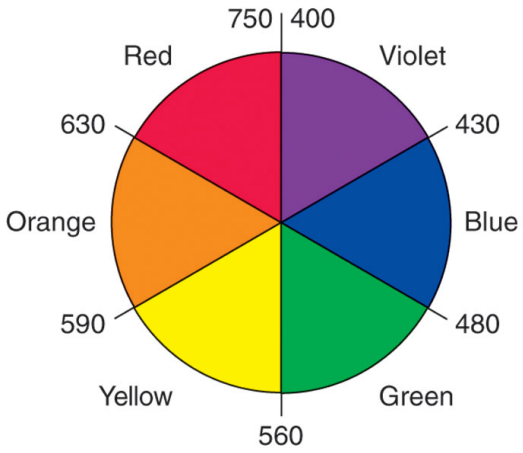

Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

Acknowledgements

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

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