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

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

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Research Articles

The Application of Differentiated Instruction in Postsecondary Environments: Benefits, Challenges, and Future Directions

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The population of students pursuing higher education is increasingly diverse. Research suggests, however, postsecondary instructional beliefs and practices have not evolved in ways that effectively respond to diverse students' unique needs. This scholarly self-study examined the nature and impact of using differentiated instruction in an introductory-level graduate course comprised of students who varied significantly in terms of their levels of readiness, their interests, and their learning profiles. The findings suggest differentiation had a positive and meaningful impact on student learning. Students' class performance and their reflections on the experience indicated that students were appropriately challenged and were able to find meaning and relevance in the course content and activities. Themes emerging from this study highlight the necessity for pedagogy that reflects college students' (a) diverse ways of learning, (b) diverse interests, experiences, and goals, and (c) diverse personal circumstances. Insights gleaned from this investigation are offered and recommendations for future research are provided.

I process information in a different way than it is taught or utilized in science courses. I learn to understand by putting [concepts] into my own language, not by memorizing and spitting out the words as I receive them… [The other students] were not attentively taking notes, computing problems along with the professor, or asking questions. Most appeared bored. Either they had the material before, or they were totally lost…I am not stimulated to think all this information through as I copy it into my notes. So, when a question or doubt arises in mind, I let it float on by… I wasn't willing to change the study habits and thought processes that worked so well for me in literature, history, and political science… I insisted on studying to understand, not memorize and perform… I was weeded out…because the material never really captivated or stimulated me in ways that I am used to being stimulated. (Tobias, 1990, pp. 54, 57-58)

It is well-documented that the population of students who are pursuing higher education is increasingly diverse. Specifically, we have seen changes with the postsecondary student population related to race, ethnicity, gender, economic class, and nationality (Almanac Issue, 2005; American Council on Education [ACE], 1999, 2000; National Center for Educational Statistics [NCES], 2005). There is also an increasing number of older adult learners, many who have significant responsibilities such as working and caring for dependants while attending college (National Survey of Student Engagement [NSSE], 2006). Finally, there has been a dramatic rise in enrollment among students with disabilities who now comprise 11.4% of undergraduates (Brinkerhoff, McGuire, & Shaw, 2002; NCES, 2005).

A separate body of research suggests that several salient factors influence postsecondary learning outcomes and experiences. First, students' performances are influenced by their academic skills (Mull, Sitlington, & Alper, 2001) and self-regulatory strategies (Hofer & Pintrich, 1997; Pintrich & Schunk, 2002; Ruban & Reis, 2006). Specifically, difficulties in areas such as reading, writing, mathematics, memory, time management, and organization negatively impact performance in individual courses and reduce the overall likelihood of degree completion (Allsopp, Minskiff, & Bolt, 2005; Reis, Neu, & McGuire, 1997; Wirt, Choy, Rooney, Provanik, Sen, & Tobin, 2004). Second, students' previous educational experiences impact levels of engagement and motivation in subsequent courses (Kuh, 2007; NSSE, 2006). Third, learning outcomes are influenced by instructors' beliefs about the process of teaching and learning. A student-centered, learning-oriented epistemology promotes learning; a teacher-centered, transmission-oriented epistemology inhibits learning (Kember 1997, 2001; Norton, Richardson, Hartley, Newstead, & Mayes, 2005; Samuelowicz & Bain, 2001; Trigwell, Prosser & Waterhouse, 1999). Fourth, positive outcomes are associated with the use of certain instructional techniques. Specifically, efficacy is promoted by interactive, engaging, and collaborative instruction (Hake, 1998; NSSE, 2006; Putnam & Burko, 2000) that is congruent with students' interests, beliefs, and background experiences (Grossman, 2005; Ross, 1983; Ross, McCormick, & Krisak, 1986; Wideen, Mayer-Smith, & Moon, 1998) and aligned with their learning profiles (Hativa & Birenbaum, 2000; Kember, 2001; Layton & Lock, 2003; Tobias, 1990).

By juxtaposing knowledge of increased student diversity with insights related to teaching and learning, one would logically assume postsecondary instructional practices have evolved from being uniform and didactic. However, as the introductory quotation illustrated, the status quo persists. Pilner & Johnson (2004) explain,

> Although higher education became more available to historically underrepresented groups, educational practices and culture did not shift significantly to address the experiences and learning needs of the students newly enrolled. So, although legislation opened the door to diverse student populations, the absence of efforts to change the culture or the educational practices in higher education (such as the curriculum, physical layout, and teaching and testing methods) have created significant barriers to access, retention, and graduation for many students. (p. 106)

Differentiated Instruction

In contrast to the educational practices that exist in higher education, pedagogy in elementary and secondary schools is evolving to meet the needs of diverse learners (e.g., Darling-Hammond, 2006; Pugach, 2005). This has been accomplished, in part, through the use of differentiated instruction (Haager & Klinger, 2005; Salend, 2008; Tomlinson, 2005a, 2005b). The overarching premise of differentiated instruction is that learning experiences need to be designed and adapted to meet students' individual, and diverse needs in order to facilitate student success. In other words, teachers need to be "flexible in their approach to teaching and adjust the curriculum and presentation of information to learners, rather than expecting students to modify themselves for the curriculum" (Hall, Strangman, & Meyer, 2003, p. 2). Differentiated instruction has expanded in both breadth and depth during the past few decades and is now recognized as an effective way for elementary- and secondary-level teachers to meet all students' diverse needs (Lawrence-Brown, 2004; Olenchak, 2001; Piggott, 2002; Stodolsky & Grossman, 2000; Strangman, Hall, & Meyer, 2003; Tomlinson, Brimijoin, & Narvaez, 2008; Tomlinson et al., 2003). The widespread endorsement of, and interest in, differentiation is further evidenced by its integral presence in professional journals and teacher education programs (Hagger & Klinger, 2005; Mastropieri & Scruggs, 2007; Pugach, 2005; Salend, 2008).

As with most pedagogical approaches, multiple models of differentiated instruction have been proposed. However, because Tomlinson's (2005a, 2005b) comprehensive framework is one of the most frequently cited in professional literature (Hall et al., 2003), it was used as the theoretical foundation for this investigation. The premise of Tomlinson's model is that teachers promote equity and excellence by differentiating high quality content, process, and product based on their understanding of students' readiness levels, interests, and learning profiles.

Readiness, interest, and learning profile. The concept of readiness encompasses students' knowledge, understanding, and skill vis-à-vis the instruction a teacher is planning (Tomlinson 2005a, 2005b). Readiness is not synonymous with intellectual ability; it is a much broader and deeper construct that is shaped by prior learning and life experiences, attitudes about school, as well as cognitive and metacognitive proficiency. The goal of readiness differentiation is to ensure all students are provided with appropriately challenging learning experiences (Vygotsky, 1962, 1978). Tomlinson (2005a) explains,

> A task that's a good match for student readiness extends that student's knowledge, understanding, and skills a bit beyond what the student can do independently. A good readiness match pushes the student a little beyond his or her comfort zone and then provides support in bridging the gap between the known and the unknown. (p. 45)

Students' interests are the topics and/or processes that evoke curiosity and inspire passion (Tomlinson, 2005a, 2005b). Differentiating instruction according to students' existing interests promotes engagement, facilitates motivation, and helps them connect what it being taught with things they already value. Interest-based differentiation can also be structured to encourage students to discover new interests.

Learning profile describes the ways in which a student learns most effectively (Tomlinson, 2005a, 2005b). Salient factors include group orientation, cognitive styles, intelligence preferences, and learning environment preferences. Differentiation based on learning profile allows students to learn in ways that are natural and efficient.

Content, process, and product. Teachers' knowledge of students' levels of readiness, interests, and learning profile characteristics facilitates effective and appropriate content, process, and product differentiation. Content consists of both *what* is being taught as well as *how* students access that material (Tomlinson, 2005a, 2005b; Tomlinson & McTighe, 2006). In the vast majority of instances, it is preferable for *what* is taught to remain relatively constant across learners, with teachers varying *how* students get access to specified content to address learners' needs. In other words, if the objective of a lesson is to solve algebraic equations, that expectation should apply to all students;

some may need to work in ways that are more complex and with more independence and others with greater scaffolding (support) from the teacher and peers. Exceptions to this guideline occur in two instances: (a) when a student has already mastered complex understandings and applications of that goal, or (b) when a student has gaps in prerequisite elements such that there is little or no likelihood he or she will be able to successfully reach the goal, even with support. In these cases, teachers augment required content with opportunity and support to master prerequisite content or extend required content. In all other cases, essential or core understandings form the basis from which differentiation occurs.

Strategies that promote content differentiation in response to readiness include, but are not limited to (a) providing text materials at varied reading levels and levels of complexity (and languages, if appropriate), (b) curriculum compacting, (c) using small group instruction to re-teach or reinforce content, (d) providing text on audiotape, (e) supplementing oral presentations with videotapes and visual demonstrations, (f) providing note-taking organizers, (g) highlighting or summarizing key portions of text, and (h) using manipulatives (Tomlinson, 2005a, 2005b). Allowing students to focus on an area they select, focusing the overall content on student-derived topics and questions, and offering examples that relate to students' experiences and areas of interest are all examples of how content can be successfully differentiated in response to students' interests. Content differentiation in response to students' learning profile characteristics can be effectively achieved using strategies such as presenting material in visual, auditory, and kinesthetic ways, using examples and illustrations that represent varied ways of thinking, and presenting information in both deductive and inductive formats.

Process can be thought of as "sense-making-activities" that allow each student to increase his or her level of understanding about the topic being taught (Tomlinson, 2005a, p. 79). Although there is inherent overlap between content and process, a simplistic way to contrast the two is to think of process as being the task (or series of tasks) that allow students to begin thinking about, working with, and personalizing information after they stop listening to the teacher or reading text materials (the content). High-quality differentiated activities focus clearly on essential learning goals, facilitate students' ability to understand content, are interesting and engaging, require students to use higher-level thinking, and involve use or application of content (rather than rote recall).

As with content differentiation, process can be differentiated in response to readiness, interest, and learning profile (Tomlinson, 2005a, 2005b). Examples

of strategies that promote effective process differentiation include providing varied levels of support and accommodations (e.g., graphic organizers, structured activity guides), tiering activities to various levels of complexity, providing directions at varied levels of specificity, varying the pace of work, offering multiple options of expression, giving students alternative topics on which to focus, explicitly helping students make connections between personal interests and learning activities, and creating activities that are harmonious with students' preferred modalities of learning.

Products are culminating assessments that allow students to demonstrate how much they understand and how well they can apply their knowledge and skills after a significant segment of instruction (Tomlinson, 2005a, 2005b). Contrasting the performance orientation of differentiated products with more traditional, formal assessment procedures, Tomlinson (2005a) explained, "teachers may replace some tests with rich product assignments, or combine tests with product options so the broadest range of students has maximum opportunities to think about, apply, and demonstrate what they have learned" (p. 85). Products should offer students' multiple pathways to show mastery of common learning goals. Hallmarks of effectively differentiated product assignments include providing clear and appropriate criteria for success, focusing on real-world relevance and application, promoting creative and critical thinking, requiring the analysis and synthesis of multiple sources of information, and allowing varied modes of expression. Throughout product development, it is also important for teachers to provide students with adequate scaffolding and support, as well as opportunities for peer and self-evaluation.

Purpose of the Study

Despite the well-documented interest in, and indications of success with, differentiation at elementary- and secondary-levels, there is a paucity of research exploring parallel implementation in higher education. This scholarly self-study was designed to address that gap in the extant literature. Specifically, the purpose of this research was to explore the nature and impact of using differentiated instruction in an introductory-level graduate course (Education and Psychology of Exceptional Learners) taught by the first author. Students enrolled in the course were highly diverse in terms of their levels of readiness, interests, and learning profiles. Three research questions served to focus this investigation: (a) How do the principles and practices associated with differentiated instruction influence students' progress towards course objectives?; (b) How do students perceive the use of differentiated instruction?; and (c)

What conditions and/or strategies contribute to the outcomes?

Methodology

Self-study research has received increasing attention in recent years and is now recognized as a valuable and necessary form of scholarship, especially within the field of teacher education (Clift & Brady, 2005; Richardson, 1996; Russell, 2002; Zeichner & Noffke, 2001). As Zeichner (1999) explained,

> Contrary to the frequent image of the writings of teacher educators in the wider educational research community as shallow, under-theorized, self-promotional, and inconsequential, much of the work has provided a deep and critical look at practices and structures in teacher education. This work can both inform the practices of teacher educators who conduct it and contribute to knowledge and understanding of teacher education for the larger community of scholars and educators... Teacher educators conducting research about their own practices can play an important part in communicating this complexity to those who themselves are not involved in the work of teacher education. This disciplined and systematic inquiry into one's own teaching practice provides a model for prospective teachers and for teachers of the kind of inquiry that more and more teachers are hoping their students employ. (p. 11)

In keeping with that tradition, the motivation for this self-study was three-fold. First, it was anticipated that the research experience would expand the instructor's reflectivity and pedagogical repertoire. Second, given the hypothesized efficacy of differentiation, it was anticipated that students' learning outcomes and experiences would be positively impacted. Third, it was anticipated that publicly sharing the findings would offer insight, promote critical discussion, and spawn questions for subsequent inquiries (Loughran, 2007; Louie, Drevdahl, Purdy, & Stackman, 2003; Zeichner, 2007).

An Introduction to the Students

This study was conducted at a large, state-supported university accredited by the National Council for Accreditation of Teacher Education. During the semester this research was conducted, 25 students (16 female and 9 male), ranging in age from nineteen to "sixty-plus," were enrolled in Education and Psychology of Exceptional Learners. They represented the full spectrum of socioeconomic classes, as well as several different racial and ethnic groups. As outlined

in Table 1 (and described in the next section), students were also highly diverse on multiple factors associated with readiness, interest, and learning profile which, collectively, had significant implications for course content, processes, and products.

Readiness. Related to readiness, three factors were particularly salient for the instructor to understand and use as a guide for appropriate differentiation. First, students began the course with differing levels of background knowledge. Three members of the class were nearing completion of their master's program; they had completed an extensive amount of educationally-related course work at the graduate-level. Nine students had completed some educationally-related coursework at the undergraduate-level, but were just beginning their graduate studies (either as part of an alterative route certification or master's degree program). The remaining 13 had completed little or no coursework in topics related to education. Second, students differed in terms of relevant experience. Regarding school-based experiences, eight students were experienced educators, five were beginning their first year of teaching, and 12 had no practical experience. Regarding personal experiences, five students had a close relative with a disability and three had disabilities themselves. Third, students had differing levels of proficiency with skills that were relevant for the course. Five students were highly proficient readers and writers, 16 possessed adequate reading and writing skills, and four students had significant difficulty with reading fluency, reading comprehension, or expressing their ideas in written form (two students had a documented learning disability and two were learning English as a second language).

Interest. Two factors related to interest proved to be especially important for appropriate differentiation. First, students were (or were aspiring to become) employed in a variety of professional roles. These included school psychologist (four students), special education teacher (six students), learning disability teacher consultant (five students), general education teacher (four students representing three content areas), curriculum specialist (one student), school counselor (three students), and building administrator (one student). Two students were taking the course as an elective and not pursuing educationally-relate careers. Second, students had different preferences regarding the age group on which to focus. Two students were most interested in preschool-aged children, 13 were interested in elementary-aged children, seven were interested in middle- or high-school aged students, and one was interested in adults.

Learning profile. Related to learning profile, four factors were important to consider. First, students differed in terms of their preferred modalities of

Table 1
Student Characteristics

Characteristic	n	% (N = 25)
Previous education coursework		
Extensive graduate	3	12
Some undergraduate	9	36
None	13	52
Previous school-based experience		
Extensive	8	32
First year teacher	5	20
None	12	48
Previous personal experience		
Family member with a disability	5	20
Self	3	12
None	17	68
Reading & writing skills		
Highly proficient	5	20
Adequate	16	64
Difficulties	4	16
Professional role		
Special education teacher	6	24
Learning disability teacher consultant	5	20
School psychologist	4	16
General education teacher	4	16
School counselor	3	12
Curriculum specialist	1	4
Building administrator	1	4
Other, not educationally-related	2	8
Population of interest		
Preschool	2	8
Elementary	13	52
Secondary (middle and high)	7	28
Adults	1	4
Preferred learning modality		
Visual	20	80
Auditory	5	20
Active	23	92
Passive	2	8
Preferred grouping format		
Alone	3	12
Pairs or small groups	22	88
Preferred level of autonomy		
Highly structured, guided	23	92
Autonomy, minimal guidance	2	8
Preferred mode of expression		
Written narration	11	44
Oral	6	24
Creative	8	32

learning. The majority of the class learned best through visual representations and active, hands-on activities. A few, however, preferred auditory input and more passive, reflective learning experiences. Second, students had different grouping preferences. Three strongly preferred to work alone, whereas the rest of the class found pairs and small groups enhanced their learning. Third, students differed in their desired level of autonomy. The majority of the class preferred a high level of structure and guidance from the instructor. However, two found minimal guidance and self-directed learning to be most beneficial. Finally, students differed in their preferred mode of expression. Eleven believed they were best able to communicate their thoughts and knowledge through written narration, six preferred oral formats, and eight favored 'creative' means (e.g., visual representations, demonstrations, and/or PowerPoint presentations).

An Overview of the Course

Education and Psychology of Exceptional Learners was a three-credit hour, introductory-level graduate course. It was a requirement for students pursuing graduate degrees in special education, school psychology, school counseling, and nursing, but was open to any graduate student at the university. The overarching goal of the course was to develop an understanding of, and appreciation for, the impact and implications of having a disability. The primary areas

of focus included: categorical disability characteristics, relevant federal laws and state regulations, school classification procedures, community resource options, and classroom practices that facilitate positive experiences and outcomes for students with disabilities.

Preparation. To design a differentiated version of Education and Psychology of Exceptional Learners, the instructor needed first to identify a set of clear course objectives that delineated the knowledge, understandings, skills, and dispositions all students were expected to demonstrate by the end of the semester (see Figure 1). After the objectives were established, the instructor selected an anchor text (Hardman, Drew, & Egan, 2005) and drafted a weekly topical outline.

Next, the instructor designed five primary course assignments and wrote a comprehensive rubric that corresponded with each assignment (see Figure 2). Development of these assignments was guided by Tomlinson's (2005a, 2005b) recommendations for differentiating content, process, and product in response to anticipated diversity in students' levels of readiness, interests, and learning profiles. The rubric for each assignment was trichotomous (i.e., Exceeds Expectations, Meets Expectations, Does not Meet Expectations) and included descriptive indices that corresponded with course objectives (or a portion thereof). Rubrics included a self-evaluation component (i.e., students rated themselves on each element prior to submitting an assignment) and an instructor evaluation component (i.e., the instructor assigned a point value to each element after reviewing the assignment). Students had the option to use feedback from the instructor to revise all assignments except the summative course assessment. A recommended schedule for completion and due dates were outlined for each assignment. During the semester, however, if a student needed additional time, he or she could discuss that need with the instructor. This non-threatening dialogue resulted in a mutually agreed upon plan for completion and additional support was provided, when necessary.

The instructor's final preparation task was to create a pre-assessment that each student would complete during the first class meeting (see Figure 3). Students' responses were carefully reviewed by the instructor and then graphed to facilitate understanding of individual levels of readiness, interests, and learning profile characteristics, as well as salient patterns of similarity and difference among members of the class.

Implementation. Data from the pre-assessment, combined with that ascertained by other informal and formal techniques were used by the instructor to appropriately differentiate content and process throughout the semester. For instance, with regard to readiness, students' responses to the open-ended pre-

assessment questions served as an initial assessment of their reading and writing proficiency, as well as their relevant content knowledge. During each class meeting, the instructor furthered her understanding of students' levels of readiness by carefully observing interactions and engagement during a variety of activities and by reviewing students' performance on written tasks. Additionally, the instructor frequently dialogued with each member of the class to solicit information related to salient strengths and needs. Collectively, these strategies ensured assessment reflected both the instructor's evaluation, as well as students' self-evaluations.

To differentiate content, a variety of supplemental reading materials was used for each course topic. This provided each student with opportunities to focus on content that was appropriate, relevant, and engaging. To address a variety of readiness needs, supplemental materials of differing complexity were used. Students who had limited knowledge or experience with a particular topic were able to select materials that offered background information and clear outlines of key points. Students who already understood the fundamentals were able to select materials that offered a more advanced discussion of topics. An illustration of this is seen regarding the topic "special education processes and procedures." Students selected and read (at least) one of three articles in addition to the text. The first article provided an easy-to-read, practitioner-oriented overview of the steps required to determine special education eligibility in public school settings. The second article offered a comprehensive discussion of procedural best practices for school professionals involved with classification decisions. The third article was an empirical examination of how specific standardized assessments can be used to increase diagnostic validity among English Language Learners. Supplemental materials were also used to address differing interests. For example, when the topic was "learning disabilities," students selected and read (at least) two of four articles in addition to the text. The first article focused on early intervention and diagnosis, the second on challenges faced by middle school students, the third on effective transition strategies for students going to college, and the fourth on social experiences among adults.

To facilitate access to content presented via text format, all readings were available in paper and electronic form; guided reading questions, key point summaries, and highlighted texts were also available to students who felt they would be beneficial. Finally, students who had difficulty with reading fluency were given advanced copies of supplemental text materials and any readings that were used during class. Strategies that facilitated access to content presented during class

Figure 1
Course Objectives

Students will demonstrate knowledge and understanding of:
  a) The current laws, regulations, and best practices related to providing services to individuals with exceptionalities;
  b) The current best practice procedures for defining, assessing, and diagnosing a variety of exceptionalities within an educational setting;
  c) Empirically-based instructional strategies, modifications, and accommodations that effectively support individuals with exceptionalities, including those from culturally diverse backgrounds, throughout the lifespan; and
  d) Many educational and community-based resources which promote learning outcomes and personal independence among individuals with exceptionalities.

Students will demonstrate the ability to:
  a) Access, critically evaluate, and utilize articles from professional journals;
  b) Locate and reflect upon the relevance of various educational and community-based resources for individuals with exceptionalities;
  c) Effectively collaborate with professional peers to gain knowledge, deliver a professional-development workshop, and increase personal reflection; and
  d) Effectively communicate facts and ideas.

Students will demonstrate they value and are committed to:
  a) Understanding and embracing exceptionalities and other aspects of diversity;
  b) Working to improve the lives and experiences of individuals with exceptionalities; and
  c) Collaboratively supporting learning outcomes and personal independence among individuals with exceptionalities.

included the use of multi-media presentations, pairing oral explanations with visual representations, offering note taking guides, having students discuss key ideas using a Think-Pair-Share format, and offering supplemental instruction outside of the scheduled class meeting times.

Regarding process differentiation, tiered activities were used to address varied levels of readiness (Tomlinson, 2005a, 2005b). This ensured that each student had opportunities to obtain a solid understanding of essential information, as well as to learn about more advanced topics, when appropriate. An illustration of this is seen in conjunction with the course topic "special education eligibility and placement decisions." Two groups of students with little experience or knowledge were assigned a Jigsaw activity (Clarke, 1994; Johnson, Johnson, & Holubec, 1994); each group member become an expert on one stage in the eligibility process and taught what they learned to their peers. Concurrently, another group comprised of experienced school psychologists and special education teachers were assigned a role-play activity that simulated a contentious placement meeting for a student with a learning disability and then reflected on the experience. Homework assignments corresponding to tiered activities were also structured to ensure that students had opportunities to reinforce fundamental understanding and to extend their inquiry, when appropriate.

To capitalize on students' diverse interests and future goals, interest-based learning centers were used during the last two course meetings (Tomlinson, 2005a, 2005b). The topics (multiple/severe disabilities, gifted and talented instruction, transition issues, early childhood education) reflected students' preferences as indicated on the pre-assessment. Students completed activities at three of the four learning centers and were given the option of working independently, with a partner, or in a small group.

Appropriate differentiation for one student who was nearing completion of his degree in school psychology was achieved through the use of a semester-long independent study experience because the pre-assessment data (and follow-up conversations) revealed he already demonstrated unilateral mastery of the course objectives. Collaboratively, he and the instructor designed a meaningful and challenging research project focused on a topic of particular interest to him (traumatic brain injury) using a format that was personally relevant (creating a comprehensive handbook and designing and implementing professional development workshop for his colleagues at the school where he worked). He and the instructor had regular meetings throughout the semester to discuss the topic and review his progress on the project. At the end of the semester, he assumed the role of 'instructor' during one class meeting and taught his peers about his selected topic.

Figure 2
Primary Course Assignments

Video Case Reflections

   Students selected four (of five) CD-ROM video cases (Harris, 2005). Each case focused on a specific exceptionality, included actual classroom interactions, and offered insightful perspectives from children, families, and a variety of school / community professionals. After viewing each case, students selected and answered five questions from the accompanying workbook. These responses could be submitted in written or oral form (via audio or video tape).

Site Visitations and Resource Guides

   Students selected, researched, and visited two organizations that provided some form of service or support to individuals with exceptionalities. They then created a 'resource guide' which synthesized and highlighted useful information about each site (e.g., contact information, targeted population, available services). At the end of the semester, each student gave a brief oral summary of their two sites and distributed their resource guides to the other members of the class.

Sensitivity Experience and Reflection

   Students engaged in a series of tasks which simulated the challenges that might be faced by someone who uses a wheelchair. Students who were employed in an educational setting, completed this activity in that environment, so they could gain first hand-knowledge of any barriers that existed. Those who were not (yet) working in a school setting selected a relevant public place (e.g., a local retail mall). After completing the experiential portion of the assignment, students reflected on various aspects of the experience and identified specific ways to improve conditions for individuals with physical disabilities. These responses could be submitted in written or oral form (via audio or video tape).

Professional Development Workshop

   Students collaboratively researched a disability category of interest, designed a professional development workshop (targeted towards colleagues within a school setting), and then implemented it during one class meeting. To facilitate successful collaboration and personal relevance, the first task for each group was to identify the unique skills, preferences, and contributions each member had to offer (e.g., creating a PowerPoint presentation, leading activities for the class, locating and interpreting research) and then outline equitable responsibilities based on that insight. Each group was required to meet with the instructor at least two times before giving their presentation to ensure they successfully located / interpreted relevant articles, and created an accurate, comprehensive, and engaging professional development experience.

Summative Content Assessment

   At the end of the semester, students were required to demonstrate their cumulative knowledge, understanding, and skills. The class collaboratively wrote six questions that reflected salient course topics; each student selected four to complete. This final assessment was given out on the last day of class and students had up to two weeks to prepare their answers. Students completed this assignment individually, but were allowed to use their notes and other resources they found useful. The four students who experienced significant difficulty expressing their thoughts in writing were given (and exercised) the option of engaging in a professional dialogue with the instructor about each topic.

Data Collection and Analysis

   Students' progress towards mastery of the course objectives was documented via performance on the pre-assessment, the primary course assignments, and other class-based activities. At least two sources of data were used to assess each course objective. Students' perspectives about the class were ascertained using the Student Instructional Report (SIR) II, a standardized course evaluation instrument with well-established reliability and validity (Educational Testing Service, 1995). The SIR II was administered by a neutral faculty member during the last class meeting, in adherence with all the prescribed procedures. The SIR II provided students an opportunity to respond anonymously to 45 items using a five-point Likert scale. Twelve items were pre-selected as being directly relevant for the research questions of this study (see Table 2). Descriptive statistical techniques were used for analysis (Hinkle, Wiersma, & Jurs, 1994).

   Students' perspectives about differentiation were documented in narrative format. After the semester concluded, students were given the opportunity to respond to the question, "Based on your experience with this class, what do you see as the benefits and drawbacks of differentiated instruction?" All 25 members of the class submitted a written reflection; responses ranged from six sentences to two pages. These narrative data were analyzed inductively using the constant comparative method and open coding procedures (Miles & Huberman, 1994; Strauss & Corbin, 1998). This allowed for the emergence,

Figure 3
Pre-Assessment

1. List the major provisions / requirements related to each of the following laws:
     Individuals with Disabilities Education Act (IDEA) (as per the 2004 reauthorization)
     Section 504
     The Americans with Disabilities Act (ADA)

2. What key changes were made to IDEA when it was re-authorized in 2004?

3. Describe the process that would occur between the time a parent suspects their child has a learning disability until the time an IEP is written:

4. Define "inclusion" and describe your thoughts about this concept.

5. Complete the following chart related to each of the disability categories we will study in this course (Headings included: definition, common characteristics, diagnosis / assessment, effective intervention strategies, personal relevance / level of interest).

6. Define "differentiated instruction" and describe your thoughts about this concept.

7. Describe your personal "learning profile." In other words, "How do you learn best?" (e.g., auditory, visual, kinesthetic; individual, small group, large group; active or passive; from the big picture to details or vice-versa).

8. Describe how this course relates to your professional / personal experiences, your interests, and your goals.

9. How knowledgeable / comfortable are you with APA style for writing and referencing?

10. How knowledgeable / comfortable are you with accessing, reading, and utilizing research articles from professional journals?

11. Please rank the following topics based on your interest level:
               Multiple / severe exceptionalities
               Gifted / talented students
               Transition issues
               Exceptionalities during early childhood
               Working with families of students with exceptionalities
               Court cases that influence school practices
               Assistive technology

identification, integration, and synthesis of thematic codes and categories (available from the first author, upon request). Computers and coding software (i.e., QSR NVivo) facilitated data interpretation. However, this technology was used in conjunction with manual techniques to ensure that the richness and context of the data were preserved (Hesse-Biber, 2004). The use of a thematic conceptual network also facilitated integration, analysis, and interpretation of the quantitative and qualitative data (Coffey & Atkinson, 1996; Miles & Huberman, 1994).

Trustworthiness and Authenticity

Although discussion regarding the nuanced connotations of what constitutes "high-quality" self-study research continues, thematic consensus has emerged in several areas (Bullough & Pinnegar, 2001; Feldman, 2003; Loughran, 2007; Zeichner, 2007; Zeichner & Noffke, 2001). Scholarly self-study necessitates: (a) grounding an investigation with theory and research; (b) collecting and analyzing data with rigorous, comprehensive, systematic, and competently

Table 2
SIR II Results

Statement	5	4	3	M (SD)
5. The instructors way of summarizing or emphasizing important points in class	21 (84%)	4 (16%)	0 (0%)	4.84 (0.37)
6. The instructors ability to make clear and understandable presentations	25 (100%)	0 (0%)	0 (0%)	5.00 (0.0)
7. The instructors use of examples or illustrations to clarify course material	23 (92%)	2 (8%)	0 (0%)	4.92 (0.28)
11. Instructors helpfulness and responsiveness	22 (88%)	3 (12%)	0 (0%)	4.88 (0.33)
13. Instructors concern for student progress	23 (92%)	2 (8%)	0 (0%)	4.92 (0.28)
14. Availability of extra help for this class	21 (84%)	4 (16%)	0 (0%)	4.84 (0.37)
29. My learning increased in this course.	17 (68%)	8 (32%)	0 (0%)	4.68 (0.48)
31. My interest in the subject areas has increased	13 (52%)	12 (48%)	0 (0%)	4.52 (0.51)
33. This course actively involved me in what I was learning	16 (64%)	7 (28%)	2 (8%)	4.56 (0.65)
34. I studied and put effort into this course	10 (40%)	8 (32%)	7 (20%)	4.12 (0.83)
36. I was challenged by this course	11 (44%)	10 (40%)	4 (16%)	4.28 (0.74)
40. Rate the quality of instruction in this course as it contributed to your learning (try to set aside your feelings about the course content)	18 (72%)	7 (28%)	0 (0%)	4.72 (0.46)

Note. For items 5-14 & 40: 5 = Very effective; 4 = Effective; 3 = Moderately effective; 2 = Somewhat ineffective; 1 = Ineffective. For items 29-36: 5 = Much more than most courses; 4 = More than most courses; 3 = About the same as other courses; 2 = Less than most courses; 1 = Much less than most courses. Ratings of 1 or 2 were not used.

applied methods; (c) providing a detailed description of the research setting and process; (d) producing credible, justifiable, and contextually-situated findings; (e) democratic participation; (f) vigilantly searching for alternative perspectives and explanations; and (g) publicly sharing the results. These salient principles, along with time-honored expectations for qualitative inquiry (e.g., Brantlinger, Jimenez, Klinger, Pugach, & Richardson, 2005; Denzin, 2004; Lincoln & Guba, 2002; Miles & Huberman, 1994), guided the design and implementation of this research, as well as the writing of this article.

This investigation was preceded and informed by a comprehensive review of the relevant extant literature. The study was solidly grounded in Tomlinson's well-established, comprehensive theoretical framework of differentiated instruction. The use of guiding research questions ensured data collection, interpretation, and analysis were focused, appropriate, and relevant. A thorough description of the students, the course, and the methodology provided transparency and established the context. The findings are supported by direct quotations and data triangulated by type, method, and source (e.g., qualitative and quantitative, gathered over an extended period of time, collected from every member of the class, and reflective of perceptions as well as actual learning outcomes). Deliberate steps were taken to

avoid an over-representation of articulate, high-status, or conforming participants and/or influence from the inherent institutional power structure (e.g., SIR II anonymity, written reflections on differentiation completed after grades were submitted). Finally, peer debriefing and second-level member checks were used to encourage critical consideration of emerging themes. Collectively, these strategies promoted trustworthiness and authenticity.

Results

Impact on Learning

The first research question was "How do the principles and practices associated with differentiated instruction influence students' progress toward course objectives?" Collectively, the data documented differentiation had a positive and meaningful impact on student learning. Performance on primary assignments and other class activities documented that all 25 members of the class successfully mastered each course objective. Fourteen students exceeded the required course expectations by completing assignments or activities that reflected advanced goals. The SIR II data provided additional evidence of the positive impact.

Specifically, students indicated their learning increased significantly (SIR II item 29; $M = 4.68(.48)$) and the quality of instruction positively impacted learning (SIR II item 40; $M = 4.72(.46)$).

Insights about Differentiated Instruction

The second and third research questions were "How do students perceive the use of differentiated instruction?" and "What conditions and/or strategies contribute to the outcomes?" Collectively, the data yielded the overarching theme that members of the class viewed differentiation as unique, but highly beneficial because it allowed the course to be structured in ways that reflected diversity among members of the class. Supporting that broad finding, three thematic strands emerged: (a) Differentiation was beneficial because college students have diverse ways of learning; (b) Differentiation was beneficial because college students have diverse interests, experiences, and goals; and (c) Differentiation was beneficial because college students have diverse personal circumstances.

Diverse ways of learning. All 25 students indicated that differentiated instruction was effective because college students do not learn in a single, uniform fashion. Students' narrative reflections about the course provided strong evidence for this conclusion. For instance, an experienced general education teacher who was just beginning her master's program in special education summarized her perception this way:

As a teacher, I know that not all students are the same cookie cutter shape. Everyone learns differently and approaches learning from a different point of view. We recognize this with our younger students, so why not give adults the same opportunities. If you think about it, as adults, we're no different from our children and we should be given opportunities to maximize our learning potential. Not everyone is Einstein, doing complex math problems in the blink of an eye. Some people need more time, more resources, different models, or support in other ways. Isn't the ultimate goal to have everyone get the right answer? This class showed that using differentiated instruction makes that possible, and I now believe necessary, at this level.

Students indicated that using a variety of materials and activities was especially beneficial because it promoted active learning and engagement. This, in turn, led to improved comprehension of key ideas. Some also extended that relationship to include enhanced self-perceptions. For example, a student enrolled in the alternative route certification program explained:

In contrast to what I experienced in this class, differentiated instruction is not evident in most courses that have been part of my alternate route teacher preparation program. Time after time, professors stand in front of everyone, speak about the benefits of differentiated instruction, and then proceed to lecture for hours while you feverishly took notes. I can tell you that I remember absolutely nothing from those long Saturdays, other than the fact that my hand hurt from all the writing. For anyone who was not an auditory learner, the experience seemed like an eternity and only left you with a sense of failure as a student and future teacher.

Others correlated high engagement with the potential to improve attendance, as illustrated by the response from a special education teacher.

I think that if more college professors took the stance that they were there to engage their students, a lot more students would come to class. I think that all too often professors believe that college students should be able to learn from dry lecture, because they are in college and that's what they are supposed to do. News flash: college is still about learning and teaching in a way that ensures the maximum amount of learning.

Another experienced special education administrator hypothesized:

If other graduate courses were taught like this one, more people would be apt to go back to school and continue their professional development through course work at a university because they would see the learning as engaging and relevant.

Along with identifying the benefit of using a variety of materials and activities, many students also noted the additive value of participating in collaborative learning opportunities and of having options for expression. For example, a general education teacher explained:

Within our groups, we were allowed to capitalize on our strengths and choose what and how we'd like to contribute. I really appreciated that we could each have a different format for any of our presentations, because, alas, I'm still a poster-board man in a Power Point world! However, I will admit I learned a lot about Power Point presentations from my cohorts, and this was an unexpected benefit of the course.

Similarly, the students with writing difficulties indicated that being able to submit some of the course assignments in oral form provided them with an opportunity to validly demonstrate their knowledge. One of the students who did not speak English as her native language explained, "This was my first time where I can show what I do know, not just what I do not know."

Finally, all of the students who had difficulty with reading indicated they benefited from the strategies that were designed to support text comprehension because those strategies allowed them to master (and in many instances exceed) the course objectives. One student with a learning disability summarized her thoughts this way:

> I know that I definitely benefited from differentiated instruction within our classroom. The experience truly was helpful for me. I am a slow reader and by giving me handouts to pre-read and allowing me to have extra time, I was successful. It wasn't something that I was used to.

Another student who had significant difficulties with fluency and comprehension (but who was not officially diagnosed as having a learning disability) concurred.

> I feel like once we make it to college, where we're expected to be capable adults, the recognition of needed accommodations seems to be forgotten. If the purpose of college is to educate, then these accommodations and learning techniques which have been proven through research to be helpful, should continue. . . Too many college courses are simple lecture and "read on your own" type classes. Many professors mistakenly assume that at this level, learners don't have varied needs anymore. This is far from the truth. I needed the extra 'boost' like highlighters, questions to focus me, and outlines to follow. With that, I was fine. Without that, I would have really been having a tough time.

The SIR II data provided additional support for the conclusion that differentiation was beneficial because college students have diverse ways of learning. Specifically, students felt challenged (SIR II item 36; $M = 4.28(.74)$), but also supported (SIR II items 11, $M = 4.88(.33)$; 13, $M = 4.92(.28)$; and 14, $M = 4.84(.37)$). They also believed important points were summarized effectively (SIR II item 5; $M = 4.84(.37)$), presentations were clear and understandable (SIR II item 6; $M = 5.00(0.0)$), and examples and illustrations were used effectively (SIR II item 7; $M = 4.92(.28)$).

Diverse interests, experiences, and goals. All 25 students indicated that differentiated instruction was effective because college students have different interests, experiences, and goals. Specifically, students strongly endorsed class-based activities and course assignments that allowed them to select topics and tasks that were at an appropriate level of complexity and that were personally relevant. These options increased motivation to put forth effort, enhanced understanding and internalization of the concepts, and created a desire to pursue additional, independent learning. For example, a student finishing her degree in school psychology explained:

> My previous experiences stressed conformity as opposed to individuality. I feel that I learn best when I am able to freely explore alternatives and find answers on my own. By being able to do this, it allowed me to derive personal meaning from the material that I was studying and further explore information that would readily apply to my future.

The student who engaged in the independent research project offered a similar reflection:

> I want to thank you again for this opportunity to move beyond a pedantic learning experience into a realm of abstract and in-depth research on a topic. It allowed me to move past germane facts... and delve into a more complex rationale and theory in an effort to individualize the material into my current situation!

Finally, the provision of choices led students to feel an increased sense of voice and personal agency in the class. For example, one student who was finishing her master's degree in special education explained:

> The course began by allowing us to choose what we were interested in learning about. I really appreciated how things were adapted to meet my needs. For example, being able to complete the sensitivity project at my school allowed me to actually improve it. It gave me a feeling of power which is often taken away in college courses.

The SIR II data provided additional support for the conclusion that differentiation was beneficial because college students have diverse interests, experiences, and goals. Specifically, students strongly agreed with the statements: "My interest in the subject areas has increased" (SIR II item 31; $M = 4.52(.51)$); "This course actively involved me in what I was learning," (SIR II item 33; $M = 4.56(.65)$); and "I studied and put effort into the course" (SIR II item 34; $M = 4.12(.83)$).

Diverse personal circumstances. Eight students indicated that differentiated instruction was effective because college students have personal and professional

responsibilities which impact their course experiences (e.g., working multiple jobs, raising families, and taking other courses). Within that context, the use of flexible timelines reduced students' stress levels and provided the opportunity for them to produce high quality work. One of the full time special education teachers explained,

> In one of the articles we could choose to read for the last class, we read about a teacher who believes that kids should be comfortable in their class in order to perform their best. In this class, we were made comfortable with flexible timelines and they saved my sanity during this term! I knew I wanted to do the work, and do it well, but I just didn't have the time. Being able to take a step back and know that I didn't have to have everything done that next day really helped me put the extra effort into each assignment. It goes without saying that extra effort only increased my knowledge.

In many instances, students who requested additional time completed advanced activities, and indicated that doing so was only possible because of having that option.

Discussion and Conclusions

This self-study was designed to explore the nature and impact of using differentiation in an introductory-level graduate course. Guided by Tomlinson's (2005a, 2005b) model, course content, processes, and products were differentiated to reflect students' levels of readiness, interests, and learning profiles. It was hoped that this research would expand the instructor's reflectivity and pedagogical repertoire, enhance students' learning outcomes and experiences, and offer insight for subsequent inquiries and discussion.

Perhaps the most noteworthy finding from this investigation is that the efficacy associated with differentiation in P-12 settings can also be realized in a postsecondary environment (Lawrence-Brown, 2004; Olenchak, 2001; Piggott, 2002; Stodolsky & Grossman, 2000; Strangman et al., 2003; Tomlinson, 2005a, 2005b; Tomlinson et al., in press; Tomlinson et al., 2003). More specifically, Tomlinson's (2005a, 2005b) theoretical framework for instructional design and delivery can be utilized to successfully address the needs of an increasingly diverse college student population (ACE 1999, 2000; Almanac Issue, 2005; Brinkerhoff et al., 2002; NCES, 2005; NSSE, 2006). Collectively, the data provided evidence that differentiation optimized the learning experience for the 25 students enrolled in Education and Psychology of Exceptional Learners; each member of the class was provided with appropriate levels of support and opportunities. Students who would have struggled to be successful if the course was taught with traditional pedagogy were able to master all the course objectives. Students who started the semester demonstrating mastery (or near mastery) of some objectives, as well as those who sought out opportunities for accelerated and advanced learning, were able to experience a challenging and enriching curriculum. Differentiation enabled all students to find meaning and relevance in the course content and activities. Incorporating a wide-variety of materials and activities, using flexible grouping strategies, providing options for expression, supporting text comprehension, offering choices, and being flexible with timelines were some of the strategies that proved to be most beneficial.

Students' reflections about differentiation revealed that it was beneficial because college students have (a) diverse ways of learning; (b) diverse interests, experiences, and goals; and (c) diverse personal circumstances. The first two themes reinforce Tomlinson's (2005a, 2005b) assertion that content, product, and products should reflect students' unique levels of readiness, interests, and learning profiles. They also support previous findings that suggest learning experiences and outcomes are influenced by students' academic skills (Allsopp et al., 2005; Mull et al., 2001; Reis et al., 1997; Wirt et al., 2004), the instructor's epistemological beliefs (Kember 1997, 2001; Norton et al., 2005; Samuelowicz & Bain, 2001; Trigwell et al., 1999), and the use of instructional strategies that are congruent with students' interests, beliefs, and background experiences (Grossman, 2005; Ross, 1983; Ross et al., 1986; Wideen et al., 1998) and aligned with their learning profiles (Hativa & Birenbaum, 2000; Kember, 2001; Layton & Lock, 2003; Tobias, 1990).

The third theme highlights a nuanced consideration within the context of postsecondary instruction that is not explicitly noted in Tomlinson's (2005a, 2005b) model; adult learners have competing, external responsibilities that are not typically experienced by P-12 students yet these responsibilities have the potential to significantly influence a student's unique course experience. Responsibilities such as providing and caring for family members, financial obligations, and job responsibilities all compete against college course expectations and requirements for the adult learner's time and attention.

This differentiated course experience also illuminated several important insights and implications for practice. First, appropriate differentiation was predicated on the establishment of clear course objectives. Delineating the common areas of knowledge, understandings, and skills, allowed fundamental elements to be prioritized and enabled the creation of more advanced activities that were aligned with the overarching goals of the course. Clear

objectives also provided a framework for identifying differentiation strategies that could effectively support students' learning without compromising the integrity of the course. For example, allowing multiple forms of expression was appropriate because it enabled the instructor to validly assess students' content knowledge and was harmonious with the objective, 'Students will demonstrate the ability to effectively communicate facts and ideas.'

Second, success with differentiation was achieved through the integral use of assessment throughout the semester. Although Tomlinson's (2005a, 2005b) model provides a theoretical framework for considering how student characteristics can be used to guide instruction, specific decisions regarding how to implement differentiation throughout the course reflect the instructor's evolving understanding of students' levels of readiness, interests, and learning profiles. Because members of the class were keenly aware of their unique needs, assessment strategies that provided opportunities for students to directly offer their feedback and personal insight, in addition to documenting their progress towards course objectives, proved extremely beneficial. As one general education teacher explained,

> From experience, I know what I must do to be successful in a classroom. I need frequent breaks, various delivery techniques (Power Points, videos, group dialogues, research, projects etc.), good student/teacher relationships, and 'inconspicuous' support in class if I don't understand something. But, it's just occurring to me now that even though I have all this insight about how to be successful, no one has ever asked me to share it before.

Third, because the use of differentiation at the postsecondary level is not a common practice, it was critical for the instructor to provide students with an overview of Tomlinson's (2005a, 2005b) model, to initiate discussions about philosophical underpinnings of differentiation, and to clarify the roles and responsibilities that teachers and students assume in a differentiated classroom. This discussion began during the first class meeting, and continued throughout the semester, as "teachable moments" arose.

Finally, the experiences with this course highlighted that fact that effective differentiation requires a significant amount of time, effort, and dedication on the part of the instructor. In so far as the preparation for any college course can be characterized as "substantial," preparing for a course that involves differentiated content, processes, and products proved even more intensive. After the foundational objectives and topical outline were written, the primary assignments and rubrics had to be thoughtfully and strategically created. Initial ideas for supplemental readings and topical activities were outlined, but during the semester they were constantly modified and expanded in response to an evolving understanding of students' needs. With multiple activities and supplemental readings being utilized in each class, the time and effort required inherently exceeded that of a course where all students have a uniform experience. Because the primary course assignments were specifically designed to facilitate critical thinking and reflection, significant time and effort was also dedicated to reading and providing extensive feedback to students on each one. Students had the option to revise each assignment based on the feedback, so often papers were submitted and read more than once. A significant amount of time was also devoted to meeting with each class-facilitation group and to providing individualized support for students who experienced difficulty meeting the high expectations. We would passionately argue, however, that the time, effort, and dedication required for effective differentiation is unequivocally worthwhile when the high level of student engagement and mastery are experienced. Further, once an instructor develops an initial set of differentiated tasks for a particular course, those can serve as a baseline for refinement in subsequent offerings of the course and thus, significantly decrease instructor preparation in the long term.

It is our hope that this self-study will serve as an impetus for others to systematically and reflectively explore ways to ensure that all students have meaningful and appropriately rigorous learning experiences. This initial course experience proved to be validating and inspiring, but it is hardly definitive. Future research is needed to posit an expanded understanding about the nature and impact of utilizing Tomlinson's (2005a, 2005b) model with different courses and with different populations of students. Specifically, we encourage instructors in all disciplines to design a relevant pre-assessment tool and then differentiate content, process, and product in response to students' levels of readiness, interests, and learning profiles. All of the strategies described within the context of this course (e.g., supplemental readings, tiered assignments, interest-based centers, independent study projects, flexible grouping, flexible timelines, reading comprehension supports, multiple options for expression, reading comprehension support) could be readily implemented in other classes. Within the context of teacher education, it will also be critical to establish whether if experiencing differentiation in their college courses has an impact on future teachers' subsequent P-12 practices and outcomes. Finally,

expanding the use of differentiation will only be realized if postsecondary educators endorse the philosophy, understand the model, and gain proficiency with a wide variety of instructional strategies. Thus, there is a necessity to explore current attitudes and practices among college faculty, as well as to enhance their pedagogical repertoires.

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Validity and Reliability Issues of Two Learning Style Inventories in a Greek Sample: Kolb's Learning Style Inventory and Felder & Soloman's Index of Learning Styles

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This study aimed at investigating the psychometric properties of two inventories for the measurement of learning style preferences in a Greek sample: Kolb's (1985) Learning Style Inventory (LSI) and the Index of Learning Styles (ILS) by Felder & Soloman (1999). The inventories were administered in a total of 340 Greek university undergraduate students of different disciplines (education, psychology, and polytechnics) and primary school teachers. Regarding the LSI, our sample was found to strongly prefer the accommodative and the divergent learning style. Results indicated that in the Greek sample the LSI had a satisfactory reliability but its construct validity was weakly supported. No significant differences were found in relation to discipline, a finding that calls the discriminant validity of the inventory into question. Regarding the ILS, our sample showed a preference for the visual and the sensing learning style; its reliability was barely acceptable but the construct and the discriminant validity were well-supported. In conclusion, this study revealed psychometric weaknesses in both inventories suggesting that they could be used as a tool to encourage self-development of an individual within a discipline group, but not as a tool for grouping them according to given learning styles.

This paper is concerned with two learning style models: (a) Kolb's (1984) experiential learning theory, which is one of the most influential and commonly used models in higher education, and (b) Felder & Silverman's (1988) learning style model, which originally was designed to capture learning differences among engineering students. Both models have developed inventories for measuring learning style preferences. Kolb designed and later refined (Kolb, 1985) the self-report Learning Style Inventory (LSI) to assess learning styles. In the Felder & Silverman (1988) model, learning style preferences are assessed by the Index of Learning Styles (ILS), which was developed by Felder & Soloman (1999). The present study aimed at checking the psychometric properties of the above instruments in a sample of Greek university undergraduate students and primary school teachers.

The Learning Style Inventory (LSI) is one of the most widely distributed instruments and claims to provide a valuable framework for the design and management of learning activities (Healey & Jenkins, 2000; Sadler-Smith, 2001). Although the LSI has been used extensively, it has also been challenged mainly for its construct validity (a detailed critique is presented bellow). The Index of Learning Styles (ILS) has been used far less than the LSI and its psychometric properties are to a great extent still under close scrutiny. Thus, the aim of the present study is to contribute to the discussion regarding the psychometric soundness of these instruments. Moreover, our aim was to add to the existing research evidence from Greek samples,

which at the moment is very limited (Andreou, Andreou, & Vlachos, 2006; Andreou, Andreou, & Vlachos, 2008; Metallidou & Platsidou, 2008; Platsidou & Zagora, 2006).

Kolb's Learning Style Model

Kolb (1984) based his theory of experiential learning on peoples' different approaches of perceiving and processing information. In his model, learning is described as a four-stage interactive process that involves four distinct learning modes, which represent different types of learning: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). The combinations of the learning modes form four learning styles: the accommodative (AE/CE), the divergent (CE/RO), the assimilative (RO/AC), and the convergent (AC/AE). Every individual utilizes each of the four learning modes to some extent, but he/she has also a preferred learning style for grasping and transforming the information. In particular, the accommodator would rely on concrete experiences mixed with active experimentation in a hands-on experience. The diverger would start from concrete experience and would combine it with reflective observation in order to come up frequently with a creative solution. The assimilator would be concerned mainly with reflective observation in order to develop models and abstract theories for explaining reality. Finally, the converger would grasp information through abstract understanding of the immediate experience and puts into practice her/his ideas in a deductive fashion. The effective learner can

use each of the four styles in different learning situations rather than only rely on his/her preferred style (Kolb, Boyatzis, & Mainemelis, 2000). Although Kolb's work has been criticized for logical inconsistencies in the theory construction (Coffield et al., 2004; Garner, 2000; Holman, Pavlica, & Thorpe, 1997; Vince, 1998), it still remains a very popular learning style model (Demirbas & Demirkan, 2007; Kayes, 2005; Marriott, 2002).

As regards the psychometric properties of the LSI, relevant research has generally supported its internal reliability (e.g., Heffler, 2001; Sadler-Smith, 2001; Willcoxson & Prosser, 1996), although some studies have detected the presence of measurement errors such as a response-set bias (Henson & Hwang, 2002; Ruble & Stout, 1990). The validity of the instrument, however, has been at best described as fair (Curry, 1991). Specifically, construct validity research findings have not been conclusive (e.g., Cornwell, Manfredo, & Dunlap, 1991; Mainemelis, Boyatzis, & Kolb, 2002). Some studies confirmed the factor structure of the inventory as predicted by Kolb (1984; 1985), in contrast to others (de Ciantis & Kirton, 1996; Geiger, Boyle, & Pinto, 1992; Loo, 1996, 1999; Ruble & Stout, 1990). The criticism is focused mainly on conflicting evidence in support of Kolb's bipolar dimensions as well as on the interdependent nature of ipsative scores of the measure (high scores on one dimension leading to low scores on the other dimension and forcing artifact negative correlations between dimensions) (for reviews see Brew, 2002; Henson & Hwang, 2002; Kayes, 2005; Koob & Funk, 2002). In spite of the above criticism, the efficiency and value of the LSI as a pedagogical tool is supported by many studies (e.g., Loo, 1999).

Also, there is considerable evidence of discriminant validity of the LSI. Kolb (1984) advocated that certain learning styles are considered characteristic of special educational choices and professions and based this claim on the assumption that different learning strategies, epistemological positions, and modes of discourse or educational processes are required or employed in different disciplines or fields of study (Kolb et al., 2000; Nulty & Barret, 1996). A number of studies corroborated the above, as they revealed significant differences in students' learning style preferences across different disciplines (such as social studies, English, science and mathematics) (Clump & Skogsberg, 2003; Jones, Reichard, & Mokhtari, 2003; Yean & Lee, 1994). Specifically, it was found that art students have a preference towards the divergent and assimilative learning styles (Kruzich, Friesen, & Van Soest, 1986; Willcoxson & Prosser, 1996), social science students towards the accommodative style (Kruzich et al., 1986) while

science students towards the convergent learning style (Andreou et al., 2008; Willcoxson & Prosser, 1996).

Felder & Silverman's Learning Style Model

Felder and Silverman's learning style model (1988) was first applied in the context of engineering education, with the aim of capturing the most important learning style differences among engineering students and, thus, providing a good basis for engineering instructors to formulate a teaching approach that would address the learning needs of all students (Felder, 1993; Felder & Spurlin, 2005). The model categorizes individuals' preferences in terms of type and mode of information perception (i.e., sensory or intuitive; verbal or visual), approaches for the organization and processing of information (i.e., inductive or deductive; active or reflective), and the rate at which students progress towards understanding (i.e., sequential or global) (de Vita, 2001). In this way, individuals are classified according to their preference for one or the other pole of each of the following four scales: (a) sensing (concrete thinkers, practical, oriented towards facts and procedures) / intuitive (abstract thinkers, innovative, oriented towards theories and underlying meanings); (b) visual (prefer visual representations of presented material, such as pictures, diagrams and flow charts) / verbal (prefer written and spoken explanations); (c) active (learn by trying things out, enjoy working in groups) / reflective (learn by thinking things through, prefer working alone or with a single familiar partner); (d) sequential (linear thinking process, learn in small incremental steps) / global (holistic thinking process, learn in large leaps). The dichotomous learning style dimensions of this model are continua, not either/or categories. The learners' preference on each scale may be strong, moderate or mild, may change with time, and may vary from one subject or learning environment to another (Felder, 1993; Felder & Spurlin, 2005).

Relevant research data support a claim of construct validity of the instrument (Felder & Brent, 2005). Factor analysis studies suggest that most of the ILS scales are well-defined, although two of them (the sequential-global and the sensing-intuitive) have shown a moderate degree of overlapping (Felder & Spurling, 2005; Livesay, Dee, Nauman, & Hites, 2002; van Zwanenberg, Wilkinson, & Anderson, 2000; Zywno, 2003). In addition, the ILS has evidenced satisfactory convergent and discriminant validity in student and faculty samples from various disciplines, such as engineering, humanities and polytechnics (Felder & Brent, 2005; Felder & Spurlin, 2005). For example, it was found that, although all students were on average visual learners, the engineering students were

consistently more visual and sensing than the education and the liberal arts students; the last two groups were more reflective and global than their counterparts in engineering and science (Kuri & Truzzi, 2002 and Lopez, 2002 as cited in Felder & Spurlin, 2005; Litzinger, Lee, Wise, & Felder, 2005). Finally, the learning style profiles for engineering faculty members differ from those of engineering students in a manner which is consistent to the theory; e.g., faculty members were significantly more reflective, intuitive and global and preponderantly visual than students of the same discipline (Rosati, 1996 as cited in Felder & Spurlin, 2005). These differences were attributed to the increased experience and expertise of faculty in the specific discipline (Felder & Silverman, 1988; Felder, 1993). The issue of reliability of the ILS, however, is still in dispute; in almost all studies, the test-retest reliability is satisfactory, but the internal consistency reliability proves to be low and barely acceptable (Felder & Spurlin, 2005; Livesay et al., 2002; van Zwanenberg, et al., 2000; Zywno, 2003).

Based on the above critiques as well as the critiques related to the ipsative nature of the instrument, it is argued that the ILS may be best used for assessing the relative strengths of learning preferences within an individual, rather than for comparing learning style preferences among individuals (van Zwanenberg et al., 2000). Others claim that the ILS is a suitable instrument for assessing learning styles, although they recommend that the research on reliability and validity of the instrument should be continued (Felder & Spurlin, 2005; Livesay et al., 2002; Zywno, 2003).

Aims and Hypotheses of the Present Study

The present study aimed to check the psychometric properties of the above inventories (LSI and ILS) in a Greek sample of students from three disciplines (education, psychology, and polytechnics) and of professionals from the discipline of education (primary school teachers). Specifically, the study aimed at examining the following:

(a) the internal consistency reliability of the two inventories. It was expected that the LSI would show a satisfactory reliability (Hypothesis 1a) (e.g., Heffler, 2001; Sadler-Smith, 2001), whereas the reliability indices of the ILS would be low (Hypothesis 1b) (e.g., Felder & Spurlin, 2005).

(b) the construct validity of the instruments. Research evidence has provided a weak support for the construct validity of the LSI (e.g., Cornwell et al., 1991; Mainemelis et al., 2002; de Ciantis & Kirton, 1996; Loo, 1996, 1999), whereas the

construct validity of the ILS has been adequately supported (Felder & Spurling, 2005; Livesay et al., 2002; van Zwanenberg et al., 2000; Zywno, 2003). Given that the empirical results concerning the construct validity of the LSI are inconclusive, we are not in a position to make a clear prediction for its validity in the Greek sample. As regards the construct validity of the ILS, following the results of previous factorial models, the prediction was that most of the theoretical scales would be well-defined, although the sequential-global and the sensing-intuitive scales would possibly overlap (Hypothesis 2).

(c) the discriminant validity of the two inventories. As described earlier, both learning style models claim that different learning style preferences predominate in various disciplines or fields of study (Felder & Spurling, 2005; Kolb et al., 2000). Thus, it was expected that learning style profiles would be differentiated among samples of different disciplines in both inventories (Hypothesis 3a & 3b, respectively).

As regards the learning style preferences of students and professionals from the same discipline, in the LSI, the in-service teachers (given their social background) were expected to show a greater preference for the assimilative and the divergent learning styles than the education students, as older individuals were found to become more reflective and observational in the learning environment (Truluck & Courtney, 1999) (Hypothesis 4a). In the Felder and Soloman's (1999) inventory, differentiated learning profiles of the teachers and the education students were also expected, since previous evidence has shown such differences in the learning style profiles of engineering faculty members and students (Hypothesis 4b).

Method

Participants

A total of 340 participants were involved in the study fitting into four groups: (a) 64 in-service primary school teachers with 10 up to 28 years ($M = 17$) of teaching experience and being 35 to 55 years old; (b) 108 undergraduate university students in the Department of Primary Education (also regarded as pre-service teachers); (c) 89 undergraduate students in the Department of Psychology; and (d) 79 undergraduate students in various Departments of the School of Polytechnics. The sample consisted of 103 (30.4%) males and 237 (69%) females.

Research Instruments

Two self-report instruments were used to assess the participants' learning styles: (a) the Learning Style Inventory (Kolb, 1985) and (b) the Index of Learning Style (Felder & Soloman, 1999).

Learning Style Inventory. Twelve short statements concerning learning situations were presented and the participants were required to rank order four preferences for learning organized in four columns (e.g., When I learn: "I like to deal with my feelings," "I like to watch and listen," "I like to think about ideas," and "I like to be doing things"). After summing up each of the four columns, a total score for each of the four learning modes (concrete experience-CE, reflective observation-RO, abstract conceptualization-AC and active experimentation-AE) was obtained for each participant. Combined scores between the learning modes were also obtained to address the participants' preferences for each of the four learning styles: convergent (AC/AE), divergent (CE/RO), assimilative (RO/AC), and accommodative (AE/CE).

Index of Learning Style. Forty-four forced-choice items were presented to the participants (e.g., "I understand something better after I (a) try it out, (b) think it through"). After summing their scores, their preferences on each of the four bipolar learning styles scales (as described by the Felder & Silverman model) were assessed by a subtraction score between the first and the second pole of each scale: active-reflective (act/ref), sensing-intuitive (sen/int), visual-verbal (vis/vrb), and sequential–global (seq/glo). A positive subtraction score indicated a preference for the first pole of the scale, whereas a negative subtraction score indicated a preference for the second pole.

Results

Reliability and Construct Validity of the Two Learning Style Inventories

Cronbach alpha coefficients for the four learning modes of the LSI were found to be satisfactory, as expected (Hypothesis 1a): concrete experience $\alpha = 0.81$, reflective observation $\alpha = 0.72$, abstract conceptualization $\alpha = 0.76$ and active experimentation $\alpha = 0.76$. In the ILS, the reliability indices for most of the learning style scales were moderate (sensing-intuitive $\alpha = 0.62$) to low (active-reflective $\alpha = 0.45$, visual-verbal $\alpha = 0.51$, sequential-global $\alpha = 0.45$), as predicted in Hypothesis 1b.

As regards the construct validity of the two instruments, firstly, in accordance with previous factorial models, a two-forced factor principal component analysis was applied on the four learning modes of the LSI (with varimax rotation) (see Table 1). Factor 1 loaded the CE/RO bipolar dimension and factor 2 loaded the AE/AC dimension. The results supported the bipolar factor structure of the LSI but not in the pairing proposed by Kolb.

Subsequently, the construct validity of the ILS was checked. In previous studies, factorial models with eight factors (Litzinger et al., 2005) and five factors (Zywno, 2003) were obtained. We tested those models in our data but they were not adequately fitted. Specifically, in the eight-factor model, which accounted for 38.75% of the total variance, only the four factors were found to be well-defined (i.e., they may be considered as independent) whereas, in the other four factors, the learning style scales showed considerable overlapping making it obvious that this model can hardly explain the theory parsimoniously and consistently. On the other hand, our five-factor model accounted for the 28.3% of the total variance and all its factors were relatively well defined. Factors 1, 2 and 5 were similar to those found by Zywno (2003) and loaded the sensing-intuitive, the visual-verbal and the sequential-global scales, respectively. Factors 3 and 4, however, were differentiated in our model; they both loaded the active-reflective scale, while in the Zywno model factor 3 loaded the active-reflective scale and factor 4 was equally associated with the sensing-intuitive and the sequential-global scales. As a result of the poor fit of the above models, we tested a four-factor model, which is presented in Table 2. In this model, each factor loaded most of the items assumed to be related to the respective learning style scale (and few items were misfit), suggesting that the original four learning style scales are moderately well defined. However, the variance explained by this model was quite low (24%).

Discriminant Validity of the Inventories

When assessed by the LSI, participants in total were found to show a strong preference in descending order for the accommodative ($M = 64.8$, $SD = 9.1$), the divergent ($M = 62.7$, $SD = 7.2$), the convergent ($M = 57.5$, $SD = 6.8$) and, last, the assimilative learning style ($M = 55.3$, $SD = 9.5$). Means and standard deviations for all sample groups are given in Table 3. To explore any differences related to the participants' different disciplines, we applied a 4 (discipline groups) X 4 (learning styles) MANOVA. The main effect of discipline was not found to be significant for any of the learning styles across the four discipline groups. It must be underlined that the two groups from the same discipline, i.e., the education students and teachers, showed no significant differences in their learning style profiles.

Table 1
Results of Principle Component Analysis on the LSI

Scale	Factor 1	Factor 2
CE	-0.97	
RO	0.71	
AE		-0.96
AC		0.68
Eigen value	1.80	1.21
Variance %	45.0	30.3
Cumulative %		75.3

Table 2
Results of Principle Component Analysis on the ILS

| Items | Factors | | | |
	1	2	3	4
38	0.56			
14	0.54			
2	0.52			
26	0.46			
6	0.45		0.41	
18	0.44		0.38	
34	0.42			
30	0.40			
32	0.39			
39	0.39			
36	0.38			
35	0.33			
29	0.31			
31		0.69		
7		0.61		
11		0.60		
15		0.48		
40		-0.40		
19		0.35		
23		0.35		
3		0.33		
27				
4				
21			0.54	
41			0.44	
9			0.43	
10	0.41		0.42	
13			0.40	
22	0.31		-0.39	0.37
33			0.38	
37			0.36	
5			0.33	
1				
44				
25				-0.58
8				0.47
42				0.45
17				-0.42
28				0.35
12				0.30
16				
20				
43				
24				
Eigen value	3.05	2.76	2.47	2.34
Variance %	6.94	6.29	5.61	5.31

Note: Loadings under 0.30 are omitted

Taking into account the concerns about the construct validity of the instrument, we decided to also apply a MANOVA on the learning modes. In this case, the main effect of the discipline was found to be significant in two out of the four groups. Specifically, in the abstract conceptualization learning mode, the education students had higher scores than the psychology students [$F(3,336) = 3.9$, $p < 0.05$, $\eta^2 = 0.03$]; in the active experimentation, the education students had lower scores than both the psychology and the polytechnic students [$F(3,336) = 7.9$, $p < 0.05$, $\eta^2 = 0.07$].

As regards the ILS, the participants' reports of their preferences for the eight learning styles (two styles in each bipolar scale) showed that they strongly preferred the visual ($M = 2.71$, $SD = 4.44$) and the sensing ($M = 2.70$, $SD = 4.63$) learning styles; a moderate preference was also reported for the sequential ($M = 1.41$, $SD = 4.11$) and a lower preference for the active learning style ($M = 0.68$, $SD = 4.14$); the reflective, global, intuitive and verbal were the least preferred learning styles. Table 4 presents the learning style preferences for the four bipolar scales of the four sample groups.

Subsequently, we applied a 4 (discipline groups) X 4 (learning style scales) MANOVA in order to investigate any discipline group differences in the participants' learning style preferences. The main effect of discipline was found significant in two of the four

Table 3
Means (Standard Deviations) and Statistical Indices for the LSI Scales in Relation to Disciplines

	Total	In-service teachers (n=64)	Education students (n=108)	Psychology students (n=89)	Polytechnic students (n=79)	F	p	η^2
Learning styles								
Accommodative	64.82	62.54	64.92	64.76	66.61	2.41	0.07	0.02
	(9.06)	(9.27)	(9.05)	(9.50)	(8.09)			
Divergent	62.67	63.88	62.61	61.61	62.95	1.28	0.28	0.01
	(7.21)	(6.79)	(5.99)	(7.04)	(8.99)			
Convergent	57.49	56.18	57.30	58.66	57.51	1.73	0.16	0.02
	(6.75)	(6.78)	(5.95)	(6.37)	(7.99)			
Assimilative	55.34	57.51	54.99	55.51	53.85	1.86	0.14	0.02
	(9.46)	(9.27)	(9.08)	(10.35)	(8.89)			
Learning modes								
Concrete experience	36.04	36.60	36.85	34.70	36.00	1.48	0.22	0.01
	(7.52)	(7.48)	(7.18)	(7.76)	(7.90)			
Reflective observation	26.63	27.29	25.76	26.92	26.95	0.82	0.49	0.01
	(7.13)	(6.46)	(6.67)	(7.45)	(7.45)			
Abstract conceptualization	28.71	30.23	29.23	28.59	26.90	3.91	0.01	0.03
	(6.18)	(6.10)	(5.61)	(6.24)	(6.58)			
Active experimentation	28.78	25.95	28.06	30.06	30.61	7.90	0.00	0.07
	(6.62)	(6.75)	(6.39)	(6.41)	(6.24)			

Table 4
Means (Standard Deviations) and Statistical Indices for the ILS Scales in Relation to Disciplines

	Total	In-service teachers (n=64)	Education students (n=108)	Psychology students (n=89)	Polytechnic students (n=79)	F	p
Act(+) Ref(-)	0.68	0.33	0.88	-0.15	1.62	2.821	.039
	(4.14)	(3.78)	(4.33)	(4.02)	(4.13)		
Sen(+) Int(-)	2.70	3.35	3.29	2.28	1.83	2.196	.088
	(4.63)	(5.00)	(4.49)	(4.66)	(4.36)		
Vis(+) Vrb(-)	2.71	2.62	3.23	1.32	3.65	4.711	.003
	(4.44)	(4.68)	(4.88)	(3.75)	(3.98)		
Seq(+) Glo(-)	1.41	1.74	1.66	1.80	0.38	2.210	.087
	(4.11)	(4.46)	(4.28)	(3.58)	(4.06)		

learning style scales, the active-reflective and the visual-verbal (see Table 4). The application of Scheffe's multiple comparison test showed that the polytechnic students reported a higher preference for both the active [$F(3,336) = 2.82$, $p < .05$, $n^2 = 0.03$] and the visual learning style [$F(3,336) = 4.71$, $p < .05$, $n^2 = 0.04$] as compared to the psychology students. Also, in the visual learning style the education students reported a higher preference compared to the psychology students. Finally, no significant differences were found between the education students and teachers. Overall, these results offer some support to the discriminant validity of the ILS.

<div align="center">Discussion</div>

The present study aimed to contribute to the investigation of the psychometric properties of two learning style inventories: Kolb's (1985) LSI which has been extensively used (and criticized) in higher education and Felder and Soloman's (1999) ILS which is a relatively new and less known instrument. Specifically, we attempted to investigate psychometric rigor of the ILS in order to define its applicability in relation to the widely used Kolb's LSI. As both inventories have been sparsely administered in Greek samples, we decided to address the issues of internal consistency reliability and construct and discriminant validity of the two instruments.

Reliability and Validity of Kolb's LSI

Kolb's inventory indicated a quite satisfactory reliability as regards learning modes, consistently to our Hypothesis 1a. This finding is in line with other research data that generally support the internal consistency reliability of the LSI both in international samples (Heffler, 2001; Sandler-Smith, 2001; Loo, 1996; Willcoxson & Prosser, 1996) as well as in a Greek sample (Andreou et al., 2006). Construct validity, however, was found to be problematic, as the bipolar factor structure of the LSI identified in the present study was not in line with the one proposed by Kolb (1984, 1985). This is not a surprising finding, since evidence in the same direction was obtained in other relevant studies (de Ciantis & Kirton, 1996; Geiger et al., 1992; Wilson, 1986) and it is attributed to the limitations of the ipsative scores (Cornwell & Dunlap, 1994). Conclusively, research findings from the Greek as well as from the international studies call into question the construct validity of this instrument.

In assessing the validation and the robustness of an inventory, the issue of discriminant validity is of major importance. Different discipline groups of participants were expected to be related to different learning modes

and learning style preferences (Jones et al., 2003; Kolb, 1985; Kolb et al., 2000) (hypothesis 3a). However, no significant differences in the learning style profiles of the four discipline groups were found. When the learning modes were employed in the analysis, some differences were revealed. In the abstract conceptualization learning mode, the education students had higher scores than the psychology students and, in the active experimentation, they had lower scores than both the psychology and the polytechnic students. It must be noted, however, that no significant differences were found between the two same-discipline groups, the education students and the in-service teachers. These findings only partially confirmed our hypotheses (3a and 4a respectively) and offer a limited support of the discriminant validity of the LSI.

Other relevant studies, however, have found that the LSI is adequate, to a large extent, to discriminate participants' preferences regarding learning styles or modes, in relation to their discipline (e.g., Andreou et al., 2006; Clump & Skogsberg, 2003; Jones et al., 2003; Reading-Brown & Hayden, 1989; Yean & Lee, 1994; Willcoxson & Prosser, 1996). Apparently, there is a discrepancy between the results of our study and the existing research evidence, which is crucial for drawing safe conclusions regarding the discriminant validity of the inventory. To further investigate this inconsistency, we compared the learning styles profiles of our discipline groups with those found in other relevant studies. In our study, both the education and the polytechnic students were found to prefer in descending order the accommodative, the divergent, the convergent and, last, the assimilative learning styles. Results obtained in another Greek study of Andreou et al. (2006) showed that the education students' major preference was for the divergent style; this partially agrees to what we found, as our education students' preference for the divergent learning style was also high and close to their major preference. Regarding the polytechnic students in the Andreou et al. study (2006), however, their major preference was found to be for the convergent learning style, while this, in our findings, was one of the least preferred styles by the specific discipline group. The picture regarding students' learning profiles gets even more obscured when relevant international studies are considered, as they also vary in the reported results. For example, a number of studies have shown that the education students prefer mainly the divergent or the assimilative learning style (Kolb, 1995; Kruzich et al., 1986; Willcoxson & Prosser, 1996), a finding that is consistent with the result obtained in the Andreou et al. (2006) study but not with ours. In other studies, the polytechnic students were found to prefer the convergent learning style (Katz, 1988; Reading-Brown & Hayden, 1989; Willcoxson & Prosser,

1996), a finding which stands in stark contrast with our results. Finally, other studies have also shown incongruent learning style profiles of groups of students from other disciplines. For example, in the social sciences, some studies reported the accommodative learning style as the students' major preference (Kruzich et al., 1986; Wilson, 1986), others reported the assimilative and the divergent (Jones et al., 2003), while in one study (Tsang, 1993) social work students were found to shift from starting as accommodators in the first year of their studies, to becoming assimilators at the end of the same year, and to finishing as convergers their second year. In a number of studies in science students, findings are even more complicated: some reported the convergent style as their major preference (Katz, 1988; Reading-Brown & Hayden, 1989; Willcoxon & Prosser, 1996), others the accommodative and the divergent (Andreou et al., 2006) and, finally, others the assimilative and the convergent (Jones et al., 2003). This blurred picture leads to the conclusion that convergent validity of the LSI cannot be supported, since data collected from various samples of the same discipline with the LSI do not present similar learning style preferences.

In conclusion, although Kolb's theory of learning styles is well grounded and comprehensive, it lacks empirical rigor (Garner, 2000). Our study adds to the existed research concerning Kolb's work on learning styles measurement in a critical, evaluative manner. Although a considerable number of studies refer to the LSI as an adequate measurement, most of them use the learning modes to highlight the different approaches to learning and the different stages within the learning process (Kruzich et al., 1986; Nulty & Barrett, 1996). It is argued that Kolb's learning cycle has a positive role to play in informing or differentiating students about the learning processes, which is accomplished by the learning modes measurement (Garner, 2000). However, when research aims to assign students to learning styles (pairing the learning modes in the way described by the theory) and associate those with individual differences such as gender, discipline, career choice, age and expertise, psychometric problems and inconsistencies arise, such as those revealed in the present study regarding construct, discriminant and convergent validity.

Reliability and Validity of Felder & Soleman's ILS

Felder and Silverman (1988) have proposed an empirically based model to describe learning style preferences. Having started with the engineering students, Felder later on focused his attention to various discipline students and faculty groups with the aim of formulating teaching approaches that address the learning needs of different groups of students in a satisfactory way (Felder & Brent, 2005).

Consistent with all the relevant studies (Felder & Spurlin, 2005; Livesay et al. 2002; Seery, Gaughran, & Waldmann, 2003; van Zwanenberg et al., 2000; Zywno, 2003), our findings revealed that the ILS scales have moderate to low reliability indices (Hypothesis 1b). Although it is suggested that for attitude-assessing instruments an alpha of at least 0.5 is an acceptable criterion (Tuckman, 1999), the weak internal consistency reliability of the ILS still needs to improve in order to be adequate for measuring learning styles preferences. As Litzinger et al. (2005) proposed, a possible solution may reside in the elimination of the weakest item(s) in each scale, which in their study improved the scale reliability indices up to 0.04 units. Evidently, there is a need for a refinement of the ILS that, taking into consideration the research evidence, will attempt to overcome the weak reliability of the instrument.

In the next step, the examination of the construct validity of the ILS revealed that a four-factor model fitted the data best. Although our results did not confirm the five-factor or the eight-factor models found in other studies (Litzinger et al., 2005; Zywno, 2003), in our model each factor related well to one of the learning style scales (the active-reflective, the sensing-intuitive, the visual-verbal and the sequential-global). This model supports a claim of construct validity of the ILS in the Greek sample.

To discuss the validity issues in the ILS, the following data need to be considered. First, inspection of the participants' learning style profiles revealed that they were in average sensing ($M = 6.87$), visual ($M = 6.86$), and sequential ($M = 6.22$) learners rather than intuitive ($M = 4.17$) and verbal ($M = 4.15$). The same profile was obtained in another Greek study (Platsidou & Zagora, 2006) of 136 education, business and finance students; they were mostly visual ($M = 7.24$), sensing ($M = 6.96$), and sequential ($M = 5.82$) learners rather than intuitive ($M = 4.04$) and verbal ($M = 3.76$). Second, the effect of discipline must be considered, as the present study revealed some significant differences in two of the four learning style scales. Specifically, the polytechnic students were found to have a stronger preference for the active and the visual learning style than the psychology students. Also, the in-service teachers were found to be more visual than the psychology students. To our knowledge, no cited data exist regarding the learning style preferences (measured with the ILS) of teachers or psychology and primary education students, therefore we are not able to further elaborate on the specific discipline results. However, previous research in various disciplines has shown that preferences of engineering students differed from

preferences of students of other fields of study (such as humanities and science) (see Kuri & Truzzi, 2002 and Lopez, 2002 as cited in Felder & Spurling, 2005). These results evidenced satisfactory discriminant validity in student and faculty groups (Felder & Brent, 2005; Felder & Spurlin, 2005). On the other hand, in the present study, no significant differences were found in the same discipline groups, the teachers and the education students, contrary to what was expected due to age and expertise (Felder & Brent, 2005) and to what was found in previous studies (e.g., Rosati, 1996 as cited in Felder & Spurlin, 2005). It is concluded that our study offers a limited support to the discriminant validity of the ILS in the Greek sample.

As in the case of the LSI, convergent construct validity of the ILS was checked by comparing the learning style profiles of our engineering students with those obtained in previous studies (as noted above, no data exist for the other discipline groups). Data from different studies (Felder & Spurling, 2005; Kuri & Truzzi, 2002) have shown that the engineering and the polytechnic students reported similar learning style preferences: their major preference was for the visual learning style and their minor was for the sequential. The same highest and lowest preferences were found in our polytechnic students. This highly consistent evidence supports a claim of convergent construct validity of the ILS.

Conclusion

The present study has shown that there are psychometric weaknesses and limitations in both inventories. It is hoped that the ongoing research on these inventories will improve their weak points. Nevertheless, consistent to what the relevant literature review and research evidence has shown, the learning style inventories can be used as a tool to encourage self-development of an individual within a discipline group and not as a tool for grouping them according to given learning styles (Coffield et al., 2004; Rayner, 2007).

A great amount of the criticism and the dispute regarding the application of the learning style models in teaching is related to the inappropriate use of learning styles to label students and then to recommend pedagogic strategies that supposedly match their profiles (e.g., Coffield et al., 2004; Garner, 2000). In fact, we agree with this critique; the alleged role of the learning style profiling of a learner as a means to adapt or personalise a learning environment to suit the needs of the learner is quite simplistic and certainly not supported by the research evidence. On the other hand, we also agree with those considering learning styles as a useful tool for supporting communication between student and teacher, encouraging the student to reflect

on his/her own learning experience and actively seek different ways in which it can be improved.

As Kozhevnikov (2007) suggests, learning styles represent heuristics that learners use to process information and facilitate learning. Teachers should be aware of the possible drawbacks and selectively use learning style models and inventories to support the development of students' self-awareness and metacognitive skills. Knowledge of learning styles can be used to increase the self-awareness of students (and teachers) about the strengths and weaknesses of their own learning and that of others (Melis & Monthienvichienchai, 2004). The potential of such awareness lies in enabling individuals to see and to question their long-held habitual behaviour (Sadler-Smith, 2001). This is surely a considerable improvement on a student who merely "sponges" whatever he/she considers as knowledge from the teacher.

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Pattern Language Development in the
Preparation of Inclusive Educators

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Pattern language is the lexicon used to express the schema of a field of professional practice (Smethurst, 1997). This lexicon is frequently presumed to exist in communities of practice in educational settings, although the findings derived from the longitudinal study of schools (Elmore, 1996; Goodlad, 1984; Lortie, 1975; McLaughlin & Talbert, 2001; Sizer, 1987) indicate that the presence of such a lexicon is much more likely to be the exception than the rule. This study sought to establish the differential effects on pattern language of embedding evidence-based practice in the design of an inclusive education teacher preparation course. Embedded design involves creating self-repeating patterns in the instructional design of a course by expressing essential design features at multiple levels in the teaching and learning experience. In this case study, classroom communities of practice were employed as a learning context for students to develop their pattern language and as vehicle for applying the embedded design principle. The study also sought to establish whether increases in the frequency and sophistication of pattern language use increased as the pre-service course progressed through four teaching cycles and students learned more about inclusive approaches. The results indicate that pattern language frequency and sophistication covaried with participation in the course, and increased over time. The findings are discussed within the context of building more rigorous teacher preparation programs and the role of embedded design in pre-service inclusive education.

Over the last 20 years, collaboration techniques have become a cornerstone of inclusive education practice used to develop and review individual education plans, for instructional problem-solving, as a medium of engagement with parents, and by the different professionals who serve students with diverse educational needs (Friend & Cook, 2003; Idol, Paolucci-Whitcomb & Nevin, 1986; Salend, 2005). Collaboration among regular and inclusive educators is also frequently identified as a key to the successful conduct of all classrooms and schools (Loreman, Deppeler, & Harvey, 2005; Smith, Polloway, Patton & Dowdy, 2007; Villa & Thousand, 2000; Villa, Thousand & Chapple, 1996; West, Idol & Cannon, 1989).

The role and process of collaboration have also been connected to the related construct of communities of practice (Lave & Wenger, 1991; Wenger, 2000). Wenger (2000) describes a community of practice as a social container for the competence that makes up a system. Communities of practice are characterized by mutual engagement, joint enterprise, and a shared professional repertoire (Wenger, 1999). They involve those individuals who wish to deepen their knowledge and expertise about a shared concern, process or problem through ongoing interaction (Wenger, McDermott, & Snyder, 2002). Participation in a community of practice defines what constitutes competence in a given professional context.

Like collaboration, the construct of communities of practice also resonates powerfully with the challenges of inclusion (Wesley & Buysse, 2001) and especially the need for school-wide teacher collaboration if the inclusion of students with diverse educational needs is to be successful (Buell, Hallam, Gamel-McCormick, & Scheer, 1999). Communities of practice have been widely advocated in inclusive education to tap expertise and bring stakeholders together for problem-solving and the communication of professional knowledge (Buysse, Sparkman, & Wesley, 2003; Linehan, Muller & Cashman, 2005; Ryba, Selby & Kruger, 2001; Wesley & Buysse, 2001). They can be viewed as entities where the instrumental process of collaboration and collaborative problem-solving are embedded systemically in a local context.

To be effective, a community of practice must possess a shared repository of communal resources, as well as the routines and shared repertoire that relates to the purpose of the community (Wenger, 2000). This common conceptual framework for action or schema (Marshall, 1995) is shared by all members and defines each member's interaction with the community. The schema represents what the community believes and values about its work (Bain, 2007).

For a teaching community of practice to be the social container for genuine professional interaction, all teachers require the knowledge associated with the teaching and learning approaches valued by the community. This includes the pattern language used to locate those approaches within the community's broader schema. A pattern language consists of the terms the community uses to express the models and practice that constitute its schema (Smethurst, 1997). For example, if inclusive educators are to work together to solve a problem related to the use of cooperative learning or peer assisted learning they all need to

Figure 1
Pattern Language Source Matrix

Philosophy, Theory and Research Philosophies, theories, concepts and research trends in the field that underpin service delivery and practice. delivery and educational process	*Assessment and Evaluation* Assessment and evaluation forms; purposes, process and psychometric characteristics delivery and educational process
Service Delivery Procedural and regulatory terms related to the way services are delivered within jurisdictions delivery and educational process	*Instruction and Classroom Process* Strategies, planning process, Differentiation, collaboration, pedagogical, technological and content knowledge delivery and educational process

understand the roles and goals of those practices within the broader context of the community's overall schema of inclusive practice.

Figure 1 describes a matrix of possible pattern language domains for inclusive educators indicating the scope of language development required for overall schema building. The present study focused specifically on the instruction and classroom process domain.

The existence of this pattern language is a prerequisite for schema development and ultimately for articulating and evaluating the professional standards of the teaching profession at scale (Yinger & Fredericks-Lee, 2000). A complete schema would call for an integration of the domains in the matrix as interpreted by individuals and ultimately a community of practice.

While there are many descriptions of the application of communities of practice in educational settings (Colley, James, & Diment, 2007; Elmore, 2007; Gunawardena et al., 2006; Hartnell-Young, 2006; O'Donnell & Tobbell, 2007) the extent to which they actually represent venues for sophisticated schema-driven professional collaboration is unclear (Wenger, 2006). Whether these communities share the kind of professional

pattern language and cultures required to meet Wenger's definition of a practice community is also less apparent from existing accounts.

The longitudinal study of schools by researchers including Goodlad (1984), Lortie (1975), McLaughlin and Talbert (2001), and Sizer (1984) would indicate that communities of practice, when defined as venues for sophisticated professional exchange, do not occur naturally in schools nor are they characterized by the use of a collaborative professional pattern language. Each of the aforementioned authors characterized schools as predominantly autonomous systems focused on individualized engagement, possessing only limited and idiosyncratic cultures of shared professional knowledge and collaborative action. This characterization of schools is problematic given the kind of collaborative action required for successful inclusive practice in schools and especially if that practice is expected to occur systemically at some level of scale within and across schools and preservice teacher education.

The aforementioned multi-generational research would suggest that building capacity with a pattern language and schema of inclusive practice represents a challenge for both pre and in-service

education if teachers and schools are to be capable of participating in and/or building communities of practice systemically and/or at scale. This requires that teacher education programs provide more than the explicit instrumental skills related to professional practice. They need to develop among teacher education students, a deep meta-cognitive understanding of the approaches they address, including the way any given teaching and learning practice fits within a broader professional schema.

While all communities of practice are locally constructed and should reflect the context in which they evolve (Wenger, 2000), they should also include the cumulative professional knowledge of the field in which they are situated. Building this professional knowledge and the capacity to share it begins in preservice education where teacher candidates should learn the kind of professional pattern language required to exchange sophisticated ideas about student learning needs, pedagogy, assessment, and curriculum. This language represents the cornerstone of a professional schema or conceptual framework that develops over time and becomes contextualized within the schools in which teachers work.

Recent reforms in the design of pre-service teacher education programs have the intent of enabling students to build a more sophisticated schema or conceptual understanding of their learning by requiring that programs possess an extant form or framework that permits schema building to occur (e.g., National Council for Accreditation of Teacher Education [NCATE], 2006). This standard is applied to all NCATE (2006) approved programs that prepare inclusive education teachers.

For example, a program at the University of Cincinnati (2007) has extended the conceptual framework dimension of the NCATE program standards to include the explicit development of a pattern language and lexicon as a graduation outcome and a way of articulating the conceptual design of the program in practice. This pattern language is based on what is described as professional ways of knowing, professional ways of being and professional ways of doing which focus on the content knowledge and pedagogical knowledge of the field (University of Cincinnati, 2007). What remains less clear at this time is the ways in which the design of pre-service preparation can assist students to develop pattern language required to be successful members of professional communities of practice.

We contend that to develop pattern language the key ideas, skills and knowledge required in any program of professional preparation need to be deeply and repeatedly embedded in all courses in a program of study. It is this deep embedding and repeated exposure that brings practical value to a conceptual framework and makes schema development possible.

Embedded Design

Our goal in this study was to determine whether we could further the development of pattern language among pre-service teachers by designing an inclusive education course using principles derived from prior work on a theory of self-organizing schools (Bain, 2007). That theory, and the research that supports it, focuses on the way in which a system's design can enable pattern language and schema development through the process of embedded design (Bain, 2007).

Successful complex systems exhibit self-repeating patterns within their organizational structure (Waldrop, 1993). Embedded design involves creating these self-repeating patterns in a system by expressing the essential features of a pattern language and schema at many levels in the system's design while also embedding each of those design features in all others. For example, if a system assigns value to collaboration as a key concept then it is important that collaboration becomes deeply embedded in the pattern language and overall schema for the system.

According to the theory, embedding collaboration or any other practice generates a deeper and elaborated understanding of, and facility with, the role of collaboration in inclusive practice and the role of inclusive practice as it relates to collaboration. When this principle of embedded design is extended to all features of the course or system, the theory posits that a common understanding and regularity required for pattern language and schema development can emerge (Bain, 2007). Previously completed studies have shown that the application of the embedded design principle covaries with increases in the self-efficacy (Lancaster & Bain, 2007) and pedagogical content knowledge (Bain, Lancaster, Zundans & Parkes, in press) of pre-service inclusive educators.

Purpose

The purpose of this study was to establish whether the application of the embedded design principle in classroom practice communities covaried with the frequency and sophistication of pattern language use by students. Pattern language was developed through the creation of collaborative communities of practice within which students were exposed to the embedded design of inclusive practice. Pattern language was expressed in reflections about inclusive lesson designs written by students. The designs required students to use an inclusive practice, including its research-based characteristics, to construct a lesson. The students were then required to differentiate the content, process and

product of their lessons (Tomlinson, 2001). The designs were a graded component of the course. Those approaches that were the subject of the reflections (i.e., explicit teaching, cognitive strategy training, peer assisted learning and cooperative learning) are widely acknowledged as cornerstones of inclusive educational practice (Ashman & Elkins, 2004; Mastropieri & Scruggs, 2004).

Further, the study sought to establish whether changes in the frequency and sophistication of pattern language use increased over time as students became more engaged with the course and the collaborative communities of practice in which they worked. It was our expectation that as students experienced each of the teaching and learning cycles implemented for the aforementioned approaches, and using the embedded design principle, that they would use more pattern language in more sophisticated ways. We expected that the embedded design of the approaches in each teaching cycle would drive increased pattern language use. For example, according to Slavin et al. (1994), explicit or direct teaching (Rosenshine, 1986) is recommended as the way to begin a cooperative learning lesson, while cognitive strategies can be embedded in explicit, peer and cooperative teaching approaches. As such, a rationale existed for the way pattern language use could build over the weeks of the course based on the connections across the approaches learned by the students.

Method

Participants

The participants were 54 volunteer preservice teacher educators enrolled in a mandatory inclusive education course in the second year of the Bachelor's Degree in Primary (Elementary) Education. Of the total, 14 were male and 40 were female.

Setting

The sessions of the 13-week course were held in the lecture theatres and tutorial rooms on the university campus. Lectures were of one hour and included all students while tutorial/workshop sessions were of two hours and included approximately 20 students in each class.

Embedded Design

The embedded design principle was applied to the course design and implementation at four levels. They were as follows:

Level I: Knowledge and Awareness. All students were required to complete pre-reading on collaboration, explicit teaching, cognitive strategy training, cooperative and peer assisted learning, in preparation for lectures. Lectures were then used to develop and apply the concepts and ideas described in the readings. Students attended seven lectures over the 13 week period. The reading and lectures were threaded together by a set of specific objectives provided to students on the week prior to the introduction of a new topic. The objectives explained the key understandings for each topic and how related information would be provided either in reading, by lecture or both. Students were accountable for developing responses to each of the objectives for each week. Quiz questions were based upon the objectives.

Level II: Active Experience. At this level of course design and implementation, workshops were used to translate knowledge and awareness into skill in a series of practical experiences. Students participated in five two-hour skill-building workshops. Workshops were conducted in collaboration, explicit teaching, cognitive strategy training, cooperative learning, and peer-assisted learning. Students were taught how to build lesson designs using each of the approaches and then differentiate those designs for an inclusive classroom. In each case, the teaching approach that constituted the topic of the workshop was employed to teach the workshop. For example, students learned about cooperative learning by using cooperative learning (i.e., Jigsaw II - Slavin et al, 1994) as the medium of instruction in the workshop. The same approach was applied to the design and implementation of workshops on explicit teaching, peer assisted learning, and cognitive strategy training.

Level III: Continuous Application and Feedback. The embedded design principle calls for the embedding of key elements in all others (Bain, 2007). This was accomplished in the course design and implementation by using the collaborative process in all subsequent workshops as a medium for learning about other approaches. In the first workshop meeting (week 2), students were randomly placed in collaborative practice communities for the duration of the course and learned a collaborative problem-solving process together (Friend & Cook, 2002; West, Idol & Cannon, 1989), practicing it first with simple problems like naming their community. The application progressed to more sophisticated instructional problem-solving related to the lesson designs.

Students convened their communities as a part of the teaching cycle for each inclusive approach in order to share their lesson designs. Students shared copies of their designs with peers. After reading the design, the group used the collaborative process to provide feedback on each lesson. This process embedded collaboration in the learning about all other practices

and called upon students to make active use of their knowledge of the pattern language of explicit teaching, cognitive strategy training, cooperative learning and peer assisted learning by deploying their knowledge of those practices in the feedback exchange.

Level IV: Personal Impact. At the personal impact level, embedded design has a direct, "non-simulated" effect on the students' engagement with the course. Students use the inclusive practices in ways that have consequences for their performance in the course. This involved using the inclusive practices taught from week to week as part of the students' preparation for their assessment tasks. In the present case, this happened in two ways. Students used collaborative, peer assisted and cooperative learning in preparation sessions to prepare for the quizzes they would take as part of their assessment. Students met in pairs or cooperative groups in those class sessions in which quizzes were scheduled. For 20 minutes prior to the administration of the quizzes, the students used the respective processes to prepare for their quizzes. As such, their capacity to employ the research-based characteristics of the inclusive approaches influenced the quality of their preparation and ultimately their quiz grade (Bain, Lancaster, Zundans, & Parkes, in press). In this way, the embedding was intended to result in a more visceral or direct level of impact where students could experience, authentically, the effect of the approaches on their own learning and performance. Further, the student lesson designs described in the previous section were also graded as an assessment requirement. The quality of the collaborative feedback each student received form the community influenced the quality of their revisions that in turn influenced the grade they received. The Personal Impact Level of embedding occurred on three occasions for quiz preparation and on four occasions for lesson feedback in the course schedule.

Teaching Cycle

The four levels of embedding were implemented sequentially for each topic and framed the week-to-week teaching cycle for the course. The cycle included pre-reading, lecture, skill building workshop, lesson draft development, collaborative feedback, lesson submission, and quiz. Each level of embedding focused on reinforcing the learning experience acquired at other levels. For example, the approaches to cooperation (Slavin et al., 1994) used in quiz preparation were the same approaches that students read about and were described in lecture. The collaborative process used in class to review lesson designs was the same process introduced in the active experience workshop. In this way, each level of embedding was designed to have a self-reinforcing effect on the other as students' learning

experience at one level was reinforced at another (Bain, 2007). Students engaged in a procedurally consistent and self-reinforcing approach focused first on building knowledge level capacity with new pedagogical knowledge, the elaboration of that understanding through exchange with their peers and then the application of that knowledge in lesson designs.

The collaborative communities of practice were the vehicles employed by groups of students to express the four levels of embedded design included in each teaching cycle. The exchange in those communities reflected the knowledge of the inclusive pedagogies (Level I), the application of learning derived from workshops (Level II), the venue for the use of collaborative process to provide feedback (Level III), and for test preparation (Level IV). At all levels, the communities provided both the context and opportunity for students to share and elaborate upon the knowledge and skill developed throughout the course.

The study is premised on the view that students would engage in a deeper and more reflective engagement with the course content if key pedagogical knowledge was developed over the course of each teaching cycle using the four levels of embedding. This deeper engagement would translate into greater facility with the use of that knowledge in lesson designs, in tests and quizzes and in the use of professional pattern language. The collaborative communities of practice were the vehicles employed by groups of students to express the four levels of embedded design included in each teaching cycle. The exchange in those communities reflected the knowledge of the inclusive pedagogies,

Research Design

A simple uninterrupted time series design (Brockwell & Davis, 1991) was employed in the study focusing on the common event history of the participants. Measurements were taken after the conclusion of each teaching cycle for all participants in the cohort in order to establish any pattern of responding that covaried with the teaching cycles.

Measuring Pattern Language

Student pattern language was measured by asking students to write a reflection about their lesson designs on four occasions throughout the course. This occurred after the completion of each teaching cycle. Reflections were produced in weeks 5, 7, 10, and 13 after completion of the teaching cycle for each of explicit teaching, cognitive strategies, cooperative learning and peer assisted learning. Students were asked to write for up to 30 minutes using four guiding questions and were given the same amount of space

and time to record each reflection. The questions were the following:

Question 1: How well is the inclusive approach represented in your lesson design?
Question 2: What are the strengths of your design?
Question 3: What are the weaknesses of your design?
Question 4: How would you change or improve your design?

The students were asked to draw upon their own experiences developing the lesson designs and the feedback they received from their peers. Students were not asked, directed, or encouraged to try and include pattern language in their reflections nor were the reflections graded. The reflection questions did not require students to incorporate knowledge from prior reflections although it was possible to do so.

Analysis of the Reflections

The reflections were analyzed in two ways. First, a frequency count was taken of the number of pattern language terms included in each student response. Pattern language terms were defined as those words that comprised the professional lexicon of the teaching approach or strategy taught in the class. For example, with respect to explicit teaching, words like *modeling guided practice, anticipatory set, independent practice*. For cooperative learning, words like *task structure, interdependence, group reward, individual accountability* were deemed to constitute pattern language terms. These terms describe the critical sub-components of the pedagogies, knowledge of which is essential to implement the pedagogies with integrity and to problem-solve their use in classroom settings. Figure 2 describes a list of the terms included in the study.

A repeated measures analysis of variance (occasion as the repeated measurement factor) was used to determine any statistically significant changes in the frequency of pattern language usage over each of the four teaching cycles.

The ways in which the terms were used in the narrative constituted the second form of data analysis. We considered that it would be possible to use pattern language terms frequently as part of a reflection in ways that did not necessarily have clear meaning, communicative intent, or show any level of sophistication in understanding or analysis. It is also possible that a sophisticated response could be produced without pattern language terms, although the successful use of the practices included in the study is predicated upon knowledge of their structural elements (e.g., task structure, guided practice).   We considered

the use of terminology related to those structural elements to be an important component of a sophisticated response. The Structure of Observed Learning Outcomes taxonomy (SOLO) was used to make a determination of the sophistication of the reflection narratives and address the way pattern language terms were used.

The SOLO was developed by Biggs and Collis (1982) as a means of assessing the sophistication of learner responses across a range of domains and across students of various ages (Chan, Tsui, Chan, & Hong, 2002).   The taxonomy is structured into five major levels as indicated in the table below and is hierarchical in nature increasing in structural complexity. Figure 3 describes the categories employed in the SOLO taxonomy.

These hierarchical levels reflect the quality of learning for a particular task and are suited to the content analysis of prose passages or process analysis such as mathematical problem solving (Biggs, 1995). SOLO has been used extensively in assessing responses including secondary science (Levins, 1997); knowledge of biology, in particular evolution amongst stage six students (Creedy, 1993); use of LOGO computer language (Hawkins & Hedberg, 1986); the visual arts in higher education (Hulsbosch, 2006); and assessment in higher education across subject areas (Biggs, 1992).

In the present study, a trained research assistant who did not possess knowledge of the study's research questions undertook the coding and analysis of the reflections. In the first round of analysis, the assistant identified all instances of use of the pattern language terms on each of the reflections. In the second round of analysis, each reflection was reviewed and coded according to the SOLO level to which it corresponded. The identification of terms and designations of the assistant were compared to ratings made by the second author for 20% of the reflections. The checks achieved or exceeded 80% agreement for the identification of terms and the designations of response sophistication on the SOLO Taxonomy. Reliability was calculated by determining the instances of coding agreements for both factors in the reflections across the sample for the two raters and then dividing those by coding agreements plus disagreements. This included agreements/ disagreements for the presence of pattern language terms and the SOLO level of coded responses. Excerpts from responses at each of the SOLO levels are described in Table 1. The categorical data produced by the SOLO taxonomy was analyzed using a contingency table analysis. In this case, the distribution of the responses across the SOLO categories were compared by question within each reflection. Each of the four questions that comprised a reflection became the unit of measurement and, as with the parametric analysis, occasion or teaching cycle was the unit of comparison.

Figure 2
Pattern Language Lexicon

Cognitive Strategy (CS)	- Cognitive strategies Direct Instruction
	- Guided practice
	- Independent practice
	- Assessment of outcomes
	- A learning framework
	- Different learning styles
	- Self-monitoring
	- Metacognitive learning
	- ET framework
	-
Peer Tutoring (PT)	- Tutor
	- Tutee
	- Tutor procedures
	- Same age
	- Cross age
	- Class wide PT
	- Independent
	- Supplemental practice
	- Interrelated
	- Structure
	- Sequence
	- Reinforcement
	- Practice
	- Feedback
Cooperative Learning (CL)	- Face to face interaction
	- Positive interdependence
	- Interpersonal skills
	- Focus on group process
	- Individual accountability
	- Social cohesion
	- Cognitive elaboration
	- Metacognition
	- Procedural
	- Declarative
	- All levels of learning
	- Differentiation
	- Motivation
Explicit Teaching (ET)	- Outcomes/ objectives identified
	- Anticipatory set
	- Link to prior learning
	- Teacher model
	- Guided practice
	- Independent practice
	- ET in conjunction with mastery learning
	- levels of learning
	- Differentiation

Figure 3
SOLO Coding System Categories

Code	SOLO Level	Criteria
0	Blank	The explanation section has been left blank and no explanation is provided.
1	Prestructual	The response does not appear to answer the question or may simply be stating the question.
2	Unistructural	One piece of information was evident in the response. Responses at this level contain one fact.
3	Multistructural	More than one piece of information was provided in the explanation. Responses at this level contain several facts, but consider the facts in isolation; no clear links are made amongst the facts.
4	Relational	Pieces of information have been presented and related together. Various facts are linked together and are related to a main concept, the explanation is valid only for the given context.
5	Extended Abstract	A response of this type goes beyond what is asked in the question however the explanation presented by the respondent clearly indicates how the additional information relates to the question. The response generalises across contexts.

(Biggs & Collis, 1982)

Table 1
Example Responses at Each Level on the SOLO Taxonomy

SOLO Level	Response
Prestructural	"One weakness my group pointed out after listening to everyone was there were no safety steps for using the frying pan. I too saw that this as possibly a very important part of the lesson that needs to be involved at the very beginning and spoken about throughout the lesson."
Unistructural	"I think one of the strengths of the lesson is that I broke the lesson down into a series of steps. Each step was in a logical sequence that flowed on to the next."
Multi-Structural	"More emphasis on definitive stage level. Need to list equipment. Be specific with outcome, must make sure (outcome) has three explicit parts (lacked condition). Methods of differentiation."
Relational	*"I thought a weakness was the fact that even though I checked each step in guided practice the steps needed to be put together in a sequence to match the modelling stage. This was affirmed by the group."*
Extended Abstract	"Some of the strategies included in my design include students having knowledge of the task structure. Students will have individually accountability to ensure they learn enough of the correct material. Students (we)re also interdependent… the group have to learn as much as they can for the group. The students will also have an understanding of the goals that they must achieve as a group and the fact that they will be rewarded for their work. I have also used the motivational strategy to encourage the students to work their hardest. These elements focus on the need for students to have a clear understanding of what is expected from them both in an academic and social sense. The combination of these elements allows students to gain as much as possible from the lesson content as they have directed questioning and a motivational reason and social perspective to do well. They depend on each other."

Results

Table 1 provides a narrative description of responses at each of the SOLO levels. The descriptions provide a term of reference for interpreting the quantitative data presented in this section.

The examples show both the presence/absence and form in which students used the professional language taught in the course. At the pre-structural level, the example makes no reference to any of the professional language taught in the course. The unistructural level example alludes to the language with reference to steps

in the lesson although specific terms are not employed. The multi-structural level makes reference to terms employed in direct or explicit teaching in a meaningful context. The relational level example used similar terms and indicated a capacity to relate those terms to each other and evaluate the way they were employed in a lesson design. At the extended abstract level, the terms were used in a highly interrelated form showing a deep understanding of the terminology, in this instance related to cooperative learning.

Pattern Language Frequency

Table 2 describes the mean and standard deviation scores for the frequency of pattern language use by students for each teaching cycle. Summing the instance of pattern language across the four questions derived a score for each reflection. The results show an increase in the frequency with which students used the professional pattern language terms within the body of their reflections after each of the teaching cycles. This was consistent across all four cycles.

A Repeated Measures ANOVA indicated statistically significant differences in pattern language use over the four teaching cycles ($F (3, 141) = 49.59$, $p =.0001$). The results of follow-up comparisons (using the Scheffe-F test procedure) comparing the teaching cycles indicated statistically significant differences between the means for the initial explicit teaching cycle and all three subsequent teaching cycles ($p = .05$), for the second cycle (cognitive strategies) and the fourth

peer assisted learning cycle ($p = .05$) and between the third (cooperative learning) and fourth and final (peer assisted learning) cycle ($p = .05$). What is clear from the results of the omnibus test and the pair wise comparisons is that the frequency of pattern language use progressed in a manner that covaried with the addition of those teaching cycles. As the pre-service teachers progressed through the course, they used the pattern language of inclusive practice with greater frequency every time a new teaching cycle was added.

Sophistication of Reflections

Contingency table analyses were used to ascertain whether the proportion of responses in the SOLO categories to each question (1-4) varied in a statistically significant manner over the four teaching cycles. Table 3 describes the results for question 1 (elements of the inclusive method).

The results indicate an increase in the sophistication of responses to question one over the four teaching cycles. Fifty percent of responses in the first cycle (explicit teaching) fell in the pre-structural and uni-structural categories. In the fourth cycle (peer assisted learning), over 70% of responses fell in levels 3-4 (multi-structural and relational) categories. The contingency table analysis confirmed that the observed pattern of responding diverged from the expected showing an increase in the sophistication of response as the teaching cycles progressed (chi square $(3,4) = 48.90$, $p = .0001$).

Table 2
Mean and Standard Deviation Scores for Frequency of Pattern Language by Teaching Cycle

Teaching Cycle (in order)	Mean	SD
Explicit Teaching (ET)	7.04	3.61
Cognitive Strategies (CS)	15.21	5.01
Cooperative Learning (CL)	16.93	7.91
Peer Assisted Learning (PAL)	20.59	10.13

Table 3
Summary of SOLO Responses for Question One

SOLO Level	Question 1			
	ET	CS	CL	PT
1	19 (35.19)	3 (6.25)	4 (7.55)	6 (11.11)
2	10 (18.52)	8 (16.67)	4 (7.55)	2 (3.70)
3	22 (40.74)	17 (35.42)	18 (33.96)	20 (37.04)
4	3 (5.56)	14 (29.17)	23 (43.40)	22 (40.74)
5	0 (0.00)	6 (12.50)	4 (7.55)	4 (7.41)

Note. Percentage of total responses in parentheses

Table 4
Summary of SOLO Responses for Question Two

SOLO Level	Question 2			
	ET	CS	CL	PT
1	12 (22.22)	2 (4.08)	3 (5.66)	1 (1.89)
2	18 (33.33)	14 (28.57)	4 (7.55)	3 (5.66)
3	24 (44.44)	18 (36.73)	20 (37.74)	22 (41.51)
4	0 (0.00)	12 (24.49)	24 (45.28)	26 (49.06)
5	0 (0.00)	3 (6.12)	2 (3.77)	1 (1.89)

Note. Percentage of total responses in parentheses

Overall, the change in the structure of student responses corresponded to the results for pattern language frequency indicating that the amount of pattern language use increased along with the sophistication of responses as the course progressed. This did not occur in as clear a linear fashion as was the case with the frequency data. For example, the pattern of responding in category three (multi-structural) was consistent across all cycles while the responses in category four decreased slightly from the third to fourth cycle. It should be noted that responses in the highest level of the SOLO taxonomy (extended abstract) were lower for question one in all cycles.

Question 2. Table 4 describes the results for question 2 (strengths of the design) across the four cycles. The results were highly similar to those reported for question 1 and indicate an increase in sophistication of response to question two from the first cycle (explicit teaching) where over 50% of responses fell in the pre-structural and uni-structural categories to the fourth cycle where 90% fell in the multi-structural and relational categories. The contingency table analysis confirmed that the observed pattern of responding diverged from the expected (chi square $F_{(3,4)} = 64.93$, $p = .0001$). As was with Question 1 (characteristics of the approach), the responses corresponded broadly to the results for pattern language frequency. The amount of pattern language use covaried with an increase in the sophistication of responses as the course progressed occurring in an even clearer and more incremental fashion across all four cycles. It should be noted that responses in the extended abstract level were again lower in all cycles.

Question 3. Table 5 describes the results for question 3 (weaknesses of the design) across the four cycles. The results concurred with those reported for Questions 1 and 2. The predominance of responses fell in the pre and uni-structural SOLO categories for the first two cycles (over 60% for each) with a predominance of responses in the multi-structural and relational categories (85%) for teaching cycles 3 and 4. The contingency table analysis was also statistically significant for Question 3 (chi square $F_{(3,4)} = 57.86$,

$p=.0001$). Responses in the highest level of the SOLO taxonomy were again lower in all cycles.

Question 4. Table 6 describes the results for question 4 (changing the design) across the four cycles. The results also remained consistent with those reported for questions one through three. A higher proportion of responses fell in the pre and uni-structural categories for the first two cycles (over 45% for both explicit teaching and cognitive strategies) with a predominance of responses in the multi-structural and relational categories for teaching cycles 3 and 4 (over 85%) . The contingency table analysis was also statistically significant for question 4 (chi square $F_{(4,3)} = 57.39$, $p = .0001$) Responses in the highest level of the SOLO taxonomy were again lower in all cycles.

In summary, the sophistication of response across all four questions increased as the teaching cycles and embedded design principle was implemented in a manner that covaried with an increase in the frequency of pattern language use. This increase did not result in high levels of responding in the most advanced (extended abstract) SOLO category for any question under any of the four teaching cycles.

Discussion

The first and most obvious finding of this study is that the pre-service teachers increased the frequency and sophistication of pattern language use over the course of the study and in a manner consistent with the application of embedded design in each teaching cycle. By the completion of the last teaching cycle, approximately 10 percent of those words were professional pattern language terms. Practically speaking this means that most sentences in the reflection included at least one professional term on average. Further, the sophistication of use of those terms fell predominantly within the multi-structural and relational categories indicating that the students were able to present multiple professional ideas and for relational responses, link those to a main idea or concept. The terms used in the student reflections were consistent with those identified in the literature

Table 5
Summary of SOLO Responses for Question Three

SOLO Level	Question 3			
	ET	CS	CL	PT
0	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
1	19 (35.19)	13 (27.08)	3 (5.66)	1 (1.85)
2	16 (29.63)	20 (41.67)	14 (26.42)	13 (24.07)
3	14 (25.93)	9 (18.75)	19 (35.85)	33 (61.11)
4	4 (7.41)	5 (10.42)	16 (30.19)	6 (11.11)
5	0 (0.00)	1 (2.08)	1 (1.89)	1 (1.85)

Note. Percentage of total responses in parentheses

Table 6
Summary of SOLO Responses for Question Four

SOLO Level	Question 4			
	ET	CS	CL	PT
0	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
1	11 (20.37)	5 (10.42)	6 (11.32)	0 (0.00)
2	14 (25.93)	18 (37.50)	7 (13.21)	2 (3.70)
3	24 (44.44)	19 (39.58)	25 (47.17)	25 (46.30)
4	4 (7.41)	3 (6.25)	13 (24.53)	23 (42.59)
5	0 (0.00)	3 (6.25)	2 (3.77)	4 (7.41)

Note. Percentage of total responses in parentheses

as being important for inclusive practice (Ashman & Elkins, 2004; Mastropieri & Scruggs, 2004).

Few responses fell into the extended abstract category which requires evidence of generalization beyond the immediate context. This level of responding is consistent with the expectation that the inclusion of the four levels of embedded design in the course teaching cycles would contribute to a broader and deeper conceptual understanding of practice. As students engaged with embedded design in their collaborative communities and across teaching cycles experience, their use of pattern language improved. Using this definition, few students appeared to respond in a manner that was indicative of the existence of a broader schema. However, such a schema would be expected to emerge from a cumulative and interrelated professional exposure in multiple courses and field-based experience. As such, schema development was not expected as an outcome of the experience in just one course, and one experience with the course design approach.

The time series design employed here produced evidence that that the design of the teaching cycles to include the four levels of embedded design in collaborative communities covaried with increases in both the frequency and sophistication use of professional pattern language. These findings are reinforced by existing research that has shown similar increases in self-efficacy and professional knowledge under comparable instructional conditions where the embedded design principle was applied (Bain, Lancaster, Zundans & Parkes, in press; Lancaster & Bain, 2007). The findings also support existing research on the importance of collaborative communities for inclusive practice (Buysse et al., 2003; Linehan et al., 2005; Ryba et al., 2001; Wesley & Buysse, 2001) and shows that the use of professional language increases with community participation.

The findings lend support to the role of embedded design in assisting early career educators to contribute professional knowledge to those communities with which they engage in the early stages of their careers. They also signal the importance of ensuring that communities of practice include the professional language of the field as a term of reference for effective collaboration.

The application of the embedded design principle as described here need not be restricted to course design in the field of inclusive teacher education. The approach may be relevant to higher education teaching in range of areas where collaborative work is desired and valued and the development of a professional language and lexicon is necessary. This is especially the case in fields that have a well-established professional language (e.g., medicine, architecture, engineering). The results are nonetheless encouraging in teacher preparation given the difficulty the education field has experienced in translating its research base into practice at scale in schools (Cuban,

2003; Elmore, 1996). Efforts to address this issue begin with the methods employed in pre-service education.

The results of this study also provide important formative or emergent information about the kind of pattern language that needs to exist in an inclusive education course. This information can inform the broader conceptual framework for an elementary pre-service teacher education program. Based on the preliminary findings described here, more controlled research can investigate the relative contributions of the levels of the embedded design principle, the discrete role of collaborative communities, and their application across courses at a program level.

Limitations and Conclusions

This study's generalizability is clearly limited by its focus on just one university program, an available population of students, and the quasi-experimental nature of the time-series design which limits causal inference. A most obvious and important consideration in the interpretation of the data described herein pertains to the extent to which the circumstances of the teacher education program and its students account for, or contribute to the findings. It is altogether possible that these factors exerted an influence on the implementation and results. Further, the data described here represent just one, albeit important, dimension of inclusive practice, the use of those pedagogies that have been shown to enable inclusion.

Clearly, the ultimate test of the effects of the approaches described in this study is in the extent to which they exert a summative influence on the actual classroom practice of pre-service teachers. This remains as the next step in the broader program of research to which this study pertains.

With due recognition of these limitations, the direction of the findings in the study lends support to the potential for pattern language development in teacher preparation. This is especially the case given the general paucity of data associated with the development of pattern language in preservice preparation or education in general. These findings should stimulate the continued examination of the role of course design and specifically collaborative communities in building pattern language in teacher preparation programs. This includes an examination of those factors that contribute to building a pattern language lexicon, benchmarks for the development of pattern language by pre-service teacher educators, and the way design coherence across multiple courses can contribute to higher levels of professional understanding and schema development.

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The Relationship Between Feedback and Change
in Tertiary Student Writing in the Disciplines

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This study examined the relationship between teacher written feedback and change in the disciplinary writing of tertiary students in their final year of undergraduate study. The student texts and teacher written feedback examined arose naturally out of a third year disciplinary-based unit in which each student submitted a text three times over the course of a semester, each time receiving feedback and a mark prior to rewriting and resubmitting. In analyzing the relationship between the different types of feedback and the changes that occurred, the feedback was categorized according to the issue that was being addressed, the manner in which it was given, and its scope. The different types of feedback were directly related to the changes that occurred in the students' subsequent rewrites. The analysis shows that certain types of feedback are more strongly related to change than other types of feedback. In addition, the analysis shows that change is further influenced by the balance between the various individual points of feedback and the degree to which they reinforce each other. The findings show that the use of feedback that is strongly related to change can improve the writing of students in the disciplines.

Concerns have long been expressed about tertiary students' ability to write (Lea & Street, 1998; Reid, 1997; Russell, 1991) with many educators looking to find effective ways to improve their students' writing. Many initiatives have been undertaken at universities to address this issue such as the provision of academic skills advisers and writing classes. This study, however, addresses improvement of writing within the disciplinary context.

The disciplinary context provides many challenges that are difficult to recreate in a writing class. Through their degree program, students are placed in learning contexts where they grapple with increasing complexity and depth of subject matter which they are often required to address in lengthy, detailed, and specific ways (Enders, 2001; Grabe & Kaplan, 1996; Vardi, 2000). As they further progress in their studies, they need to demonstrate their ability to evaluate textual material in ways appropriate to the discipline (Geisler, 1994) and demonstrate where they are situated relative to the literature. This ability to construct their own "voice" through aligning, disagreeing, contrasting and juxtaposing the ideas of others (Ivanic, 1998) is a major intellectual challenge for students (Carson et al, 1992).

While much has been written about disciplinary ways of writing (Chanock, 1994; Lea & Street, 1998; Odell, 1992), writing in the disciplines is not uniform (Herrington, 1985; Ivanic, 1998). There are many different types of writing tasks and many different expectations from staff even when situated in the same discipline (Herrington, 1985; Lea & Street, 1998; Vardi, 2000). This poses additional challenges for students each time they write for a new task and is further exacerbated when writing for a new lecturer.

As these challenges are specific to the disciplinary classroom and the writing task at hand, an important responsibility is placed on lecturers to help their students meet the specific writing requirements of the classroom. One of the major tools that lecturers have is written feedback. Its role in improving tertiary student writing has been studied across a number of different contexts including tertiary composition study, second language acquisition, and the disciplinary context.

Across these three contexts, a number of similar conclusions have been drawn about feedback and its role and effectiveness in the writing process. Several researchers have found that when given an opportunity to revise, students usually attend to most teacher written feedback and make changes (Ashwell, 2000; ; Ferris, 1997; Sweeney, 1999), particularly when written as a request or a direction on what to improve and how (Ferris, 1997; Sweeney, 1999; Ziv, 1984). Changes in response to feedback occur even when students do not understand why the change needs to be made (Ziv, 1984). Feedback increases the number of changes that students make on revision (Ashwell, 2000; Fathman & Whalley, 1990; Sweeney, 1999) and these changes usually improve the quality of student writing (Beach, 1979; Beason, 1993; Fathman & Whalley, 1990; Olson & Raffeld, 1987; Sitko, 1993).

Certain types of feedback have been found to be more effective in producing positive change than others. Overall, text-specific feedback results in more substantive change than general feedback (Chamberlain, Dison, & Button, 1998; Ferris, 1997; Jenkins, 1987; Sweeney, 1999; Zamel, 1985). Feedback addressing the characteristics of mechanics, structure or content in the text has been found to lead to changes which improve the quality of writing (Ashwell, 2000; Beason, 1993; Fathman & Whalley, 1990; Ferris, 1997; Olson & Raffeld, 1987). But, while feedback on mechanics improves writing, when it is the only

feedback given, it does not necessarily translate into increased marks in the discipline (Olson & Raffeld, 1987). This finding reflects the importance that disciplinary markers attribute to both content and form in their evaluation of the overall quality of the written piece.

Despite these positive observations about the types of feedback that result in improved writing, both researchers and students from across a range of contexts have expressed concerns about how it is used in the classroom. Researchers have found that some teachers give limited feedback (Plum, 1998; Spinks, 1998), misread students' work (Jenkins, 1987; Zamel, 1985), over-emphasize certain aspects of the text such as grammar (Cohen & Cavalcanti, 1990), arbitrarily impose rules and standards (Zamel, 1985), and do not address specifics in the text (Chamberlain et al., 1998). Feedback from some teachers has been variously described as vague (Chamberlain et al., 1998; Jenkins, 1987; Zamel, 1985), unclear or cryptic (Chamberlain et al., 1998; Hoadley-Maidment, 1997; Jenkins, 1987), ambiguous (Jenkins, 1987), sarcastic (Chamberlain et al., 1998), contradictory (Chamberlain et al., 1998; Zamel, 1985), buck-passing (Chamberlain et al., 1998), and lacking in praise or positive comments (Beason, 1993; Chamberlain et al., 1998; Cohen & Cavalcanti, 1990; Spinks, 1998).

These types of observations about teacher feedback have led Jenkins (1987) to the conclusion that feedback often lacks a sense of instruction, and Chamberlain et al. (1998) to the conclusion that much of the feedback students receive is unhelpful. Vague, unclear, non-text-specific feedback would appear to be particularly unhelpful when students enter a writing situation with new conventions, norms, ideas and ways of thinking as occurs in the discipline based classroom.

Given the observations made about teacher feedback, it is not surprising that several researchers (Cohen & Cavalcanti, 1990; Plum, 1998; Sitko, 1993; Zamel, 1985) have observed that many students have problems in using it. Students in various studies have reported not understanding a range of feedback that they have been given (Cohen & Cavalcanti, 1990; Jenkins, 1987; Lea & Street, 2000; Leki, 1995; Sommers, 1992). This lack of understanding has been linked not only to "unhelpful" feedback, but also to feedback that does not reflect the in-class discussions and negotiations which had occurred about the writing (Sperling & Freedman, 1987). Students report sometimes not knowing what to do with the feedback given (Leki, 1990) and are disappointed when they do not receive enough useful feedback (Spinks, 1998). These types of findings have even led some to conclude that written feedback is not effective (Faigley et al., 1985; Hillocks, 1986; Leki, 1990).

Yet despite these problems with teacher feedback, students report wanting useful feedback (Spinks, 1998) and have spoken of the types of feedback they like or would like to receive on their writing. Several studies have reported that students want positive feedback (Beason, 1993; Cohen & Cavalcanti, 1990; Hyland, 1998; Spinks, 1998). This aspect of feedback is important as it not only provides motivation, but also information about the correctness of a response (Wittrock, 1986). However, students also want teachers to engage with their ideas and provide feedback on content and its organization (Cohen & Cavalcanti, 1990) with direct explicit instruction on how to improve (Hyland, 1998; Leki, 1990; Ziv, 1984) – a desire which is strikingly similar to the types of feedback found to be effective in producing positive changes to students' writing. When they do not receive these types of feedback, the experience can result in a lack of motivation to continue writing (Hyland, 1998).

While students clearly want the types of feedback found to be effective in improving writing quality on rewrite, the tertiary context of writing within the disciplines often does not provide students with the opportunity to act on the feedback they get. Given that at the pre-tertiary level and at the postgraduate research level, students are given feedback on their drafts, it is quite an anomaly that undergraduate students are rarely given an opportunity to act on feedback from their assignments. Both Chamberlain et al. (1998) and Beason (1993) have noted, that when tertiary students are given an opportunity to respond to teacher feedback, they do so and that this results in improved writing.

To date, studies on feedback have examined the various types of feedback given to students (Beason, 1993; Chamberlain et al., 1998; Ferris, 1997; Spinks, 1998; Tapper & Storch, 2000), the types of feedback to which students attend (Ashwell, 2000; Beason, 1993; Olson & Raffeld, 1987), the amount of change that results (Ashwell, 2000; Ferris, 1997; Hyland, 1998; Sweeney, 1999), the change in quality of writing (Beach, 1979; Fathman & Whalley, 1990; Olson & Raffeld, 1987), and students' reactions to the feedback they receive (Cohen, 1993; Hyland, 1998; Jenkins, 1987; Lea, 1994; Spinks, 1998; Ziv, 1984). There does not appear, however, to be any research which directly relates each point of feedback given to the subsequent changes made to the text. This study addresses this gap by examining feedback and change within the disciplinary context.

Method

This naturalistic study was conducted in a third year comparative Industrial Relations (IR) unit in a

large Australian university. As part of their assessment, over 100 students were given a major 2500 word take-home writing assignment, and were required to write in response to the same essay prompt three times over the course of the semester each time working to improve their written response. After submitting each text, the lecturer provided detailed written feedback and a mark to each student before the next rewrite was due. The first text was allocated 15%, the second 20%, and the third 10%. The student texts that arose naturally out of this process formed the basis of this study.

The participants comprised those full-time third year IR students whose first language was English and who consented to having their written work analyzed. This resulted in a pool of 15 students. The written texts along with the accompanying feedback of four of these students were selected for in-depth analysis. Collection and analysis occurred after all assessments had been completed and marked in order not to affect study results. These four sets of texts (3 from each student) were selected as they displayed (a) a range of marks from failure through to high achievement and (b) different rates and patterns of improvement in mark as depicted in Figure 1.

In all the selected sets, the lecturer provided substantial amounts of written feedback on both the students' first and second texts, irrespective of the grade given. The students all showed high rates of compliance with feedback that required or suggested that improvements could be made.

The first and second texts written by each student contained feedback on which students could act. Each point of feedback was coded in three ways reflecting:

- The characteristics of the text that the feedback addressed;
- The manner in which the feedback was written; and
- The scope of the feedback.

Through repeated examination of the data and based on insights gained from the categories used by other researchers in feedback and revision studies (Beason, 1993; Faigley & Witte, 1981; Ferris, 1997; Olson & Raffeld, 1987; Spinks, 1998) the codes listed in Table 1 were developed. The defined parameters for each code are detailed in Appendices A - C.

Figure 1
Improvement in Student Essays
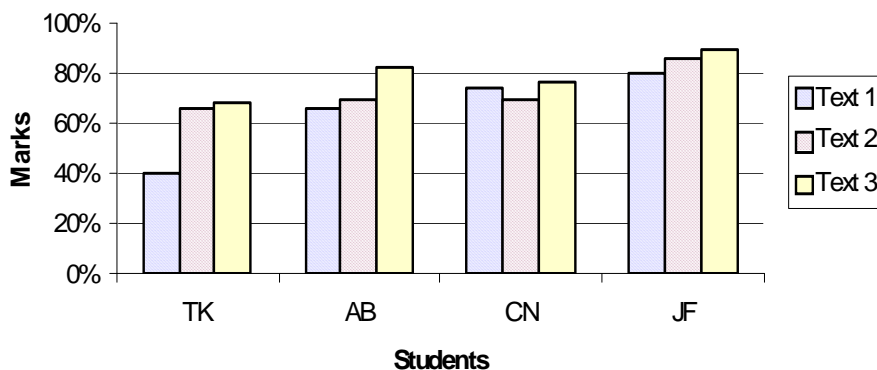
Table 1
Feedback Codes

Characteristics Addressed	Manner addressed	Scope of feedback
▪ Mechanics	▪ Prescription	▪ Local
▪ Information	▪ Direct edit	▪ Global
▪ Referencing	▪ Question	▪ Unclear
▪ Academic expression	▪ General comment	
▪ Thinking	▪ Explanation	
▪ Organization	▪ Evaluation	
▪ Sources	▪ Indication	
▪ Unclear	▪ Other	
▪ Other		

Table 2
Number of Points of Feedback by Characteristic Addressed

Characteristic Addressed	Total Number in Sample
Mechanics	58
Information	39
Referencing	63
Academic expression	61
Thinking	58
Organization	77
Sources	23

Table 3
Types of Feedback Strongly Related to Change

Scope	Manner and Characteristic Addressed
Global	• Prescriptive feedback addressing organization in conjunction with information and/or thinking and/or sources • Prescriptive feedback addressing mechanics or referencing and citation in conjunction with an explanation or example
Local	• Prescriptive feedback on the role and structure of the introduction or conclusion at the section and whole of essay levels • Direct editing of mechanics, referencing and citation practices, or academic expression • Prescriptive feedback addressing academic expression, information or thinking

Each point of feedback was coded in three ways. For instance, a point of feedback given at the end of the text such as, *"See Gardner and Palmer (1997)"*, was coded as follows:

- Characteristics addressed = Sources used;
- Manner addressed = Prescriptive; and
- Scope of the feedback = Global.

Once categorized, each point of feedback on one text was then compared with the resultant change in the subsequent text. Any changes directly related to that point of feedback were recorded. Overall, 379 points of feedback and the resulting changes in the subsequent text were analyzed. Table 2 shows the number of points of feedback analyzed based on the characteristics addressed.

The coded feedback along with the resultant changes were grouped and examined to identify the commonalities in relationships between feedback types and change across all the cases.

Findings

Feedback Strongly Related to Change

Table 3 shows the types of global and local feedback that demonstrated a strong relationship with change.

Global feedback strongly related to change. Two main types of global feedback were found to be strongly related to change. The first is global prescriptive feedback on organisation of the text. This type of feedback often resulted in widespread changes

across the text when it was directly linked to information and/or thinking and /or sources. For example, the following point of feedback written at the end of the text resulted in its complete restructuring in the subsequent iteration.

"I appreciate your decision to concentrate on three countries. I think it would have been more consistent and preferable in terms of your thinking for the essay to have used the same topics/headings for all 3 countries."

This finding matches with Olson & Raffeld's (1987) finding that feedback focusing on content (information and ideas) in conjunction with its structuring significantly influences the quality of the rewritten text. This study shows that deep changes can occur when feedback on the organization of the text indicates how to make the text work *in combination with* (a) the types of information they need to incorporate, (b) where it can be found, and (c) how it needs to be engaged with.

The second type of global feedback found to be strongly related to change was global prescriptive feedback which addresses generalizable rules or conventions, such as those found in mechanics and referencing and citation. This can also result in wide spread change across the text when coupled with an explanation or example. For example, the following feedback written on the lecturer's feedback sheet resulted in widespread change.

Don't start paragraphs with a mouthful of authors. In-text referencing is best done in

Table 4
Global and Local Feedback Poorly Related to Change

Scope	Type
Global	• Evaluation of mechanics, academic expression, referencing and citation, sources used, organization, information or thinking • Prescriptive feedback on organization or thinking given in general writing terms
Local	• Prescriptive feedback on organization or thinking given in general writing terms

brackets at the end of the relevant sentence or paragraph.

This finding is similar to Ferris's (1997) finding that global feedback on grammar results in substantive changes across the text. As mechanics and the conventions for referencing and citation are surface characteristics that do not influence content, the students showed that they could easily and readily incorporate these into the existing text. While these types of surface changes have been found to improve the quality of ESL student writing (Ashwell, 2000; Fathman & Whalley, 1990; Ferris, 1997), in tertiary writing their influence on the perceived quality of the text would appear to be minimal. This could be seen with one of the students who, despite complying with copious amounts of surface feedback, received only a minimal increase in mark in her next text. This conclusion is supported by Olson & Raffeld (1987) who found that when only this type of feedback is given, students' marks do not necessarily rise.

Local feedback strongly related to change. Three types of local feedback were found to be highly effective in promoting change. The first is local prescriptive feedback on organization which focuses on the thinking and information in introductions and conclusions at the whole of essay and section levels. This resulted in widespread deep changes to the text including changes in focus, content, analysis, and structure in the next iteration. This was seen, for example, with the following local point of feedback given alongside the introduction:

..emphasize the principle themes – e.g,. legislation, framework for centralized bargaining, role as employer, etc

The second type of local feedback found to result in consistent change was direct editing of mechanics, referencing, and citation. This resulted in students consistently making the changes in at the point of editing. The third type is local prescriptive feedback which addresses either information or thinking. While this also resulted in changes to the text, the effectiveness of that change appeared to be dependant on the degree of coherence already exhibited in the text. Where coherence was strong across all levels of the text, this type of feedback

allowed the student to incorporate the additional information and critical thought within the existing structure of the text. However, where coherence in the text faltered, this type of feedback was not necessarily incorporated in a coherent manner.

In examining the types of feedback which are strongly related to change, it is interesting to note that while it has been suggested that teachers should not use prescriptive feedback (Leki, 1990; Lunsford, 1997), this study shows that prescriptive forms of feedback can be highly effective in producing change in texts. The influence of prescriptive feedback is confirmed by Ferris (1997) and Ziv (1984) who found that students took this type of feedback seriously and complied with it.

Feedback Poorly Related to Change

While several types of feedback could be strongly related to change, other types were found to be poorly related to change. These are shown in Table 4. Global evaluation through the use of rating sheets could not, on their own, be directly related to change. While this finding could in part be attributed to the difficulty in analyzing general feedback, when a point of global evaluation was poor and *no other feedback was given* generally change did not occur. This may reflect the difficulty students have in using feedback that is not text-specific and is supported by Spinks (1998) who found global evaluation in the form of evaluation sheets to be of limited value.

Both local and global feedback addressing organization in general writing terms unrelated to the information in the text and without explanation (e.g., "more analysis" and "use topic sentences") were also poorly related to change. This confirms the findings of many (Beach, 1979; Beason, 1993; Fathman & Whalley, 1990; Ferris, 1997; Olsen & Raffeld, 1987; Sitko, 1993) that general feedback has less influence on student revisions than text-specific feedback.

Relationships Between Points of Feedback and Their Influence on Change

While much of the literature (Ashwell, 200; Beason, 1993; Chamberlain et al., 1998; Fathman &Whalley, 1990; Ferris, 1997; Jenkins, 1987; Olsen & Raffeld, 1987; Spinks, 1998; Sweeney, 1999; Tapper &

Storch, 2000; Ziv, 1984) and the findings described thus far focus on individual points of feedback, this study also found that relationships *between* points of feedback can influence the type and extent of change.

Several significant relationships between points of feedback were found to be strongly related to change. One is the relationship between the global and local feedback. Overall, the study found that global feedback was strongly related to change where it was augmented and supported by local feedback which modeled and made clear how and where the global feedback could be applied in the text.

Another important relationship found was the degree to which different points of feedback "send the same message." Where feedback conflicted, change was less likely to occur. This occurred for example where students were directed to improve their text on an aspect of their writing for which they had received a positive evaluation. This shows the importance of ensuring that separate points of feedback complement and reinforce each other. While the literature shows the importance of providing positive feedback (Beason, 1993; Cohen & Cavalcanti, 1990; Hyland, 1998; Spinks, 1998), these findings suggest that being overly positive can be counter-productive and can result in students not making necessary changes.

Another significant relationship to emerge was the relative amount of feedback given in one area as opposed to another. The students in this study appear to have attended to those areas which received the greatest quantity of feedback. This was sometimes to the detriment of other important, yet less emphasized, feedback. This occurred for example with one student who received copious amounts of feedback on surface textual features (such as mechanics, referencing, and academic expression). This appeared to have obscured the more isolated but important feedback on deeper aspects of the text (e.g., content and thinking) which the student did not address. This shows that feedback as a whole needs to be balanced with focus directed at the most important deep issues that need addressing.

These relationships between the various points of feedback, in turn, function in conjunction with the grade allocated. The relationship between the grade and the overall feedback would appear to be very strong. This was most clearly revealed on the first texts that the students submitted. Two students each received 23 points of feedback. One of the students was given a mark of 40%. The change in her subsequent text was dramatic suggesting that the initial low mark was an important part of her much improved performance. The other student received a mark of 75%. Although changes were requested through the feedback, fewer changes were seen in the subsequent text and many of the problems highlighted in the first text persisted in the second text. The students appeared to have judged the

relative importance and value of the feedback based on the overall mark. This shows how important it is for feedback to indicate the most salient aspects to which students must attend in order to improve their grade, and is confirmed by reports from students who were disappointed with their grade and the lack of feedback on how to improve (Spinks, 1998).

Role of the Iterative Process

While the types of feedback and the relationships between the points of feedback are important, the assessment process in which they occur also appears to play a significant role. In the context studied, the students received a mark for each version of the text. While teachers often do not give marks to draft work, it would appear that the marks provided in each version of the text in this iterative process influenced the students in two major ways. Firstly, it helped develop a high level of student compliance in attending to the feedback given. Secondly, it got the students to start early in the semester on their writing task and provided them with over 7 weeks to write, address feedback, and rework the text providing them with what Nelson and Hayes (1988) term a "high investment writing situation" (p. 19).

With the students investing in the task and attending to the feedback, the process provided the instructional means by which the lecturer could help improve their writing. Hence, a process approach with staged marks that provides students with an opportunity to attend to feedback and make appropriate changes can be highly effective where appropriate types of feedback are given.

However, there was also some evidence that the process may have restricted learning through the students becoming reliant on the lecturer to identify problems and provide direction for improvement. Where problems in the text existed and the lecturer did not indicate a need for improvement, change often did not occur. Similarly, where the lecturer took responsibility for improving fluency of the text (e.g., through directly restructuring the sequence of information in the text), the students simply followed without attempting to deal with the fluency issues on their own. These findings provide some evidence for the concerns that some have expressed about iterative feedback including the hand feeding of information (Sweeney, 1999), reduced ownership of writing (Hyland, 2000), and student compliance resulting in a lack of critical engagement both with their own ideas and the marker's feedback (Muncie, 2000; Sperling & Freedman, 1987).

Some of the problems arising out the process, however, appear to be related to the types of feedback given. Where the lecturer did not take control over the

meaning making, but provided sufficient scaffolds for students to make meaning on their own, there was evidence of students having critically engaged with ideas. The findings suggest that the use of explicit global feedback complemented by sufficient local feedback to clarify the points made globally provides the scaffolds needed. This type of feedback combined with an iterative process with staged marks ensures compliance in attending to task while minimizing hand feeding, the lack of critical engagement and loss of ownership.

Conclusion

Providing feedback on student writing in the disciplinary context is an important way to improve writing. However, providing extensive detailed feedback in the manner examined in this study is time consuming for both staff and students. This study demonstrates that feedback need not be extensive to be effective. As shown, when certain types of feedback are provided in a high investment context, widespread changes to text can result.

Overall, the findings suggest that feedback can improve the quality of tertiary students' texts where it

1. is clear and direct as occurs in prescriptive feedback;
2. links structuring of the text with content;
3. encourages the students' own meaning making through global feedback supported by local examples;
4. does not emphasize surface feedback (e.g., grammar, spelling, referencing conventions) over feedback on deep aspects of the text such as the content, level of analysis, and its structuring in the text; and
5. is provided in a context in which the students invest highly in the writing, attend to the feedback, and act on it.

While the findings of this study are limited to the writings of four students and the feedback of one marker, they support previous research which shows that feedback can play an important role within the disciplinary setting. They also provide clear direction to both disciplinary based teaching staff and academic staff developers on some effective ways to use feedback which can deal with the types of dissatisfaction students have expressed with the quality and usefulness of the feedback they are getting. Further research is needed to examine the impact of this type of feedback and other types of feedback with other student groups and markers.

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Appendix A
Parameters of the Codes for the Characteristics of the Text Addressed by the Feedback

1. Mechanics
    Any feedback concerning grammar, spelling or punctuation. It includes both verbal feedback such as *"not grammatical*," and non-verbal such as underlining, circling, question marks.

2. Academic Expression
    Any feedback concerning the appropriate use of general vocabulary, subject specific terminology, phraseology, "academic tone" versus colloquial uses of language. It includes both verbal feedback such as *"Not appropriate word" "a bit colloquial?"*, and non-verbal feedback such as underlining, circling, question marks.

3. Referencing and citation
    Any feedback addressing the conventions of referencing, quoting and citation practices either in-text or end-text. It also includes feedback addressing the need for referencing or citation, and feedback related to lack of referencing or plagiarism such as *"Include page numbers"* and *"Is this in the reference list?" "Reference?"*.

4. Sources used
    Any feedback concerned with the appropriateness of sources, the use of other sources, the depth and breadth of research undertaken by the student, appropriateness of quotes. For example: *"See the Australian text Gardner and Palmer (1997) Employment Relations in closed reserve. Has a good chapter on the State"*

5. Organization
    Any feedback concerning how the content was structured, sequenced and linked in the essay. This includes feedback regarding introductions, body, conclusions, paragraphing, topic sentences, where information (including citations and quotes) should be located in the text, sections to be added to the text, signposting, links (both overt and implicit) between different parts of the text, "flow" of ideas, and fluency, and the order or sequence of information. Includes verbal feedback such as *"Your introduction should include a definition", "You need a bridge to the next section"* and *"Leave this for later – it is out of place here"*, and nonverbal feedback such as arrows.

6. Information
    Any feedback concerning the subject matter of the essay including feedback related to choice / accuracy / correctness of information, the meaning/understandings conveyed, relevance of information in relation to question prompt. It includes verbal feedback such as *"Malaysia does not really represent Asia"* and *"Examine the role of government in employment relations"*, and non-verbal feedback such as question marks.

7. Thinking
    Any feedback relating to the quality of thinking / evaluation / analysis / argument/ conceptualization of material/ conceptual frameworks such as *"These are disjointed facts rather than an exploration of the themes"* and *"What are the implications of these findings in relation to the question?"*.

8. Unclear
    Any feedback where it is unclear what aspect of the text is being addressed. This includes both verbal feedback such as *"good"*, and any unclear nonverbal feedback.

9. Other
    Any feedback which does not fit into the above categories. This includes feedback related to the process such as attendance and study habits.

Appendix B
Parameters of the Codes for the Manner in which the Feedback Was Given

1.   Comment
Any feedback that is reflective or an observation and does not directly ask the student to make a change. For Example: *"The minimum wage has recently gone up to $368.40"* and *"You are tending to quote extensively but not actually drawing out themes and issues"*.

2.   Direct Editing
Any feedback which directly edits the student's work. This includes the changing of vocabulary used, addition or modification of punctuation, the rewording of a sentence, the modification of paragraphing. For example:
In addition it allows employers
     ~~They are also able~~   to move between domestic markets.

3.   Explanation
Any feedback that explains why a change is required or explains the marker's reasoning or thinking. For example, feedback such as *"This is repetitive"* written after a prescription such as *"Delete"*. It includes examples given by the marker which are not direct editing of the work such as examples of how to write end-text references.

4.   Prescription
Any feedback (including both hedged and non-hedged) that prescribes or instructs the student. For example: *"Put this into your introduction"* and *"An example would be helpful here"*

5.   Question
Any feedback which is in the form of a question.
Example: *"Why?"*   This also includes non-verbal querying in the form of a question mark.

6.   Evaluation
Any feedback which evaluates any aspect of the student's work. This includes both positive comments, such as *"Good intro"*, and negative comments, such as *"Weak argument"*. Feedback provided through the evaluation rating sheets in which characteristics of the text were rated as *"poor", "marginal", "acceptable", "good"* or *"very good"* are also included.
7.   Indication
Any feedback which indicates or points out an aspect of the text, but does not explicitly express the nature of the issue or what needs to be done about it. For example, circling or underlining an aspect of the text, or simply stating *"logic"*.

8.   Other
Any feedback that does not fit into any of the above categories.

Appendix C
Parameters of the Codes for the Scope of the Feedback Given

1.   Global
Feedback which focuses on the text as a whole.
Example: "*Reorganize your essay into three major themes*" and *"Your essay flowed well"*

2.   Local
Feedback which focuses on a specific aspect of the text at that point.
Example: "*Insert a comma here*" and *"Reference?"*

3.   Unclear
Any feedback where it is unclear whether it applies locally or globally.

An "Odd Couple" for Teaching Writing:
The Tutorial Takes in the Committee Meeting

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Writing courses are increasingly popular in higher education. This paper presents a pedagogic approach that combines theory and practice, in an accessible way, to help students appreciate the interrelation of styles and contexts, and develop skills for writing in a range of genres. The approach is characterised as *adaptive application*. It is illustrated by the modification of a traditional tutorial-group structure to provide a new setting in which students can immediately apply key terms of rhetorical theory as they negotiate differentiated experiences as writers, readers, speakers, and listeners. This change in classroom practice is achieved by adopting and adapting the roles, organizational genres, and communication conventions of the committee meeting. The resultant hybrid form of committee-tutorial assists students to engage collegially in the disciplinary study and practice of writing. It also encourages them to consider how they may transfer their understanding of rhetorical principles and techniques to writing endeavours in other scholarly and social settings.

Creating a Context for Dialogue Between Writing Theory and Practice

This paper considers a core question in studies of professional writing in the arts and humanities. How can faculty combine theory and practice, within an academic teaching environment, to help students develop the skills that are needed to work in diverse writing genres? One answer lies in creating a classroom learning context that incorporates elements of professional writing practice. Establishing such a context depends on creating, and managing, a series of opportunities to start a conversation between the practice and the disciplinary concepts applied in studying it. This article describes a method, which we call *adaptive application*, for promoting this kind of dialogue.

The method combines three key elements. One is a theoretical framework, based on academic and disciplinary ideas and terminology, for the study of writing. The second is an account of the writing forms, and related communicative activities, that constitute the objects of theoretical and practical study. The third is the pedagogic adaptation of features of the practice being studied, for the teaching and learning context, so that students can make an immediate application of the theoretical concepts in a way designed to help them become more versatile writers and scholars.

The following sections discuss the context in which this triadic approach has been developed. They outline the theoretical framework, which is based on rhetoric, and indicate the range of practices to which it is applied. An example then illustrates the use of a modified form of tutorial group work to help students explore ideas, relevant to those practices, about the role of the writer, working with an audience, and the relation between styles and contexts. This modification of the teaching situation combines different structures of group work. By way of analogy, it involves an interaction like that which happens when, in Neil Simon's 1965 play *The Odd Couple* (and its film and television adaptations), two unconventionally matched characters find themselves sharing the same space. In our teaching and learning place, the odd couple brought together is the writing class and the committee meeting. Academics sometimes assume that the latter is a dry administrative practice that has little or no relationship with scholarly endeavour. However, the committee meeting can be adapted as an innovative process for applying academic concepts and enhancing writing and related skills. In a later section, the paper draws out the research implications of the example, distinguishing the method further by comparing it with some other research on teaching and learning, and suggesting its relevance for cross-disciplinary learning.

The method presented here has developed in the teaching of a subject in the School of Arts at the University of New England, a regional Australian university where, as in many other institutions, writing courses are increasingly popular at both undergraduate and postgraduate levels. The problem, which is also an opportunity, is how to address the diverse interests, learning needs, and aspirations of students entering these courses. The combination of rhetorical theory and pedagogic practice in the approach that we describe is a response to this problem.

Context, Theory, and Objects of Study

The subject in question, *Writing for Work: Styles and Contexts*, is taken mainly by second and third year undergraduates but also, in a modified version, by candidates in postgraduate coursework programs, up to the Masters level. The students are enrolled in a wide

range of programs, from arts and communications to social sciences, education, and law. Some are immediately able to connect their work on writing to professional interests and career plans. Others are less certain about whether and how the study of writing might have vocational as well as academic relevance. Further complicating the picture is that the students' prior knowledge of writing genres, and their levels of academic and other writing skills, vary considerably. In this institutional context, the purpose of the subject has been to provide students with the means to consider the relations between academic writing and communication forms that they are likely to encounter in other work and community contexts. The subject is available in both on-campus and off-campus mode, but here we are concerned with the connection between the theoretical framework and the strategy used in on-campus classroom teaching only.

The theoretical framework of the unit is based on rhetoric, as the art of using techniques of language, with the idea of helping students to make connections between analyzing the conventions of various genres, as used in already produced works, and embarking on their own writing in diverse forms and styles. The rhetorical approach encourages reflection on the position of the writer, the role of the reader or audience, and the interrelation between communication contexts and styles of writing. However, our use of rhetoric needs to be selective and strategic. Some students study rhetoric in depth in one or more other subjects, whereas others are encountering it, in this subject, for the first time. Our approach, therefore, draws from rhetoric certain principles and guidelines that assist reading and writing across a range of forms.

In particular, the approach concentrates on basic categories that support the study of what Hart & Daughton (2005) call rhetoric as a "situated art" (p. 40). These are the factors of both "text and context" (p. 40) that recur in an indefinite number of communicative acts, while operating together in complex ways in different situations, and hence they can be referred to as rhetorical "variables" (c.f., Hart & Daughton, 2005, p. 47). In their more general study of rhetoric, Hart & Daughton (2005) investigate the variables of *rhetor* (speaker, writer), audience, topic, persuasive field (related discourse on the topic), setting, medium, and culturally based rhetorical conventions (pp. 47-53). For our purpose of exploring connections between academic and public, work-related writing, we assemble our own framework of rhetorical variables, containing nine main elements: purpose; context; writer (author); reader (audience); modes of address, and inclusiveness; medium; genre; content and structure; and style and register. This group of variables allows discussion of elements with which students are already familiar–for example, conventional expectations of

structure and style in the traditional academic essay, considered as a genre–as a basis for extending the theoretical and practical study of writing into genres used in new situations.

In the organization of classroom teaching, a lecture format is used to introduce this theoretical framework and associated readings, with examples and brief interactive exercises. So, for instance, the lectures consider the multiple contextual relations that academic, and other professional, written work can have to surrounding statements and discourses, social practices, values and uses of knowledge. Examples of university, student-association, and public policy documents illustrate the variable nature of authorship, as an individual activity, or as a collaborative practice involving the ability to write as part of a team and to give or receive feedback or editorial comment. Similarly, the need to take account of an audience's likely prior knowledge about a topic, familiarity with technical language, and reading skills, is considered by comparing documents published for specialist in contrast to lay audiences in, for instance, public writing in particular health awareness campaigns. At the same time, lectures illustrate the point that many documents have not a single audience but primary and secondary audiences (Snooks & Co., 2002): so, for instance, a thesis examiner's report needs to take into account its functions for both an examination board and the candidate whose work is being commented on and assessed. In turn, this point relates to the variables of address and style–the negotiation of formal, standard or informal registers according to purpose (Snooks & Co., 2002, p. 51), and the ethical consideration of whether one's mode of address is inclusive or exclusive in relation to possible audiences.

In setting up this theoretical approach, lectures introduce students to readings that do not necessarily employ rhetorical terminology explicitly, but nonetheless reinforce the importance of considering the writing variables of context, purpose, authorship, audience, style, and so on (Eunson, 2008; Putnis & Petelin, 1999; Windschuttle & Elliott, 1999). These readings elucidate principles of professional writing that apply to academic as well as other fields of public writing. So they assist the movement, just mentioned, from familiar forms such as the essay to working in new genres.

In conjunction with the theoretical means for considering varied forms of writing, we focus on three main examples: organizational, arts-based, and media-based writing. These "objects of study" allow students to explore, in rhetorical terms, the interrelation between particular uses of writing forms and their contexts. The organizational genres include forms of writing used in the workplace and community, from committee agendas and minutes through to discussion papers,

proposals, and reports. As with the other examples, lectures discuss the various purposes, contexts, and techniques of the genres. In arts-based writing, the focus is on reviewing, including literary, film, theatre, and music reviews. While the students are more familiar with reading, and occasionally writing, reviews than with organizational writing, this second area still extends their knowledge of genres that are used in varied fields of cultural and industry practice. The final example encourages interest in writing for different media, other than print-based ones. By developing a researched treatment for a short radio documentary script, students can reflect on the differences involved in writing for the ear instead of the eye. In their assessable work, they write in subgenres chosen from at least two of these three main areas, complementing each piece of genre writing with reflections on their experience of applying the rhetorical variables.

Representing diverse contexts, structures, and relations with audiences, these three broad types of writing are not commonly studied together in a humanities course. We do not assume that these are the only, or even the most common, genres that students would use in other work or community contexts. However, by juxtaposing them and inviting students to compare and contrast them, we are able to foreground the role of the rhetorical variables, noted above, in different writing practices. By focusing on the ways in which the variables may be negotiated in diverse situations, we also acknowledge an issue that arises in the teaching of writing, namely, that an opposition is often assumed between "creative writing" and various kinds of professional, organizational or media writing that are seen as being essentially technical or instrumental in nature. Without prescribing how students should deal with this issue in their own writing studies, we invite them to consider the role that creative thinking may play in the different forms of writing as a social activity (c.f., Cain, 2009; Hart & Daughton, 2005; Surma, 2005), which the study of the variables outlined here can help to understand.

It is a straightforward process to introduce, in lectures, the theoretical framework for engaging with the different examples. However, as we use the combination (common in several countries) of a lecture followed by tutorials, successful coverage of the lecture material depends on students' participation in the latter. This brings us to the third factor in our triad.

A Pedagogic Strategy for Relating Theory to Practice: The "Committee-Tutorial"

In order to outline the pedagogic approach, let us recount some of the steps that we took in developing it. To encourage participation in learning, we designed a format of tutorial group work intended to give students the opportunity to apply the theoretical concepts, introduced in lectures, directly to their own work. We combined the structure of tutorials with a form of organizational communication borrowed from the workplace practices being studied, namely, the committee meeting. The meeting model appealed to us for several reasons.

From a theoretical viewpoint, we were interested in the teaching implications of the argument that any strict division, such as is sometimes assumed between academic and organizational or technical writing, begins to break down if it is acknowledged that principles of professional communication (e.g., consideration of purpose, context, and appropriate address) apply across these different areas (Putnis & Petelin, 1999; Windschuttle & Elliott, 1999). Institutionally, these implications can be related to the work environment of academics and students. For some faculty, the committee meeting has connotations of overly bureaucratic communication, as opposed to open scholarly dialogue. Nonetheless, in our academic careers, we have often found that committee processes can be used collegially to support academic activities. Aspects of committee procedure, suitably adapted, can provide a formal structure of working together that helps students to explore course concepts in an applied way. For instance, as mentioned above, the variable nature of authorship, sometimes individual and sometimes collaborative, sometimes both, is a key course concept: in performing committee roles, students engage in collaborative authorship of committee documents (illustrated below), while writing other materials individually in related class preparation and assessment work.

In the planning stages, we were aware of the day-to-day problems of group work and looked for a way to overcome them, especially in a subject asking students to engage with the study of new and possibly challenging forms of writing. Whilst the traditional justification for small-group classes is to help students engage in intellectual dialogue and take responsibility for their own learning (Abercrombie & Terry, 1978; Brookfield & Preskill, 2005; Griffiths, 1999), the success of such classes depends on group dynamics more unpredictably than many staff would like (Gibbs, 1992; Herron, Beedle, & King, 2006; Meyers, Bender, Hill, & Thomas, 2006). The best-made lesson plan may fail because some students remain passive or else monopolize proceedings (c.f., Johnson & Johnson, 1999). These difficulties can demoralise those students who do contribute to the group. We looked to the hybrid class format, the *committee-tutorial*, as a way of overcoming such difficulties by promoting student participation in the direct application of disciplinary concepts.

The pedagogic strategy evolved, then, in an attempt to relate the conceptual framework to an organizational practice borrowed from other work domains (committee work and communication) and adjusted for the purpose of teaching and learning. As we began to teach the subject, introducing the meeting format, we sought to offer the students a "consistent image" (Lublin, 1987, p. 13) of what was expected of them. Success would depend on whether the students took the project seriously. We, therefore, explained why we considered the approach relevant to the study of writing, their place in a learning community, and their potential careers, and established that they would have opportunities to review the way the group structure was working. A learning conversation between disciplinary ideas and practices studied would not grow, we anticipated, by just transplanting a practice from outside the classroom, as a set of professionally fixed assumptions and procedures, without considering their purpose afresh. And indeed, implementing the committee model involved a process of gradually adjusting the meeting conventions, requiring a heuristic teaching approach. This was evident in the roles that the students undertook, and the use of organizational subgenres, which we now consider in turn.

We chose the roles of chair and secretary to encourage student leadership and provide continuity between meetings. A student chair was needed if responsibility for managing discussion were not to default to the tutor. For the chair, this meant preparing to elicit ideas about assigned materials, invite alternative responses, and bringing into play the resources of all members. The role of secretary was considered necessary to help the chair plan meetings, and record substantive points about materials and organizational matters such as task distribution.

A pre-instructional decision was that these two roles should be filled by different students each week, so that all members would perform at least one of them. For students not acting in these positions on a given day, the role was that of members who would come to the meeting ready to discuss agreed readings, genre examples, and work in progress on writing in the selected forms, as "business," in an informed way. We considered supplementary roles, and did include initially that of a timekeeper, who would liaise with the chair in planning and the secretary in monitoring the meetings. Because of the limited opportunities for the students in these three roles to confer outside class, we did not persist with the timekeeper, and decisions on timing were then left to the chair. However, in contexts where the further consultation out of class could be arranged on a more regular basis, including the timekeeper role could encourage further interaction. The role-set that we have used in tutorials, over time, has led to productive meetings when the group size is

about twelve; groups have remained functional, however, even when it has been necessary to increase membership to about twenty. The opportunity to move between the different roles gives students an opportunity to see, from different but related viewpoints, how the contributions of chair, secretary and general members depend on each other. Through committee interactions, students can explore the communication variables in practical ways. So, for instance, they work with genres that entail a form of authorship different from that to which they are accustomed in academic essay-writing, being based on group rather than individual efforts. This learning activity can be illustrated by the adaptation of agendas and minutes.

For established committees in workplace and community contexts, agenda formats tend to be a given. Initially, perhaps staying closer than we realised to more routine tutorial practice, we did not consider that formal agendas would be necessary, since we had set readings and questions in the course materials, for discussion in the meetings. However, the meeting process was foreign to most students, who soon found that they needed more structure. So they moved formally that a written agenda be tabled by the chair at the start of each meeting. The inclusion of agendas in the meetings reflected independent thinking by the students about the nature of an often taken-for-granted organizational genre. In reflecting on their group work at an early stage, they applied the subject work on the rhetorical variables, thinking about the purpose of this type of document, in a changed context. It was agreed to adopt standard agenda features, including *confirmation of minutes* and *business arising* at the beginning, and *other business* at the end, while using the middle part of the agenda flexibly, to include items on the discussion of the set readings and questions. Although not necessarily a standard part of meetings, *apologies* were also included, at the start of tutorials. Students unable to attend a class were expected to submit an apology through a fellow student or the instructor, a communication mechanism that helped to create a routine procedure for accountability. The student-led introduction of agendas gave a more purpose-built structure to meetings, and more guidance to the recording of business. The meeting process, and reflection on it, helped to make small-group teaching responsive to students' contributions to developing the means of learning (c.f., Laurillard, 2002).

In contrast to our initial decision not to use agendas, we had envisaged from the outset that minutes would be a standard part of each meeting, to record both substantive and organizational points. The function of the minutes was consolidated when the agendas were introduced and, in turn, they assisted the preparation of successive agendas. The introduction of

agendas, alongside minutes, thus highlighted the inter-relationship of organizational writing genres, which was something that we had been discussing in lectures–we had been considering, for example, the way in which a discussion paper might lead to a report and, in turn, to a press release. Using agendas and minutes for a new purpose in tutorials showed how they work together as forms of organizational writing. It also gave the students an opportunity to see how such forms of writing can help to manage a collaborative work-program over time. The process of *generic adaptation* that this example represents–modifying professional communication forms for a teaching context–is useful as both a vehicle to advance discipline-based study and a means of giving students a "feel for the game" of institutional practices.

In the meetings, which we have sustained over four years in teaching the subject, students gain valuable experience in new forms of writing and interpretation, combining collaboration with individual judgment, through multiple tasks. Using committee templates, those undertaking the role of secretary have to learn to match minutes with agenda items; record the proposer and seconder of motions; write consistently in the appropriate tense; and use clear, unambiguous language to present information accurately and economically. As chairs, they draft meeting plans, liaise with a secretary, and revise their drafts if necessary. They have to deal with silence on any issue and give guidance during a meeting on the taking of minutes. Although, as noted, we do not have time-keepers, all students have to negotiate time limits as a factor in organizing speech and writing. They need to interpret technical distinctions, such as the difference between business arising and the order of new business. But it is sometimes unforeseen problems that build an appreciation of the skills involved in collaborative writing.

An example comes from an occasion when, because of confusion arising from a course handbook error, the student chair had prepared different material from others in the group. The student vacated the chair in place of the tutor. As a result of the problem, the group members undertook to check the relevant standing orders of the Arts Faculty to see how this process could have been managed formally. It was reported at the next meeting that, in such a situation, the secretary adds to the minutes a note, preferably in italics, of the time when the chair vacated and resumed the position. Other tutorial groups were given the same checking task. The implication of the class-work for understanding professional writing is apparent. The practical scenario made students aware that, although organizational forms are often authored collectively and require writers to work to a template, they also involve a good deal of independent thinking and careful

judgement about complex and sometimes unexpected issues.

While the meeting format has thus been adapted to the teaching situation, our context is unlike that of other committees: for instance, students are assessed on their contribution to the classroom learning activities. Personal correction or criticism could make them feel failure as tutorial participants more acutely than if they had not taken on the new roles. The tutors are aware of this, and therefore seek to act as facilitators, overseeing meeting procedure in as low-key a way as possible, to help create an environment for participation, rather than directing the discussion. They circulate material on meeting structure and procedure to all the students, and brief the incoming chair and secretary before meetings, checking that these students understand how they can use the conventions of the agenda and minutes and cooperate in running the tutorial. Organizational errors in chairing or other meeting behaviour, from which the whole group can learn, are addressed as they occur, to keep the discussion on track. Beyond that, the tutors contribute to the discussion of the readings and examples, within the turn-taking protocols of a meeting, or respond to requests that others need them to "field" (for instance, about issues arising from lectures). They also offer feedback to the chair and secretary after the meeting, clarifying any concerns the students have about their roles and the remaining tasks of writing minutes and handing over to the next office-bearers.

The tutorial system provides reassurance about the individual's role in collaborative authorship, showing that, while one can take initiative in problem-solving, not all the difficulties of preparing work for public presentation need to be overcome alone. It indicates how individuals can develop resource networks in professional writing contexts. This becomes evident during the semester, as students can access examples of previous agendas and minutes when they assume the office-bearer roles. It has been reinforced by our introduction of occasional panel discussions during the lecture times, in which several of the university's senior executives have shared their career experiences with the students. These guests have discussed the importance of professional writing forms in academic planning and policy that influence the culture of teaching and learning. Students can see themselves as situated in this culture and, when these events have been arranged, they have used tutorial time to prepare questions to circulate in advance to the panellists, and afterwards have collaborated on letters of thanks.

Through the tutorials and related work, the students can begin to familiarize themselves with the knowledge, relations, techniques, and conducts that comprise a social field or *habitus* (Bourdieu, 1977; Grenfell & James, 1998) of professional writing. At the same time, the meeting process marks an attempt

to renew the dynamic of tutorials for the purpose of helping students to understand their immediate academic field, or, to adapt Cromwell's formulation (2005), to find ways in which pedagogy and curriculum content can act together in "systematic approaches to involve students in their discipline" (p. 92). As Riordan (2005) has remarked, the search for such approaches represents a concern with how, in different sites, we can "engage students in the practice of our disciplines so that disciplines become what the word implies–habits of mind that inform student lives in their various contexts and communities" (p. xix). The committee-tutorial is offered as one framework for such engagement, in which students can develop reliable habits of writing, listening, and speaking for participating in a learning community, and experience the collegial conduct of discourse and inquiry that is an important part of understanding a discipline.

Reviewing the Application of Disciplinary Concepts

In evaluating the adaptation of the committee meeting, several traditional methods used in higher education have been employed, including the regular university surveying of student opinion (referred to below as *survey*). An expert peer evaluation was conducted through the University's Teaching and Learning Centre, which is responsible for providing advice to academics (S. Stein, Peer report on teaching observation, UNE, May 26, 2005, referred to as *report*).

Expected Outcomes

The report confirms that the adaptation of professional practice supports disciplinary aims: "The ability to communicate in spoken and written modes through the meeting medium matched the course itself, which was about writing and communicating for work purposes and contexts." As already indicated, matching pedagogy and academic content is not a matter of just copying professional procedures. Rather, meetings contribute to learning because having a choice of formal roles means that individuals can play to their strengths and enhance them. The use of this format favours what has been called the development of *independence strategies* through the application of a particular "knowledge base" in group work (Gibbs, 1992, p. 51), the creation of a space in which students can study communication roles and forms in a flexible way. This is reflected in one student's comment: "I thought this was a great course–well constructed–and it allows for individual creativity" (2005 survey). In fact, although we had originally planned a logic that would deconstruct binaries of academic versus organizational writing, or professional versus creative writing, we did not necessarily foresee that the students would grasp

this so readily in practice, as opposed to theory. The report, too, recognizes that the format works to the benefit of the students:

> The organization of the tutorial was clear and, because of this clarity, students were better able to contribute to the content and form of the meeting. The structure of the tutorial was a means to stimulate interaction among the students, as well as with ideas and concepts. The format, used for each tutorial, thereby provided a safe environment: students knew what to expect.

The meeting structure–at some distance from the highly formal end of the spectrum of meeting formats (Eunson, 2008), open to modification, yet providing procedures that created the "safe environment" for contributing–reduces significantly the extent to which participation depend on individuals' shyness, nervousness or tendency to dominate. It lessens the students' anxieties about participating, through its emphasis on collaborative roles, which bring with them technical conventions that facilitate writing and speaking. This is reflected in student responses (2004 survey):

> Tutorials created a friendly learning atmosphere. I was not scared about speaking up and giving my opinion.

> I liked the learning as we go approach, as it was less stressful, and if we made a mistake the whole group learned from it.

On the issue of shifting leadership responsibilities away from instructors, students have also commented that they like having the roles of chair and secretary. We acknowledge the importance of "keeping teachers' voices in balance" (Brookfield & Preskill, p. 192) and finding "a way to teach that is neither too dominant nor too reserved" (p. 214); and the effect that the meeting structure has of devolving attention from the tutors is noted in the report in the following terms:

> The tutor took on the role of participant in the meeting. This placed the focus upon the students, their input and interaction, and took the focus off the tutor. Even the quieter students were active and engaged. The students were taking on responsibility for their own learning.

One student wrote that "to begin with, the meeting style was a little shaky, but once we got into it, we all learned from this new skill" (2004 survey), a comment echoed by others. We plan to include further guidance on meeting procedures for students. While the balance

between learning these procedures and the curriculum content needs continual processing, the following remarks from the first survey (2004) are representative:

> The meeting format wasn't as formal as I first thought and I learned a lot more than I thought I would.

> The course taught me skills about meetings that I had never used before, and how to contribute to meetings in the future.

Chairs and secretaries generally prepare well for tutorials, as do most group members. Professionalizing the tutorial means that the minutes are almost always completed on time. Comments from several students, to the effect that they think their experience of the meeting format will help them to apply independently what they have learned, indicate that the committee-tutorial has promoted their interest in transferring knowledge to different situations. In the words of one student, the subject "taught me new things and how to implement variables in my writing and how I can use these in future jobs" (2005 survey).

Unexpected Results

The size of groups, the requirement that each student perform an office-bearer role, and the interest of some students who have been chairs in also gaining practice in minute-taking, mean that sometimes more than one person has taken the minutes for a meeting. These students have then engaged in a mini-workshop out of class, comparing their minutes to generate a single document for the group. Again, the meeting process has allowed students to position themselves differently as writers–taking notes for their own reference but also writing with, and for, others. One student commented that "I learned how to write notes quickly and elaborate on them later and write up my notes for a large group" (2005 survey). Such flexible note-taking is a skill often assumed but rarely modelled or taught, although it is crucial to most, if not all, university study. In writing at one moment for themselves and at another for the group or persons outside it (as in the letter to executives mentioned above), the students have the opportunity to work in different language registers, across informal and formal styles.

As well as focusing on writing and speaking skills, the meetings encourage different ways of listening. Active listening is a core communication skill and is important for writing in organizational and other contexts. It, too, is often assumed in the university context but rarely taught. Providing students with a mode of group learning that not only informs them theoretically but also engages them in managing meetings necessitates their development of active listening skills. Subtly different kinds of listening are required to lead a group discussion, capture essential points for the minutes, or co-write a document. The meeting structure has built-in invitations and spaces for speaking as well as opportunities for providing summaries, and these can help students to integrate thoughts and behaviors, such as listening and note-taking for different purposes, underlining the social and disciplinary complexities of communication.

The committee model has had some further benefits for the students, consolidating their learning resources. The minutes can serve as supplementary revision notes for individual work, indicating which readings can be applied, and in what ways, to assignment questions. Because students decide the agenda from a set of possible activities relating to specific genres each week, the study pathways vary and cater to each group's interests. For staff, too, there have been some practical benefits. The minutes provide a detailed record of what has happened in the tutorials and individuals' contributions. One piece of administrative work, documenting attendance, becomes redundant because attendance, absences, and apologies are minuted, then confirmed the following week. Tutors gain a justifiable way to promote the timely submission of work, for groups accept that minutes need to be drafted in time to aid preparation of the next agenda. The performance of roles and the writing of agendas and minutes give a clear indication of students' efforts, to help determine participation grades, which students generally regard as a fair way of recognizing individual contributions to the group.

The logistical challenges faced in our teaching context would be familiar to many faculty in the arts and humanities. In these disciplines, students are usually expected to devote most of their study time to working outside class. Staffing constraints mean that in-class hours are limited. Some university departments are abandoning small-group teaching because of reduced resources. In our institution, educational uses of new technologies have given rise to a further problem, which may also occur elsewhere. As our off-campus delivery mode has shifted from print-only to web-based distribution of materials, on-campus students may also gain access to extensive on-line resources, or expect to do so. As a result, although there is no policy decision to reduce classes, some on-campus students cut them anyway, assuming rightly or wrongly that the online support is sufficient for success. The committee-tutorial represents one attempt to provide a form of face-to-face, interactive learning that students will find engaging.

Research Implications

From the approach explored through our committee-tutorial example, we can now draw out some implications related to more general research on pedagogy in higher education. The first area of implications concerns the similarities and differences between adaptive application and other pedagogic strategies. The second concerns the possible links between our approach to the teaching of writing and further fields of study.

The methodology that we have outlined has some resemblance to, but also some important differences from, *cooperative learning* as it has been established over recent decades. The basics of cooperative learning have been identified as positive interdependence, individual accountability, interaction that promotes learning, social skills, and processing by the group of how effectively it is working (Johnson & Johnson, 1991; Johnson & Johnson, 1999). Cooperative learning became an influential model of pedagogy in some areas of higher education (at least in the United States) in the late 1980s (Cabrera, Nora, Crissman, Terenzini, Bernal, & Pascarella, 2002; c.f., Johnson, Johnson, & Smith, 1998). Occasionally, the use of cooperative learning theory has been reported and analyzed specifically in relation to the teaching of writing in the college or university writing classroom (e.g., Nowlin & Amare, 2003) but, more generally, the five basics just mentioned have been applied or refined in a range of college and university contexts (e.g., Kelly & Fetherston, 2008; Millis, 2002; Occhipinti, 2003; Serrano & Pons, 2007; Slusser & Erickson, 2006). Further, cooperative learning has overlapped with uses of other collaborative learning approaches to support varied learning styles associated with differences of gender, ethnicity, socio-economic background, and previous levels of educational achievement, and to promote not only cognitive but also affective, interpersonal and social development, including "increasing tolerance and openness" in changing and culturally diverse educational and social environments (Cabrera et al., 2002, p. 23; c.f., Hennessy & Evans, 2006). The interest in establishing cooperative or collaborative contexts for learning can extend well beyond the "micro" level of the individual subject or classroom, to include wider integration of the curriculum, fostering of learning collaborations between students across different discipline areas (Trigwell, 2005), and community support such as collaborative learning in residence halls (Cabrera et al., p. 21).

The features that our strategy shares with cooperative learning include the organising of group interaction to support learning, and the change in the tutor's role to that of facilitator. To an extent, our

approach also shares in the concern with supporting access to learning for students from different backgrounds. So, for instance, by introducing a degree of structural formality based upon equitable contribution, the committee-tutorial has the potential to create a common ground for interaction between students from diverse educational and cultural backgrounds, of different ages, in varied degree courses, and with divergent career interests. This suggests our model's consonance with contemporary educational and social objectives of higher education. However, our illustration of the method relates specifically to a writing subject, not an entire context of support across a curriculum or institution, so we would not expect our writing pedagogy, by itself, to radically influence students' entire cognitive and social development.

Perhaps a more significant distinction is that the approach we have described does not rely on, or seek to foster, emotional and psychological bonding of the kind that, at least for several advocates of cooperative learning, is part and parcel of "positive interdependence" and the interactive learning and benefits associated with it. In the still influential model of cooperative learning represented in Johnson & Johnson (1999), among other works, is an incitation to promote a style of learning through which processes of reasoning become more meaningful when accomplished through affective bonding. In their learning tasks, students are to realize "a shared identity" that "binds members together emotionally," in an experience that "creates a positive cathexis so that group members like each other" (Johnson & Johnson, 1999, p. 79). Panglossian though this may sound in some circumstances, these authors state that the "degree of emotional bonding that exists among students has a profound effect on the quality of work performed" (p. 206), and treat this bonding as a norm for teachers and students to internalise. This affective adventure is seen as promoting the individual's cognitive development, opening up an experience of different, and possibly conflicting, perspectives for a higher "synthesis" of meaning (p. 188), beyond the premature moral and intellectual certainties of "egocentrism" (pp. 64, 212). A teaching structure that permits this development to occur is considered not to impose didactically on students, but to realise their inner potential for emotional maturation, promoting "psychological health" (p. 212).

In contrast, the approach we have presented may seem less ambitious, limited as it is to a discipline-based use of group roles encouraging students to apply rhetorical theory in their own practice and cultivate their writing and related communication skills. But it does provide students with the opportunity to participate actively in forming their own learning

environment. In this regard, our approach has something in common with the use of simulation and role-playing methods to provide what, in a related field, Booth, Colomb, & Williams (2008, p. 278) refer to as a "rhetorical context" that "dramatizes for students" their role as learners and practitioners in study. For Booth et al., the role in question is that of the student as researcher, but the analogy stands for the student as writer, reader, and listener in the writing class. The pedagogic application of rhetoric can support student learning without being made dependent on an assumed cultural capacity and predilection for psychological, affective bonding. Performing the roles in the committee-tutorial, for instance, helps students to familiarise themselves with the skills that enable them to make independent judgments about appropriate uses of genres, styles, and modes of address while working individually or with others for particular purposes, and to understand how this might apply across differentiated contexts. Seeing how the rhetoric of variables applies in pursuing their academic work can help them to recognize that successful organizational as well as academic communication depends on the inventive use of those skills. This recognition can change the idea of academic work, so that it is not viewed as merely facilitated by a somehow oppositional administration. Seeing that an organizational form of writing could be "creative," as one student implies in the feedback quoted above, is a short step from realizing that academics and administrators are perhaps not necessarily so Manichean in their relationship as is often imagined. Students can see themselves not only as preparing for a working ("real") world but in fact as already working, across the complex terrain of the university, in a way not envisaged in the psychological model of cooperative learning.

This brings us to the second research implication, the possible relevance of the approach we have presented here to other areas of study. Without assuming the applicability of a particular approach across "any" subject area, in terms as sweeping as those found in some of the literature on psychologically derived cooperative learning (e.g., Johnson et al., 1998), we can suggest some ways in which the approach of adaptive application in writing pedagogy may help connect student work on writing with adjacent areas of study.

The platform of dialogue between academic concepts of writing and professional practices studied allows a two-way movement. As mentioned previously, the applications discussed above are designed to enhance students' ability to write in forms other than the academic essay that are used in workplaces beyond, yet also within, the university. Studying diverse professional genres can in turn reinforce the skills needed in academic writing, including the ability to clarify discursive purpose, structure, and style. Given this, work in genres other than those that we have mentioned could be nested within the committee-tutorial structure, to meet varied interests. Because of the cross-fertilisation of interests between professional and academic writing, we are considering the inclusion of some specialized forms of *scholarly* writing such as research and grant proposals, abstracts, and literature reviews, acknowledged also as further modes of professional writing, to broaden the skills of those students contemplating postgraduate study. As Harris (2006) argues, such forms can prove difficult, even for students who write academic essays well. What we have been exploring as a professional turn in a humanities-based study of writing can also help students to achieve what Harris calls "cognitive complexity" and deal with the "intricacies" of scholarly writing (pp. 137, 144).

Further, a meeting process that has students thinking reflexively about their role as writers can facilitate the study of diverse genres–such as research reports in sociology, interviewing, journalistic genres, policy writing, or forms of science communication and environmental writing–in other disciplines. Writing skills are a foundation for learning more generally, as has been argued in research on teaching in the social sciences, for example (Althauser & Darnall, 2001; Cadwallader & Scarborough, 1982), and the meeting model could support projects of writing across the curriculum. It is important, however, to recognize that writing forms and techniques vary across disciplines (Anderson & Holt, 1990; McLeod & Maimon, 2000). Academics often underestimate the difficulty that students have with the variations, even in using different style guides and referencing systems. Helping students to approach this kind of difficulty with greater comprehension, the committee-tutorial grounds the development of writing skills for academic and other purposes in an understanding of writing as a situated "social act" (Anderson & Holt, 1990, p. 181), while supporting work in differentiated forms. These skills assist students to find connections between subjects and achieve the "integration of learning" across different study areas that colleagues in many disciplines want their students to possess when they graduate (Engelmann, 2005, p. 48). In promoting these skills, the teaching strategy presented here has broader implications. It assists students to approach *inter*disciplinary or cross borderland terrains without losing sight of disciplines and their specific requirements.

Conclusion

The pedagogic approach that we have called adaptive application can help students to develop the

writing skills needed to work in diverse genres. It entails the adaptation of elements of professional practice, to provide a context in which disciplinary ideas that help to understand the principles and processes of professional writing can be applied and reflected upon, in the immediate environment of the students' own work. The committee-tutorial illustrates this type of adaptation. It supports a program of lectures and guided readings that construct a theoretical framework for analyzing techniques and principles relevant to a range of genres used in diverse cultural and institutional settings. Students can use the group roles to explore the variable nature of writers' roles and the interrelations between specific contexts, purposes, and styles. In this experience, they are encouraged to consider the relations between writing and other activities, including reading, speaking, and listening, together with the elements of creativity and judgment, and the social relations and negotiations, which potentially come into play in different communicative forms and new situations that they may encounter. In a higher education context, adaptive application contributes to the store of available forms of writing pedagogy; and the not-so-odd coupling of the committee-tutorial adds to the repertoire of strategies for managing, and renewing, teaching and learning in the disciplinary study of professional writing.

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Authors Note

Instructors' Experiences of Collaboratively Teaching:
Building Something Bigger

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Instructors often teach in isolation with very little collegial interaction guiding their practice. In light of the research that exists identifying the value of collaboration within learning environments, the merits of such isolated practice must be questioned. Even though collaboration within educational settings has been identified as critical to the development of both instructors and students, highly collaborative approaches to team teaching have not been fully explored. The purpose of this study was to examine our own experience as team teachers in a team taught, educational psychology course. Through a phenomenological analysis of our lived experiences as instructors engaged in collaboratively teaching an undergraduate course, we gained understanding of the benefits of team teaching within a broader context. A thematic structure emerged that captured our experience of the process of co-teaching. This shared thematic structure consisted of one ground theme, named *we didn't have a manual for this/finding our way through*, and five themes, each providing insight into how we made sense of team teaching. The five emergent themes were (a) *You can't shoot from the hip*; (b) *Following and leading . . . all of us together*; (c) *If we walk away disagreeing, is it okay?*; (d) *The presence of another pushed us to go deeper*; and (e) *You build something bigger*. Implications for the use of team teaching in higher education are also explored, highlighting the value of collaborative praxis.

"I will build on what you project to the class and you'll build on what I project; and where you fall flat I'll pick it up or where I fall flat you will pick it up; and when I don't have the example for that student's question, you come back with the example for that student's question. If you catch that a student needed a visual to understand that auditory output, then you pick it up – cue me in, cue me in if that's what is happening there. And the next time we had class, it was powerful."
--Jessica, team-teacher

Traditionally, instructors have taught in isolation with very little collegial interaction guiding their practice. In light of the research that exists identifying the value of collaboration within learning environments, the merits of such isolated practice must be questioned. Bruffee (1993), Kagan (1994), and others have written extensively on the benefits of providing opportunities for learners to actively participate in the joint construction of knowledge, supporting a more effective learning environment. While extensive literature exists related to the benefits of collaborative learning, less research has specifically examined the inherent strengths of collaborative teaching.

Sullivan (1994), referring to the "Myth of the Independent Scholar," attributed the continual emphasis on academic isolation to the influence of enlightenment philosophies, which suggested that the development of knowledge required minds to be isolated and detached from the social world. In contrast to this widely perpetuated myth, Sullivan proposed that all academic ventures, including teaching, should be done in a collaborative fashion, claiming that "true genius lies not in the exceptional mind, but in the mind's unexceptional ability to connect with another" (p. 27).

Our own experience as team-teachers in a team taught course has led us to believe that collaborative teaching enhances the learning environment for not only our students, but also for us as instructors. It is true that effective classroom environments provide opportunities for learners and teachers alike "to construct their own knowledge... in realistic situations...together with others" (de Jong & Pieters, 2007, p. 739).

In this paper, we discuss various approaches to team teaching. We also explore the results of a phenomenological study that examined our own lived experiences as team teachers in an undergraduate educational psychology course. We conclude with an examination of the ways in which these results can enhance teaching and learning, highlighting the importance of collaborative praxis.

Literature Review

The focus of the literature on team teaching varies widely. There are many definitions of the various approaches to team teaching, as well as strategies, potential pitfalls, and advantages of collaboration (Buckley, 2000; Davis, 1995; Reagan, 1994). Several studies have explored the nature and benefits of team teaching between general education teachers and special educators within K-12 settings (Schnorr & Davern, 2005; Welch, Brownell, & Sheridan, 1999;

Wilson, 2005). Other studies conducted within a K-12 context have focused on preparing pre-service teachers through the use of team teaching with mentor teachers or with colleagues in order to gain experience (Jang, 2007; Roth, Tobin, Carambo, & Dalland, 2005; Tobin & Roth, 2005).

Within higher education, several studies of team taught courses have provided a rationale and a structure for interdisciplinary teaching (Robinson & Schaible, 1995; Shibley, 2006; Vogler & Long, 2003). For example, Beck (2006) examined her experience with team teaching at a two-year technical college where aeronautical engineering instructors teamed with communications faculty for the purpose of helping their engineering students strengthen their writing and oral presentation skills. She provided several suggestions for implementing a team teaching model in higher education, including the ability to reflect and renegotiate when things do not go as planned, the willingness to invest more time and energy than in other courses, and the need to be respectful of other team members. Further, she noted the benefits of collaboration for both students and instructors, which included positive student feedback and improved performance on the part of the students.

Several authors have written about their experiences with interdisciplinary team teaching, providing insight into what they learned through the process and offering advice to those who would consider team teaching (Bakken, Clark, & Thompson, 1998; Dugan & Letterman, 2008; Letterman & Dugan, 2004; Wilson & Martin, 1998). Consistently, this literature has identified as essential the need for extra time for planning and reflecting, strong communication skills, and an ability to embrace diversity and differences of opinion. However, this literature has also expounded on the benefits of interdisciplinary team teaching, including expanded creativity, the opportunity to learn about other disciplines, and the ability to improve student learning.

While much of the literature on team teaching provides anecdotal data attesting to the reasons and suggestions for collaborative teaching, there are a few empirical studies that more systematically analyze the team teaching experience. For example, Davis (1995) conducted semi-structured interviews with 15 instructors from one higher education institution about their interdisciplinary team teaching experiences within five different courses. Davis established four components of team teaching: planning, content integration, teaching, and evaluation, with content integration only applying to interdisciplinary courses. Each component existed as a continuum where one end represented minimal collaboration and the other represented extensive collaboration. For instance, the collaborative end of the continua was observed when

faculty worked closely as a team, developed a common syllabus, integrated diverse perspectives, and occasionally taught together (p. 7). Davis reported that for his participants, the component with the lowest degree of collaboration was teaching. One participant expressed regret that there was not more interaction between or among faculty in the classroom. Another acknowledged that there was a great deal more collaboration in the classroom that could have been done saying, "we haven't created that environment here where the faculty interact in front of the student…we are frustrated that we don't do more together, but it's difficult to break the old patterns, when you are there in a lecture hall full of students" (p. 110).

Most of what the participants in Davis's (1995) study referred to as collaborative teaching was done through what Davis called "serial" team teaching, defined as "a lot of little mini-courses stuck together" (p. 110). This was essentially one course divided into segments with each person teaching a segment, a form of team teaching referred to by Brookfield (2006) as "sequenced solo teaching" (p. 159). Interestingly, instructors from one of the five courses in Davis' study did attempt to teach with collaborative lectures where they were "actually going back and forth at the same time in front of the class" (p. 110). Most of the instructors agreed that collaborative efforts renewed their motivation to teach, enhanced their conflict management skills, and deepened their pedagogical knowledge.

While much of the research on team teaching has focused on interdisciplinary courses, less extensive research exists related to those team teaching models in which the team teachers presented the same content. In two such studies (George & Davis-Wiley, 2000; Hatcher & Hinton, 1996), the teaching team was composed of one senior faculty and one graduate student, each sharing the teaching responsibilities within a graduate course. Both teams argued that the time and energy required to successfully conduct a team taught course was greater than a non-team taught course, however, the benefits made the effort worthwhile. George and Davis-Wiley cited the importance of extensive planning, communication, and humility. Hatcher and Hinton stressed that in spite of the increased time spent planning, collaborative teaching led to stronger instruction and greater student learning.

In another study where team teachers presented the same content, social work educators, Cohen and DeLois (2001), discussed the benefits of co-facilitation which included improving teaching skills, exposing students to effective models of collaboration, and promoting professional growth for the co-facilitators. Reflecting upon their experiences as co-facilitators, the authors found a way to "exploit each other's strengths while at

the same time learning from them" (p. 32). Cohen and DeLois' approach to co-facilitation closely aligns with Brookfield's (2006) supposition that in "true team teaching *all* activities are planned, conducted, and evaluated by all members of the team who are also all present for all class time" (p. 159). In contrast to other models of team teaching where responsibilities were divided up among team members (Benjamin, 2000; Doebler & Smith, 1996; Shibley, 2006), what Wilson and Martin (1998) call a "you do this, and I'll do that" strategy (p. 6), our desire was to more fully collaborate at every level of planning and instruction.

Our Approach to Team Teaching

Within our own team teaching experience, we were committed to a collaborative approach "where we are both planning, we are both making sure we understand the material as it needs to be presented and we are both standing up there" (Kathy, team-teacher). Unlike "serial" team teaching, we "for sure knew this one thing, that we weren't going to do this, 'You teach. I teach. You take one section. I'll take one section.' We were really going to make this collaborative" (Jessica, team teacher).

Based on our core belief that knowledge was more than the sum of individual ideas, we determined that our approach to team teaching must extend beyond the idea of occasionally teaching together to *always* teaching together. We viewed team teaching as more than simply a pedagogic practice; it was a "philosophical commitment to the socially constructed nature of knowledge" (Miller, 1994, p. 284). In that our approach to team teaching employed a high degree of collaboration, as defined by Davis (1995), we referred to our approach as *collaborative teaching* instead of simply "serial" or "team teaching." One avenue through which teachers may gain insight into this approach is through walking in the shoes of the team teachers who engaged in this practice.

Method

Desiring to understand the lived experiences of instructors in a collaboratively taught course, our study employed a phenomenological method based on an approach developed at The University of Tennessee and employed there for over thirty years in a variety of departments and settings. Phenomenology examines the essence of a given experience; it is also a philosophical orientation in which it is believed that "the world is 'already there' before reflection begins" (Thomas & Pollio, 2002, p. 1). The focus of phenomenology is the "what" and not the "why" of the experience (Polkinghorne, 1989). Rather than causality and prediction, one of the objectives of phenomenology is

to find the invariant structure, or the essence, of individuals' experience within a given phenomenon (Creswell, 1998), such as collaborative teaching. This study aimed not simply to present the structure of the lived experience of team-teachers in a collaboratively taught course, but also to develop a "verbal portrait" (Polkinghorne, 1989) that revealed the emerging themes of those experiences. This verbal portrait is presented in the *Findings and Discussion* section in the form of quotes from each of the team teachers.

Participants

This collaborative teaching experience occurred in a required senior level educational psychology course for pre-service teachers at The University of Tennessee in the United States. The two team teachers, Jessica and Kathy, were graduate teaching assistants enrolled as doctoral students in the department of Educational Psychology and Counseling. As part of an instructional team that met to plan and to develop the educational psychology course under the supervision of a tenured faculty advisor, we were quite familiar with collegial collaboration outside of the classroom environment. During one academic semester (five month period), we were assigned to independently teach one section of the course and volunteered to teach another section in a collaborative format. In that we desired to gain further insight into the nature of collaboration within the process of collaborative teaching, we decided to systematically analyze our experiences.

While this was not the first university level course that either of us had taught, it was the first time that we had collaboratively taught at the university level and the first time we had worked together. Prior to engaging in this collaborative teaching, we had worked together on other research and teaching projects for approximately five months. Further, before entering graduate school, both of us had taught in inclusive K-12 classrooms that utilized some form of collaborative teaching. Kathy's experience as an inclusion teacher in secondary math classes reflected a relatively low level of collaboration, characterized by limited joint planning and very few classroom teaching opportunities. Jessica's experience as a primary classroom teacher and special educator included a high degree of collaboration within the planning process, but little actual collaborative teaching. In that we both hoped to expand our degree of collegial collaboration, we were drawn to the opportunity for collaboratively teaching.

Being both the participants and the researchers in this study, we recognize that we stood quite close to our phenomenon of interest. As is true for many disciplines, "education researchers are often researchers of familiar educational settings" (Rogers, Malancharuvil-Berkes, Mosley, Hui, & Joseph, 2005, p. 382). While some may

question the potential bias of such research, Merriam (1998) noted that an awareness of "how biases or subjectivity shape the investigation and its findings" (p. 23) is an important component of the research process. Therefore, throughout the study, we aimed to acknowledge and to value our history of participation in K-12 team teaching, along with our role as both the participants and primary researchers of this study.

Additionally, in order to acquire perspectives beyond our own, the data collection and analysis process was conducted in collaboration with five phenomenological research team members, including one senior faculty member. All of these research members, primarily doctoral students, were trained in phenomenological methodology. Throughout the study, we intentionally maintained a reflexive stance, viewing the process as "one that never ends" (Valle, King, & Halling, 1989, p. 11).

Data Collection and Analysis

Following the conclusion of the educational psychology course, a senior member of the phenomenological research team conducted one unstructured, open-ended interview with both team teachers. Each interview lasted approximately 90 minutes. The phenomenological interview began with the following question: "When you think about your experience collaboratively teaching, what stands out for you?" The research team member asked subsequent questions to clarify information already given, refocus on unfolding themes, and acquire further details and/or examples. Prior to conducting the interviews, the senior research member/interviewer participated in a bracketing interview to bring to light her own possible assumptions and biases regarding collaborative teaching methods. The intent of the bracketing interview was to make the interviewer's assumptions explicit, raising them "at the level of reflective awareness" (Valle, King, & Halling, 1989, p. 11).

Following the transcription of our (Kathy's and Jessica's) interviews, we read the interviews independently, noting and recording salient aspects of each text. We then met together to share the emergent findings, identifying salient features of each interview. In order to provide further trustworthiness to our analysis process, we brought the interviews to the phenomenological research team in order to further analyze and interpret the transcribed interviews. While each of the transcripts was read out loud, research members noted what stood out for them. Over the course of three research team meetings, research team members identified what Robbins (2006) called *meaning units*, justifying their ideas as they found support for each meaning unit within the transcript. Then, thematic commonalities were sought across the

transcripts with only those themes supported by both Jessica's and Kathy's transcripts being included in the final structure. As themes emerged, a shared structure was developed (Creswell, 1998) with each theme closely aligning with our words. In addition, there was an overarching theme, identified as the ground theme, which represented our general experience.

Findings and Discussion

The ground theme, *we didn't have a manual for this/finding our way through*, and the following five themes emerged from the analysis process: (a) *You can't shoot from the hip*; (b) *Following and leading . . . all of us together*; (c) *If we walk away disagreeing, is it okay?*; (d) *The presence of another pushed us to go deeper*; and (e) *You build something bigger*.

Ground Theme: We Didn't Have a Manual for This/Finding Our Way Through

The overarching ground theme serves as the foundation out of which the other themes emerged. The ground theme, *we didn't have a manual for this/finding our way through*, reflects our unfamiliarity with the process of collaborative teaching, including practical aspects and personal interactions. Gaining an understanding of this process required us to simply *find our way through*, as stated by one team teacher:

We didn't have a manual that we were going by, so we would always say, "Well, let's experiment with this and let's see what the response is...Let's feel what the response is by actually doing it and being practical about it and then we'll put words to what actually happened and then maybe we can replicate it the next day.

Davis (1995) affirmed that in new team teaching ventures many instructors initially have "an uneasy sense that they don't know what they are doing. They find themselves immersed in a collaborative process with other people…who also don't know exactly what they are doing" (p. 47). Each of us experienced this sense of uncertainty as expressed in the following quotes:

And there was a piece where we were just finding our way through it...We had no idea what this was going to look like and feel like…and we didn't know each other well enough by that point to even ask what it was going to look like.

The instructional decisions felt very different to me when I was in a team approach because when we first started, even before that first day, we asked

each other, "So, what are we going to say? How do we even do this? How do we know when to go back and forth with each other?

While we experienced this uncertainty during the initial weeks of the course, as time progressed, we became more comfortable with the process.

At the beginning of the course when we didn't know each other's styles, we didn't know each other's non-verbal cues, we didn't know how we acted, what meant what, I think we were a little bit hesitant and so it was like kind of trying to feel our way through.

We were very individualized when we first started and we didn't really mesh at first because we weren't sure how until we started actually doing and then we figured it out as we did it.

One of the aspects of finding our way through this process was the extensive amount of time required to plan for and reflect on each class session.

Theme 1: You Can't Just Shoot From the Hip

The first theme, *you can't just shoot from the hip*, explicates the idea that collaborative teaching demanded a major time commitment, something we saw extensively in the literature. The following two quotes illustrate each of the team teachers' perception of the amount of time required:

There's just a lot more involved in making sure you are prepared. You can't just go shoot from the hip. You can't assume that you know what you are going to say and roll with it as easily. You spend a lot more time thinking about it - about that class. I'm pretty sure I spent more time thinking about the class that I team taught than I did the class that I solo taught. Before class we would be talking about what we were going to do. After class we would talk about what went right, what didn't go right.

We had to think about everything. We spent way too much time getting ready for the class, going over what happened in the class. We spent so much time reprocessing what felt right, what went well, what didn't go well, what they understood, what they didn't understand, where we need to come up with a new instructional activity to fill in that gap and it was at a different level than we would do, or that I do, when I teach by myself.

While one dimension of time related to the amount of planning and reflection, another facet of time revolved around the interpersonal nature of collaboration. The effectiveness of each class session was in many ways contingent upon the degree to which we understood and responded to each other. This understanding took time to develop as expressed by the following:

I mean it took so much time...but then we became much more at ease with the process and I think also much more comfortable with each other and we began to collaborate in a much more fluid way. So the front end of the course was very time intensive for lots of reasons. One, we were feeling our way through the process and secondly we didn't know each other as well as at the end so we were also feeling out, how do I interact with this person? How do I push back and they push me back and we construct something together? But as things progressed, that all worked itself out.

As we developed as team teachers, our perception of the time required changed and while we may not have actually spent less time preparing, we became more efficient as we learned to follow and lead, both each other and our students.

Theme 2: Following and Leading…All of Us Together

The second theme, *following and leading...all of us together,* represents the reciprocity that was fostered within classroom relationships. This reciprocity began to develop in our own relationship as described in the following quote:

I know that person well enough now, and especially near the end, that I can flow with them better. That's what flow is – it's that following and leading. But flowing in such a way that you actually know when you are following, when you are leading and when you are totally off, when you've overtaken this position of, "This is my classroom." And you forget that this is about following and leading both the learners and this co-learner that you are teaching with as well.

Brookfield described classrooms as being either autocratic, where one teacher makes all the decisions, or oligarchic, with the teacher and a "few committed, articulate, or favored students" making most of the decisions. A more ideal classroom, valuing the "true team teaching" model, is much "closer to a democracy as participation is equalized and teachers and learners take joint responsibility for deciding what and how to

study and how to evaluate learning" (p. 236). In other words:

> It's not MY classroom. It's our classroom. It's not my classroom even if I am by myself. It's our classroom – the students'. I should be following their lead too.

There were times when the "flow" was accompanied by tension and challenge; at other times, it seemed as if there was no "flow" at all, as shown in the following quotes:

> We totally fell flat on our face a couple of times and we felt it. We felt it where we would go, "Oh. That was hard; what was it that made it hard?" So we would ask each other and we would go, "We weren't flowing with each other. We had our own agenda."

> Even if we went back today and did it again, we would have a day where we went, "Whoa, our cord of connection was really beautiful that day and we were connected with our students and with each other." And then we would have another day where it would be like, "We are still working this thing out."

This "cord of connection" represented our ability to lead and follow one another within all of our collaborative efforts. This did not evolve automatically; we had to *find our way through* it. Consistent with existing research on team teaching, our development of this "cord of connection" required a willingness and ability to work through conflict.

Theme 3: If We Walk Away Disagreeing, Is It Okay?

Much of the team teaching research addresses ways to deal with interpersonal conflict that will inevitably arise in any type of collaborative endeavor (Bakken, Clark, & Thompson, 1998; Bruffee, 1993; Davis, 1995; Creamer, 2004). The third theme, *if we walk away disagreeing, is it okay,* illustrates how we navigated such conflict. The following two quotes express our individual perceptions of conflict:

> Team teaching is a very organic experience…there is something very human that happens when you have to collaborate with someone that much at that close of a level and you make a commitment to work through whatever you disagree on – for two reasons. First because your students are always first and secondly you do care about the other person.

That was really scary to me because I wanted to make sure that our relationship was still intact when all of this [team teaching] was over. And I guess there's that dynamic that when you work closely with somebody, there's always a tendency to wonder, "If we walk away disagreeing on something, is it okay?"

Working through such disagreements is not about conforming or about assimilation. The best collaboration should not be about group-think, but be about conflict, differences, diversity, and dialogue about diversity (Cooper, George, & Sanders, 1994). For each of us, these differences often led to some tense moments, as expressed by such words as "wrestle" and "fiery."

> Part of this process was doing that [disagreeing] and it being okay. And it's okay to wrestle through issues and to walk away still maybe having a different opinion.

> Probably the most challenging piece of it because we had different approaches sometimes and we had to bend with each other and there were times when I would go, "I wouldn't have done that."…and that's where it would get fiery.

As we began to value rather than fear conflict, we realized with Dewey that "conflict is the gadfly of thought. It stirs us to observation and memory. It instigates to invention. It shocks us out of sheep-like passivity... conflict is a *sine qua non* of reflection and ingenuity," (Dewey, 1922, p. 300). It was in this conflict that we experienced professional and personal growth, while also observing our students reap the benefits.

> I remember one particular time that it was rough. I mean it just wasn't coming together at all and it was so frustrating. It was like, "Okay. I would have never had this problem if I was just teaching by myself." And it was just frustrating but then, you work through it and you kind of push and you kind of pull and when it is all said and done, you grow from it.

Theme 4: The Presence of Another Pushed Us to Go Deeper

The fourth theme, *the presence of another pushed us to go deeper*, emphasizes the opportunity for reflective practice through the process of collaborative teaching.

When you collaborate with someone else you see yourself...you see a lot about your assumptions that you make that can be adjusted based on people's response and based on questions that people ask or vice versa. And so I thought, "Well, this will be very challenging and it would really push me." I didn't realize it would push me in being a reflective teacher.

According to Parker Palmer (1998), "when we deny our own condition, we resist seeing anything in others that might remind of us who, and how, we really are" (p. 47). To avoid reflective practice is to bury unquestioned assumptions, potentially limiting our capacity for professional and personal growth.

If I didn't team teach, I would have walked in with my assumptions and my understanding based on my perspective and I wouldn't have been able to see somebody else's point of view and get a better understanding even if it meant adjusting my understanding.

The initial uneasiness about the collaborative process, the sacrifice of time for this novel experience, and the promise of personal conflict, all converged in the presence of the other and pushed us toward growth.

It was this tug between being comfortable with the process and uncomfortable in a personal way – of knowing that this was really making you grow personally and professionally and in a collaborative sense as well, of knowing when to be quiet and knowing when to really recognize that your idea might really stink and someone does need to push you back on it.

As we look back at our own growth, we see that this process of "pushing back," despite its occasional discomfort, is necessary in order to create something bigger than what we are able to do individually.

Theme 5: You Build Something Bigger

The final theme, *you build something bigger,* encapsulates the nature of the co-construction of knowledge within our experience of collaborative teaching, as we each expressed in the following two quotes:

I remember one day Kathy said to me, "This is what constructivist principles are all about." And I said, "What?" She said, "What just happened right here." We had come up with something that was bigger than what we had individually brought to the table. And it was challenging to get there but

when we got there it was like, "Wow! This is really, really neat to have this feeling of disequilibrium. You've pushed my thinking on this so I need to reconcile what's going on here." And eventually it happens. You reconcile and you build something bigger than you could have built on your own.

We would have to kind of wrestle through some issues like – maybe I had one way of looking at a particular concept and Jessica had a different way of looking at a concept and we couldn't just plan it. We had to kind of wrestle through that issue first and kind of, I guess it's co-constructing.

In comparison to teaching in isolation, collaborative teaching provided a rich opportunity to engage in constructive modes of teaching. As Vygotsky (1978) suggested, thinking is modified through social interactions with others; as those thoughts are then internalized, future learning and teaching ventures are enhanced. In our highly collaborative approach to team teaching, the potential for *building something bigger* seemed to be maximized.

Conclusions

As we found our way through this process, the time spent allowed us to deepen our understanding of the course content, improve interactions with students and each other, develop a capacity to embrace differences, and work toward a more collaborative approach to teaching and learning. Abundant research exists supporting the use of collaboration for professional and personal growth, both in and out of the classroom. For example, Harris and Harvey (2000) noted that the participants in their collaboratively taught course engaged in deeper levels of discussion and experienced a more enriching learning community due to the "distinct life experiences and different academic backgrounds" of the two instructors (p. 28). Among other advantages, Buckley (2000) suggested that collaboration increases the level of scholarship, reduces burnout by alleviating the isolation felt by individual teachers, and builds a sense of community among instructors and students. Despite the recognized value of collaborative teaching, the "Myth of the Independent Scholar" continues to dominate the university classroom, begging the question: What is it that stands in the way of instructors engaging in collaborative praxis?

Davis (1995) attributed the lack of effective team teaching to several factors including "traditions, lack of time, and a certain lack of imagination" (p. 112). Traditional views of teaching tend to perpetuate the image of an individual instructor who has developed

proven expertise in a field and whose responsibility it is to pass that expertise to her students. Collaborative teaching can be perceived as a challenge to the authority of the professor in the classroom by those who underestimate the power of collaboration. Further, there may be resistance to team teaching by more "autocratically inclined" instructors and "cost-conscious administrators" (Brookfield, 2006, p. 160). As seen in our study and in other studies examining various forms of team teaching, authentic collaboration in the classroom requires a relinquishing of individual control, an investment of time in the pursuit of professional growth, a commitment to work through conflict, and a willingness to embrace differing perspectives and ideas.

To relinquish individual control is to recognize that the classroom is *not my classroom, but our classroom,* and that only through *following and leading...all of us together* can we construct a greater understanding. As Miller (1994) suggested, we believe that "knowledge is the result of many minds approximating a 'truth'" (p. 284) and that only in the act of coming together can we truly deepen our understanding. In this coming together, team teachers must learn to "be okay" with the uncomfortable growth pains common to the process of collaboration. In that there is not a "how to" manual for collaboration, instructors must embrace the challenge of learning "on the job."

As shown in our thematic structure, *finding our way through it* demanded a significant time investment; we could not simply *shoot from the hip.* We needed additional time to jointly plan, reflect, and teach, while also navigating the interpersonal interactions inherent to collaborative teaching. Although some may see the amount of required time as a hindrance to collaborative ventures, this drawback is minimized in light of the benefits of both professional and personal growth. In order to be *pushed to go deeper*, time is required. Nevertheless, through creativity some of the challenges of time may be overcome. For example, opting to collaboratively teach during an academic term in which both team teachers have fewer job demands is a valid consideration. Further, as Beck (2006) noted, gaining "administrative buy-in" through systematically demonstrating student gains may perhaps open up more opportunities for collaboration (p. 9).

As institutions of higher education continue to recognize and value the importance of collaboration in developing knowledge and growth among their instructors, novel means of facilitating collaborative teaching must be more systematically instituted. Palmer (1998) stated that "involvement in a community of pedagogical discourse is more than a voluntary option...it is a professional obligation that

educational institutions should expect of those who teach. To not do so fosters institutional incompetence" (p. 144). Thus, simply recognizing the value of collaboration is not enough. Instructors may give mental assent to the need for collaboration but feel that it is not really a viable option. With the variance in team teaching approaches, many options exist, allowing instructors to engage in some form of collaboration that matches their work place demands. A "serial" approach, as Davis (1995) described it, may be the most pragmatic option for collaboration and while it may not incorporate the level of collaboration that we attempted to implement, we believe that any type of collaboration is better than no collaboration at all.

We recognize that team teaching is "a valid part of our praxis, a way of working that strains our schedules and – occasionally – our tempers, but which demonstrates that the collaborative model is a method for living, not just a classroom exercise" (Davis, 1995, p. 108). Despite the potential for "strain," "tempers," and occasionally *walking away disagreeing*, team teaching provides a natural opportunity for engaging in dialogue with colleagues in order to promote professional growth. Collaborative efforts enrich us as instructors, enabling us to more deeply reflect as we are pushed to question our assumptions and challenge our current level of understanding. Further, as we learn to construct knowledge together, to challenge one another, and not simply assimilate our ideas, we are enabled to *build something bigger*.

While one implication of this study is the benefit of collaboration for instructors, we also recognize the value of collaborative teaching for students. For example, we were able to model for our students what it means to approach the classroom as a community of learners, *not as my classroom but our classroom,* and to walk out both the "difficulties and rewards of working as a small community" (Wolf, 1994, p. 108). Benjamin (2000) found that when team teaching was simply about sharing the workload, it was not necessarily beneficial to the students; however, when team teaching was implemented with the purpose of improving teaching and learning, there was much more collaboration and there were greater benefits to both the instructors and the students.

As valuable as collaborative teaching is for instructors and for students within educational settings, we must not miss the potential power of collaboration within a broader context. Our thematic structure, applied to the larger community, illustrates that when we are willing to engage in reflective practice with those around us, listen to the thoughts and perspectives of others, even when there is inherent risk of conflict and disagreement, the opportunity to *build* greater understanding emerges. It seems fair to

suggest that as we *follow and lead* within a community, investing time as well as emotional and intellectual energies, we make space to *build something bigger* than we could have built ourselves.

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Student Learning with
Performance-Based, In-Class and Learner-Centered, Online Exams

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The purpose of this study was to explore the experience of students with performance-based, in-class and learner-centered, online assessment and the effects of these formats on comprehensive exam scores in an educational psychology course required of participants in a teacher education program. In our quantitative analysis, we investigated the effects of in-class and online exams on undergraduate students' performance on an in-class comprehensive final (*n*=141). Students were randomly assigned by course section to take one proctored exam in-class and two other unit exams online in a learner-centered format. At the end of the course, students in all sections took a proctored comprehensive final, consisting of a series of multiple choice questions closely aligned with questions from the unit exams. No significant differences were found between content items initially assessed utilizing the traditional, in-class format and the learner-centered online format. In our qualitative analysis, students in one of the six sections (*n*=22) were selected to participate in open-ended interviews. A phenomenological method was used to collect and analyze responses to the question: "When thinking about your experiences with both the in-class exam and Blackboard exams in [course name], what stands out for you?" Findings from our qualitative analysis resulted in separate yet balanced themes for participants' perceptions of in-class and online exams. For both categories of themes, the constructs of stress, control, and knowing stood out for participants. Implications of this research project are discussed in relation to the use of learner-centered assessment.

The growing popularity of using online resources to teach and to assess students in higher education has created a demand for improved teaching methods to maximize the effectiveness of online learning. A learner-centered theoretical framework provides one such method. According to Weimer (2002), a learner-centered approach to teaching and assessment involves five key changes to traditional, performance-centered teaching practice: (a) shifting the balance of power from teachers to students; (b) seeing the function of content as a means of facilitating changes in how students think and understand; (c) de-centralizing the role of the teacher; (d) helping students develop into responsible life-long, learners; and (e) providing evaluation and assessment that emphasizes process and promotes learning. It was this latter component, assessment, with which this study was concerned. More specifically, this study focused on how a learner-centered approach to assessment influences the performance of students within a higher education classroom, as well as how they experienced such a format.

Literature Review

In more traditional classrooms, exams have often been performance-centered, with a goal of evaluating student knowledge, rather than assessing student progress (Huba & Freed, 2000; Rocco, 2007; Weimer, 2002). The emphasis in a performance-centered classroom is on the final product, correct answers, final grades, and is often accompanied by a sense of individualism and competition (Huba & Freed, 2000). According to Weimer (2002), pressure to perform on exams often results in cheating, in students "playing games" in order to succeed, and in an overall lack of depth of understanding. Furthermore, the emphasis on grades in a performance-centered environment often has emotional consequences on students' overall sense of self, their health, and their motivation (Weimer, 2002).

In a learner-centered environment, assessment emphasizes student improvement, problem-solving, and a commitment to higher order thinking skills (Huba & Freed, 2000; McCombs & Vakili, 2005; Weimer, 2002). These environments are often associated with more supportive relationships with instructors, a sense of ownership in learning, and meaningful dialogue within a community of learners (McCombs & Vakili, 2005). In addition, learner-centered assessment may increase students' awareness of the learning process and take the focus off grades (Weimer, 2002). It should provide students with opportunities to exercise self-regulation and to gain additional control over the outcome of an exam. According to Benson (2003) and Ercikan (2006), learner-centered assessment utilizes a formative assessment process that includes multiple opportunities to take an exam, allows students to use course materials while taking the exam, and provides immediate feedback after the exam. This formative process also promotes classroom discussion. The same principles that contribute to learner-centered

assessments in the classroom may also be applied to online formats of assessment (Benson, 2003).

Since the advent of online learning, there has been extensive research on various approaches to online assessment (Lightfoot, 2005; Vonderwell, 2007), the implementation of assessment within online learning (Buchanan, 1998; McCombs & Vakili, 2005), and advantages and disadvantages associated with online assessment (Kerka & Wonacot, 2000). While some research has delineated potential disadvantages of online assessments—learner isolation, lack of instructor control over assessment conditions, and lack of security with regard to the exam itself (Benson, 2003; Kerka & Wonacot, 2000; McCombs & Vakili, 2005)—some of these researchers stress that such limitations can be addressed through a learner-centered approach to online assessment (Benson, 2003; Rocco, 2007; Vonderwell, 2007).

While we found scant literature demonstrating how to systematically apply learner-centered principles to online assessments, there were some exceptions. For example, Benson (2003) suggested that online assessments facilitate a learner-centered environment through individualized and immediate feedback. This finding is consistent with research conducted by Peat and Franklin (2002) with undergraduate biology students; in course evaluations, students expressed that the immediate feedback provided by online exams contributed to an increase in self-assessment and improved learning. We did not find, however, studies comparing student performance with online versus in-class assessment, nor studies providing an in-depth focus on students' perceptions of their experiences with learner-centered versus performance-centered assessment.

Purpose of the Study

This study was designed to explore students' experience with traditional, in-class exams and learner-centered online exams as well as the effects of the exam formats on comprehensive exam scores. The research was guided by two questions: (a) Is there a significant difference between the mean scores of items on a final exam initially assessed in-class and those initially assessed online? (b) What are the lived experiences of undergraduate students taking in-class and online exams?

Methods

The participants were 141 pre-service teachers enrolled in one of six sections of a required senior level educational psychology course at a large southeastern university in the United States. All of the participants had been admitted into a teacher education program.

Each course section was taught by a graduate teaching assistant who, with a professor-coordinator, formed a collaborative instructional team. Each section covered the same materials and had the same class assignments. Data were collected as a regular part of course requirements on only the students who signed a consent form.

The Quantitative Study

We investigated the effects of three in-class and online unit exams (40 multiple-choice items and two short essay questions) on students' performance on an in-class comprehensive final (60 multiple-choice items). Six educational psychology course sections were randomly assigned to take one exam in a traditional, proctored format (i.e., performance-centered where students had 75 minutes to complete the exam and no access to course materials) and two exams online in a learner-centered format (i.e., multiple attempts over a one week period with access to course materials, along with immediate feedback provided by online software after each trial, with items randomly rearranged before every new attempt). At the end of the course, students in all sections (n=141) took a proctored, comprehensive final exam, consisting of a series of multiple choice questions closely aligned with questions from the unit exams.

We conducted a one-way analysis of variance and Tukey post hoc on exam scores to determine any significant differences between and within the six course sections. No differences were found in the results ($p < 0.05$). We also computed comprehensive exam mean scores for items aligned with in-class and online exams separately. T-tests for independent means revealed no significant differences ($p < 0.05$) for any of the three analyses (see Tables 1-3).

The Qualitative Study

The qualitative analysis of this study employed existential phenomenological methods to investigate the perceptions of participants enrolled in the course. Rather than focusing on causality and prediction (Polkinghorne, 1989), phenomenological research focuses on meaning and understanding, the "what" and not the "why" of an experience (Thomas & Pollio, 2002). We invited students from one randomly selected course section to participate (*n* = 22) in interviews after they had completed all four exams. These participants took the first unit exam in-class and the second and third unit exams online. They also took the comprehensive final in-class.

Five members of our research team conducted unstructured, open-ended interviews with individual students. The interviews lasted from 7 to 60 minutes.

Table 1
Comprehensive Final Exam Mean Scores on Unit One Test Items
Initially Assessed Utilizing an In-Class or Online Format

Exam Format	N	Mean	Std. Deviation	Std. Error Mean	t-value	df	Significance (2-tailed)
In-Class	51	90.69	9.64	1.35	1.17	139	0.24
Online	90	88.44	11.55	1.22			

p<0.05

Table 2
Comprehensive Final Exam Mean Scores on Unit Two Test Items
Initially Assessed Utilizing an In-Class or Online Format

Exam Format	N	Mean	Std. Deviation	Std. Error Mean	t-value	df	Significance (2-tailed)
In-Class	40	77.50	9.06	1.43	-1.25	139	0.21
Online	101	79.65	9.31	0.93			

P<0.05

Table 3
Comprehensive Final Exam Mean Scores on Unit Three Test Items
Initially Assessed Utilizing an In-Class or Online Format

Exam Format	N	Mean	Std. Deviation	Std. Error Mean	t-value	df	Significance (2-tailed)
In-Class	50	75.80	11.13	1.57	-1.54	139	0.13
Online	91	78.68	10.32	1.08			

p<0.05

We began each interview with one general question that allowed the participant to share whatever perceptions he/she wished to share for whatever length of time he/she desired: "When thinking about your experiences with both the in-class exams and online exams in [course name], what stands out for you?" Other follow-up questions were asked as needed for clarification.

To provide rigor during our analysis, all interview transcripts were analyzed by our research team members who were familiar with a particular hermeneutic method developed at The University of Tennessee (Thomas & Pollio, 2002). One member read aloud each participant's transcript while others noted what stood out. Together, we discussed these *meaning units* (Robbins, 2006) and challenged each other to justify ideas with quotes from the transcript. We looked for shared meanings across participants that would answer Churchill's (2006) question: "How is it that I am standing such that I see what [the participants] see?" This analysis resulted in themes,

which we define as "patterns of description that repetitively recur as important aspects of a participant's description of his/her experience" (Thomas & Pollio, 2002, p. 37). We selected words of participants to represent the shared meaning of each theme. Finally, we derived the relational structure of themes.

The qualitative data analysis resulted in two categories, representing the two exam formats, in-class and online. Within the context of these two experiences, the research team identified three themes for each category as shown in Figure 1.

Category One: In-Class Examinations

Theme 1: *Just a Real Exam*

The first theme, "*just a real exam,*" is about the participants' perception of the in-class exam as being "similar to other in-class exams I've had in other

Figure 1
Structure of Themes for Students' Experience with Online and In-class Exam Formats
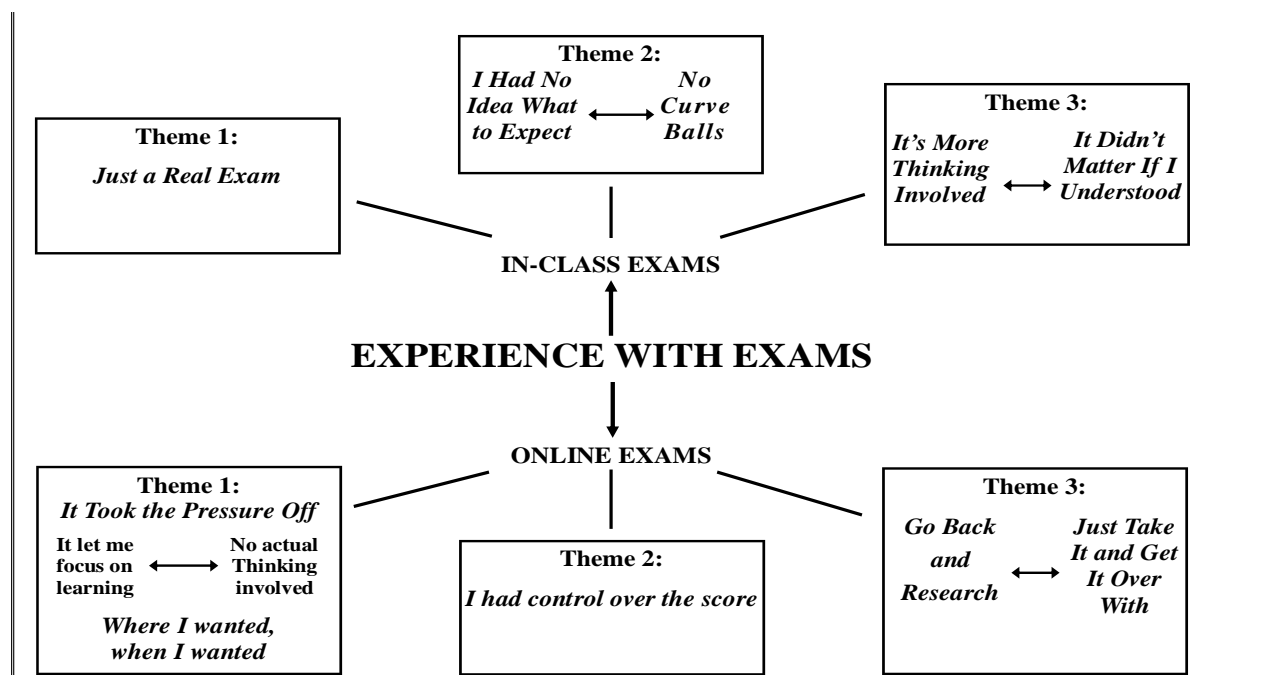
courses." For some of the participants, the idea of a "normal test" was often associated with the feeling of "I'm not going to get a second chance so I mean, kind of a 'do or die' there." One participant described a traditional, in-class exam:

> I have grown up taking the same exam, same format all through my school. I didn't have much alternate assessments. Just a real exam – studying the material covered in class and in the book and then coming in and taking it with a pencil in a classroom, silent, I guess the traditional classroom exam.

Although at least one student indicated the in-class exam was "*just* a real exam," (emphasis added) others noted it created a sense of stress:

> It's stressful to study for a test. It's stressful to be in the environment where everybody is silent and filling in the bubbles.

Sarros and Densten (1989) conducted a study asking undergraduate students to rate 34 potential stressors within their college experience. Nine out of the top 10 noted stressors were related to assessment activities, such as classroom exams and grades. The participants in our study expressed similar feelings of anxiety related to in-class exams:

> Tests make me nervous [laughs quietly] and in a classroom setting where you've had to study for several chapters and in these chapters there's so many different theories and so many concepts to grasp onto so you're studying an overall, a lot of material. So that can get stressful because you don't know exactly what's on the test.

This anxiety was expressed in the context of not knowing what to expect on the first exam.

Theme 2: *I Had No Idea What to Expect/No Curve Balls*

Many of the participants expressed uncertainty about the in-class exam, while others felt there were no surprises. This second theme is shown as a continuum with *"I had no idea what to expect"* on one end, and *"no curve balls"* on the other end. The majority of the participants felt that they did not know what to expect specifically related to the first in-class exam. On the other hand, the comprehensive in-class exam was viewed as throwing "no curve balls."

Participants described the first exam as stressful:

> I was very stressed out about the in-class exam because my class took it first, and I had no idea what to expect.

> Well, you never know what to expect when you take the first test in a class. So my first one [in-

class exam] was just kind of like, "Oh man, this is bad."

Some participants expressed that the comprehensive in-class exam threw "no curve balls," compared to their experience with the first in-class exam:

Like you walk in with just like a timidness because you're like "What's this? What's this [in-class exam] gonna be like?" So … But with the comprehensive final, that was in class too, and I didn't have that at all. I mean I studied for it and I was like, "Yeah, it's comprehensive, but I studied over the previous test. I studied my notes that I had taken in class."

If you knew the material that was tested [on the final exam], then you would be fine on this test. It wasn't throwing any curve balls like, "Oh, you should have studied page 43." Or you know, that second paragraph – there wasn't any surprises. Yeah, and I guess since I was so prepared, the second one [comprehensive in-class exam] wasn't bad at all. With the first one I guess I didn't know what to expect and maybe if I had taken the in-class exam as a second or third one instead of the first one I might have…so I think everyone was a little bit – well you never know what to expect when you take the first test in a class.

Theme 3: *It's More Thinking Involved/It Didn't Matter If I Understood*

While most of the participants referred to some knowing of the course content, there was an implicit difference in how they defined this "knowing," ranging from critically thinking to the simple regurgitation of information. A continuum of knowing emerged with *"it's more thinking involved"* on one end and *"didn't matter if I understood"* on the other end. A participant at one end of the continuum compared in-class to online exams:

Being in-class [exams] where it is more critical thinking because you have a, you get, it's like separating your mind in two different places. You have the test and then you have your database of information that you have studied and it's the process of associating that information that you have studied to the test, as opposed to a blackboard [online] – it's more of a – look at the question and find the answer. There is no actual thinking involved so I feel like, when I'm in the in-class [exam] I – because I've done that critical thinking, it's more thinking involved. That means I feel I

have more retention of the process as opposed to just regurgitating facts on blackboard [online].

Some participants, representing perspectives nearer the other end of the continuum talked about the difference between memorizing and understanding:

Really didn't matter to me at that point [with the in-class exam] if I really, I would say understood exactly – I have really good memorization so to me, if I can just memorize it word for word – maybe not even understand what it meant but just get it down I would have a pretty good shot I would think at being able to answer the questions.

Well, when I memorize I just, I know all the information and I see it long enough to write it down for the test and then when I'm done with the test I don't really care anymore [laughs]. And it goes away. I mean it will come back if I have to take a test again but it's not something that pops up in my mind all the time or I can – it's not useful to me and in like a year or two I won't remember it or in a week or two sometimes.

Another participant shared the perspective about knowing that she learned from a former teacher:

I had a history teacher; she was always like, "Understand… don't memorize." 'Cause if you understand something you will remember it mostly, but if you just try to memorize facts or memorize answers, it's not gonna stick, because it's just this whole list and stuff that's gonna get lost.

In the preceding quote, knowing is perceived as more than merely memorizing information; it is inherently connected to an in-depth understanding. While this quote referred to traditional in-class exams, the same underlying belief guided our design of online exams with our emphasis on the process and promotion of learning.

Category Two: Online Examinations

Three themes emerged in category two just as they did in category one. What stood out about the participants' experience of the in-class exams was quite different from that of the online exams; nevertheless, they continued to focus on the constructs of stress, control, and knowing.

Theme 1: It Took the Pressure Off

The first theme was prominent for all participants. They agreed that online exams reduced the amount of

pressure, at least to some extent. Within the context of the first theme, *"it took the pressure off,"* emerged two sub-themes*: "let me focus on learning/no actual thinking involved"* and *"when I wanted to, where I wanted to."*

Sub-theme a: Let me focus on learning/no actual thinking involved. Within the first sub-theme, a continuum emerged with one side representing the participants who felt the online exams "let me focus on learning." The other end of the continuum represented those who experienced the online exams as having "no actual thinking involved." Many participants fell somewhere between the two ends of the continuum, contingent upon "how they looked at it," as one participant stated.

The participants who felt that the online exams helped them focus on learning expressed the following:

> It gives you the ability to do as well as you want … it took the pressure of the grade away a little more and let you focus on learning.

> I think with having to find it on my own and having the resource in front of me, I felt like it stuck better in my mind when I went back through it to know. To have it in front of me and to have it on the test to go through, it stuck in my mind for me.

> The good thing is that I did learn it because I went over it and over it, and over it again; and it wasn't just something I was memorizing, because I didn't have to memorize it because it was right there in front of me and I was actually reading what it said rather than memorizing the words.

Interestingly, 4 of the 22 participants explicitly disagreed with this end of the continuum, seeming to approach the task of completing the online exams from more of a performance-oriented mindset. Performance-oriented perspectives tend to focus on "high grades, public displays of ability, and performance compared to others" as compared to the emphasis of learning-focused approaches on "effort, continuous improvement, and understanding" (Eggen & Kauchak, 2007, p. 337). The participants who did not feel that "it [online exam] let me focus on learning," indicated that they approached the task of online exams by simply looking at the question and finding an answer as opposed to focusing on learning the content.

> A blackboard [online test] – it's more of a – look at the question and find the answer. There is no actual thinking involved.

I think I maybe didn't learn as much through the blackboard [online] tests because I would just look it up in the book as I did it instead of reading it.

Regardless of their approach to taking the online exams, all of the participants agreed that one of the benefits of online exams was the flexibility of where and when the exam was completed.

Sub-theme b: Where I wanted, when I wanted. The participants explicitly expressed that one of the elements that lessened their sense of pressure was the way that the exams were structured. For example, the participants were able to complete the exams at a convenient time and in a comfortable location. This was expressed by the following:

> Obviously it gives you a window to be able to take the test; I don't have to study it and know all the information by Tuesday or Thursday at 9:40. I can have it between Friday night at whatever o'clock until Sunday, you know what I'm saying? It kind of gives you that window to kind of you know, when you have time.

> But the other one was nicer [online exam] because I was just sitting on my couch and you could do it when you wanted to and when you had the time . . . in the comfort of my own home.

Not only did the participants express that their sense of pressure was lessened by the flexible exam structure and the opportunity to focus on learning, they also valued their control over the final grade.

Theme 2: I had control over the score

The second theme, *"I had control over the score,"* brought forth the idea of how a sense of influence or control of a grade influences achievement. Perry, as cited in Weimer (2002), suggested that a student's sense of control, or lack thereof, strongly influenced academic achievement. In one study, Perry and Magnusson (1987) reported that a student's sense of control or perceived measure of influence upon academic outcomes had a more powerful effect than an instructor who was perceived by students as highly effective. Thus, it was intriguing to discover that the participants' perceived control over the score with online exams was often referenced in relation to their willingness to persist with the material.

> I guess, the second test I took was online and I kept getting a seventy-six out of eighty and there were two questions that um I was getting wrong over

and over. But since they switched out and it wasn't in order, it took me a long time and I kept thinking, "Seventy-six [out of eighty] is not so bad." And then I was, "No way. I'm going to get an eighty."… I wasn't settling for the seventy-six. So I did it all the way and it took me a long, long time.

I guess my motivation was stronger on the blackboard test to do better because I knew that I had control over it. Even after I had taken it the first time I was able to go back and fix what I had missed. Whereas in the classroom tests, I was not given the opportunity, so what I got wrong was what I got wrong, so it was sad. It, I guess, decreased my motivation to go back and find out the answers 'cause I had already gotten the final grade.

Many of the participants spoke about this control over the score in relation to their level of motivation. Attribution theory further explicates this idea, suggesting how a learner's explanation of their success and failure deeply influences motivation and behavior (Eggen & Kauchak, 2007). This theory states that a student's belief that an academic outcome is attributable to "internal, stable, and controllable causes" impacts their willingness to persist within a given task (Schunk & Zimmerman, 2006).

It [online exam] gives you the ability to do as well as you want, also. Obviously, you're taking it multiple times so you don't take away that sense of control. I didn't do as well as I wanted to on the first test [in-class], I didn't feel that I prepared myself enough to take the test in class, but there was a little bit of relief knowing that I could do as well as I was willing to do on the next [online] test and having some control over that. Like, I could make a hundred on the next two tests, if that's my goal. And I don't know why you wouldn't—take it as many times as you could [laughs]. I don't know if people did or not, but it was nice to have that control. It took the pressure of the grade away.

Many of the participants expressed a willingness to persist in completing the online exams by "going back and re-searching." However, for some participants, depending on how they looked at it, the online exams were seen as an opportunity to "just take it and get it over with."

Theme 3: Go Back and Research/Just Take It and Get It Over With

The third theme emerged as a continuum where one end was expressed as *"go back and re-search,"* and

the other as *"just take it and get it over with."* One end of the continuum,"go back and re-search," speaks to the very nature of our online exams, whereby the participants were provided an opportunity to take the exam an unlimited number of times during the one week timeframe, enabling them to continually revisit the course content. Many of the participants spoke about how the immediate feedback often led them not only to improve their performance, but to enhance their understanding as well.   As with category one, participants seemed more drawn to making comparisons between the two categories when focused on some aspect of knowing, as these examples indicate:

For the online exams, I took that one question, the one area it was asking and studied that in-depth in the book, like everything about it, you know and so I had more understanding of the concepts like an individual concept in-depth in the whole chapter… because for the first exam [in-class] I knew a little bit about everything but for the second two [online] I knew a lot about a few things.

With the test online, I felt like I could re-search the answers more carefully. I would take the test to see what I knew up front, and then the ones that I got incorrect, I would go back through and really look in the book and really research what the question was asking and go through all the answers. So I feel like I learned more that way.

I understand the material in those [online exams] a lot better than the material I took in class, because I looked at it once and then didn't look at it again until the final. But the ones I did online, because I was able to do them over and over and over until I got the grade I wanted, I think I got the material a lot more.

The idea of "going back and re-searching" seems to hint at the idea of self-regulated learning, with one feature of such being characterized by Zimmerman (1989) as occurring when "students monitor the effectiveness of their learning methods or strategies and respond to this feedback in a variety of ways" (p. 4). The following participants provide examples:

I guess that the way to remember it is to go back over it when you've gotten something wrong. It's not just, Ok, I got the question wrong. It's to go back over it and either the teacher re-teach it or you re-teach yourself the concept.

For me, it was "Well, if I got it wrong, I will go back over the notes and the book in that particular section and think about why could this answer be

wrong?" So think about what I'm reading and try and analyze it in a different way and figure out what the answer was.

On the other end of this continuum, a minority of participants described online exams as being something to "just take and get it over with." This end of the continuum highlighted the experience of those who approached the online exams as something to simply "check off my list" of things to complete. It was interesting to note that only 4 out of the 22 participants articulated a disposition toward this end of the continuum and tended to approach the task of online exams from a more performance-oriented mindset, as voiced by the following participants:

I studied more of the information to memorize it and like learn it and understand it more [for in-class exam] than just to answer the test – the questions on the [in-class] test because I had to remember it for a longer period of time to take the in-class than just to take it online and get it over with.

It's because, on the in-class tests, we are preparing for something and you don't have that relaxed feel where, you know, "I don't really have to study for this, this blackboard test, because I could just look up the answer really quickly.

Some of these participants spoke about simply using a process of elimination when completing the online exams.
.
… .if they are given multiple chances to get the correct answer, well then eventually they are going to keep up with what's right and what's wrong and they just go back and click through it.

This idea of just getting it over with emerged predominately when discussing the practice of not inquiring further about test questions that were difficult to understand or that the participant disagreed with.

I still probably should have asked about that [online test question], but I didn't because I just checked it off my list, "Ok, I took the test" I ended up getting it right and doing well.

The vast majority of the participants, however, explicitly disagreed with this end of the continuum "just take it and get it over with," often referring to the extensive amount of time they needed to complete the online exam, as expressed by the following participant's words:

I thought I could just look at the question, find it in the book and that would be it, it would take like 30 minutes. But finding it in the book was more, more of a task than I thought it would be and it did take more time because I went through the first time just trying to see what I knew and then trying to find that in the book and then I would miss it and have to take it again or something like that so it, it was more time consuming than I, you know, what I previously anticipated.

Structure of Themes Across Categories One and Two

Participants saw in-class and online exams through the constructs of control, stress and knowing but from different perspectives. A sense of "I had no idea what to expect/No curve balls" reflected the degree of lack of control they felt regarding the first unit exam and their improved sense of control regarding the comprehensive final. This was in contrast to the clear perception of "I had control over the score" when they took online exams. The participants also focused on the degree of stress in relation to the exams. "Just a real exam" reflects the pressure and nervousness they felt during in-class exams as well as the lack of stress due to familiarity with this format of test taking. In relation to online exams, "It took the pressure off" revealed a lack of stress due to the ability to take the test at a time and place of choice, and depending upon the approach taken, allowed one to focus on learning in-depth—or to not have to think much at all. Knowing was the focus of theme three, which participants perceived as either requiring thinking and searching for understanding or as a regurgitation of facts where understanding was unnecessary. The interesting aspect of this structure was that "it depended upon how you looked at it." The participants did not all agree on whether in-class or online exams required a higher order of understanding or lack of it, although most viewed online exams as providing more opportunity to "focus on learning," with learning more equivalent to understanding. The shared thematic structure of the in-class and the online exams required us as researchers to consider more deeply both the limitations and the implications of the findings.

Limitations

Limitations of the study included the schedule of course topics for each of the unit exams, the varying course formats, and that the unit exams covered three to six chapters. Most notably, the perspectives from students in sections taking their in-class exams for a later unit were not obtained. Thus, in that these students' perspectives may have differed from the students who were interviewed, this aspect of our study's design may have limited our understanding.

Despite these noted limitations, the findings provided a wealth of understanding related to exam formats.

Implications

One of the strengths of this study was that it involved both quantitative and qualitative analyses, thereby providing a richer understanding of learner-centered assessments. The overarching aim of the quantitative portion of the study was to examine the effects of exams administered in an in-class and online format. Our quantitative analysis resulted in no significant differences between the mean scores of the content items on the comprehensive final that were initially assessed with an in-class exam and those initially assessed with an online exam. This was an important finding because it suggested that traditionally administered exams did not necessarily result in better performance on a traditionally administered comprehensive final—and the same degree of usefulness in terms of performance on final exams for online exams. Because all of our participants were required to take standardized, national licensure exams in order to become licensed teachers, it was important for us to consider how the in-class or the online format affected their performance on comprehensive exams, given under conditions similar to those of standardized exams. If we had ended our study at this point, we could have reasoned that the literature claiming the merits of learner-centered assessment is questionable. Our qualitative study provided important information that forced us to think more deeply.

The overarching aim of the qualitative portion of this study, to provide a rich description of our participants' experience with the two exam formats, allowed us to discover a number of implications for online, learner-centered exams that we could well have overlooked without it. Our findings strongly indicated that our efforts to facilitate student appreciation and use of a learner-centered assessment approach were perceived differently by some students. These findings led us to reflect deeply on various aspects of control, stress, and knowing that stood out for our participants. We realized the need to help students question what it means to know, and how control over time, place and scores, as well as stress, can lead to more or less meaningful learning, depending upon one's perspective.

We also gained insight into factors influencing the students' level and source of motivation. Many students made comments related to a feeling of being over-extended; some were taking more than 18 semester hours and balancing projects and exams required by this course with exams or deadlines in others. Students' comments also shifted from a process to a performance orientation as they described feeling stressed by these constraints. One participant described approaching the online exam as "another thing to check off my list."

One of the considerations for future research that evolved from this study related to the instructors' observations concerning their own teaching. Even though the instructors had considerable experience administering in-class assessments to students in other educational contexts, they anecdotally expressed an uncomfortable awareness of a disjunction between their philosophy and what they were doing in the classroom. When the instructors claimed to be learner-centered and then interjected performance-centered assessment in their teaching practice, they agreed with students' written comments that they should "practice what you preach." This is an area worthy of future exploration.

Some studies have suggested that it is not necessarily the use of computer technologies that enhances student learning, but rather the epistemological orientation of the instructor using such tools (Taylor & Maor, 2000). This idea emphasizes the need for compatibility between epistemological orientations and pedagogical practices, such as assessment design.

Conclusion

Our findings uncovered learners' perceptions and orientation towards test-taking and revealed our need to more explicitly teach students to value and use learner-centered approaches. This study further suggests that traditionally administered exams do not inevitably lead to higher performance on traditionally administered comprehensive finals, encouraging the use of learner-centered approaches to assessment. Technology affords the opportunity to enhance methods of learner-centered assessment (Benson, 2003; Rocco, 2007; Vonderwell, 2007), to encourage students to become more deeply involved in learning experiences (Huba & Freed, 2000; Rocco, 2007; Weimer, 2002), and to become more self-regulated (Weimer, 2002) and persistent learners within the realities of a system where grades still count. As Chickering and Gamson (1987) asserted, "Learning is not a spectator sport" (p. 4); offering assessments with which students can actively engage, gain feedback, ask questions about, and feel genuine competence toward, can help students move out of the stands and onto the playing field.

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"I Know It's So Good, But I Prefer Not To Use It"
An Interpretive Investigation of Jordanian Preservice Elementary Teachers' Perspectives about Learning Biology Through Inquiry

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Many researchers emphasize the significance of employing inquiry learning in shaping preservice elementary teachers' tendencies to teach science. Using an interpretive research methodology, this study examined the influence of employing an inquiry-based teaching approach on teaching biology to preservice elementary teachers at the Hashemite University in Jordan. The purpose was to explore 3 teachers' perspectives of the teaching approach as well as to examine the effect of taking such courses on their future intentions to use inquiry. Findings indicated that participants were generally supportive of an inquiry-based learning strategy as they saw value in the inquiry experience provided from their course. Finally, the study suggested that support should be devoted to encourage the continuation and development of inquiry-based laboratories to better prepare prospective teachers. Furthermore, collaboration between postsecondary science teachers and science educators should be established to promote understanding of inquiry learning.

Throughout the past five decades (1960s–present), the field of science education has witnessed several calls for reforming the whole process of science teaching and learning at schools. More recently in the United States, for example, several documents that aimed at reforming science teaching were produced: *Project 2061: Science for All Americans and Benchmarks for Science Literacy* (American Association for the Advancement of Science [AAAS], 1990, 1993)*; The National Science Education Standards* (National Research Council [NRC], 1996). In Canada, *Common Framework of Science Learning Outcome* (Council of Ministers of Education, Canada, 1997) was produced. The justification for these reforms was based on the nature of science as inquiry and the effects of hands-on/minds-on approaches (Shymansky, Kyle, & Alport, 1983). Similarly, calls were observed in other countries worldwide. Jordan was one of these countries that have taken positive steps towards reforming its process of science education (*Science Curriculum and its Guidelines at the Basic Educational Cycle* [SCGBEC], 1988). According to the SCGBEC, one of the main goals of teaching science in Jordan, as stated by the scientific team at the Ministry of Education, is

In selecting the methods of teaching science, it is essential to emphasize the active role of the student through making him/her the effective element in performing class activities, conducting laboratory experiments, carrying out discussions, exploring knowledge through individualized reading. Meanwhile, the teacher plays the role of a facilitator in providing the appropriate learning environment and the needed stimulating experiences. (p. 26)

One of the reform recommendations included the task of modifying the methods of teaching science. This task falls upon the teachers, who are recognized as the central factor in the successful implementation of the reform. Accordingly, teachers should be acknowledged as facilitators of knowledge, and students are expected to actively participate in learning experiences with their hands and minds and get involved in *inquiry-oriented* investigations (NRC, 1996).

The term *inquiry learning* "refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world" (NRC, 1996, p. 23). Inquiry also "refers to the activities students engage in to develop their knowledge of scientific ideas and to investigate the natural world within their developmental capacities" (Sunal & Sunal, 2003, p. 13). Other researchers went even further to say "inquiry is one of the practices that characterizes science" (Rowell & Ebbers, 2004, p. 916).

Because of the significance of learning through inquiry (or inquiry whose focus is on the creation, testing, and revision of scientific models and explanations) to the creation of new knowledge and to scientific reasoning, one might expect that it would be emphasized from the earliest years of instruction and developed over time, not postponed until high school or beyond (NRC, 2000).

Enacting inquiry-based teaching in schools depends on elementary science teachers, who begin the preparation process of students for a scientific and technological future. A host of researchers have suggested that teachers hold images of teaching from their experiences as students and they tend to teach the way they were taught when they were students (Brown & Borko, 1992; Calderhead & Robson, 1991; NRC,

1996). More research indicates that the likelihood that the way teachers will teach science depends on their undergraduate preparation (Abell & Roth, 1992; Appleton, 1997; Loucks-Horsley, 1998; Wenner, 1993). Evidently, traditional science teaching experiences impact the way in which science is taught, where teachers learn science through the traditional methods in a period called an apprenticeship of observation (Stuart & Thurlow, 2000). As a result, they develop their own teaching beliefs based on their in-class experiences at school, which is strongly tied to their attitudes about teaching science (Bohning & Hale, 1998; Gibson, Bernhard, Kropf, & Van Strat, 2001).

Many researchers emphasize the importance of teachers' beliefs in shaping elementary teachers' tendencies to teach science (Bonnstetter & Yager, 1985; Downing & Filer, 1999; Eiriksson, 1997; Lumpe, Czerniak, & Haney, 1999). These and some other studies recommend that preservice science programs should include revised science courses that (a) combine content and methods (NRC, 1996; Prestt, 1982; Yager & Penick, 1990), (b) provide exposure to a variety of teaching experiences (Lunetta, 1975; Sunal, 1980), (c) foster improvement in preservice teachers' attitudes regarding science teaching (Cox & Carpenter, 1989), and (d) develop informed views of scientific inquiry and the nature of science (Crawford, 2007; Yore, Florence, Pearson, & Weaver, 2006).

Although these studies investigated the influence of an authentic inquiry experience on students' beliefs and attitudes toward using inquiry, they mentioned several limitations (Brown & Melear, 2006). Exploring the factors that inhibit the use of inquiry was one of these limitations. Investigating the use of inquiry at the postsecondary level is another limitation that Brown and Melear mentioned. Therefore, this study came to address these gaps in the literature by investigating the influence of employing an inquiry-based teaching strategy on teaching by two biology courses for preservice elementary teachers at the Hashemite University in Jordan. The purpose of the study was to explore the sort of obstacles that preservice elementary teachers face as a result of learning biology through inquiry. Moreover, this study intended to examine the effect of taking two courses of biology on the students' future intentions to adopt inquiry strategies in their future teaching.

Inquiry-based Biology Courses

The introductory biology courses (I & II) are offered in sequence over two different semesters to preservice elementary teachers in the Faculty of Educational Sciences. These two required courses were originally designed to be taught without a laboratory and using traditional teaching strategies. However, at the time of this study, a new instructor, the first author of this study, joined the faculty and decided to teach these courses using inquiry teaching strategies during the Fall 2006 and Spring 2007 semesters.

The courses involve engaging students in various investigations with minimal guidance from their instructor. Through inquiry-based strategy, students were expected to learn to ask researchable questions on a determined topic, design experiments to find answers for their questions, collect data, and use evidence to formulate knowledge claims and explanations of the science phenomenon that they investigated. It is important to note that students were not forced to follow these specific steps in order.

Each unit of the two courses shared a common format consisting of relevant guided inquiry investigations in consecutive class meetings, followed by an extended whole-class investigation. Guided inquiries are investigations that follow a protocol worked out mutually between learners and the instructor or as prescribed by the instructor to arrive at a particular concept, process skill, or both. Each laboratory session was designed to be a hands-on, minds-on experience through the use of prelaboratory discussion (Clough, 2002), relevant and application-oriented laboratory studies (Rutherford & Ahlgren, 1990), and postlaboratory discussion of findings (Tobin, Tippins, & Gallard, 1994).

Purpose of the Study

The main purpose of this study was to explore the sort of obstacles that preservice elementary teachers face as a result of learning biology through inquiry. Moreover, this study intended to examine the effect of taking such a series of courses on their intentions to implement inquiry strategies in their future teaching. Specifically, we sought to answer the following questions:

1. How do preservice elementary teachers evaluate the inquiry-based approach to science learning?
2. What are the obstacles that inhibit preservice elementary teachers from using inquiry in their teaching?
3. What are these preservice elementary teachers' intentions to utilize the inquiry-based approach in their future teaching of science?

To answer these questions, a qualitative research approach was chosen to guide the overall conduct of this study. This type of research strategy suits the nature of the research problem that demands, as Taylor and Bogdan (1998) stated, an understanding of a social phenomenon from the actor's own perspective and

examining how the world is experienced. Thus, based on this assumption, the researchers relied solely on the qualitative approach, where in-depth interviews and participants' observations represented the main source of data.

Participants

Participants of this study were 11 preservice elementary science teachers, who were selected from three 40-student sections, enrolled in two biology courses during the fall and spring semesters of the academic year 2006/07 in the College of Educational Sciences at the Hashemite University, Jordan. The participants were purposefully chosen based on their positive and negative attitudes after answering a professor's quick question of "To what extent do you like inquiry-based teaching?" (Fraenkel & Wallen, 2003). After answering that question, students were asked to express their willingness to participate in the study. At the end, 11 females, who demonstrated various attitudes (7 with positive attitudes and 4 with negative ones) toward the use of inquiry in teaching science, agreed to participate in this study.

Procedures, Data Sources, and Collection

This study was an interpretive within-case analysis of learning for the 11 case participants described above, relying on qualitative data. The first researcher, who was the course instructor, acted as a participant observer in each class. The elementary sources of data included the researchers' in-depth interviews and classroom observations. The interviews took place in the researchers' offices and each lasted for approximately 30–45 minutes, where each participant was interviewed two times toward the end of each semester. The interview questions were adapted from Tsai (1998), and each interview included three sets of questions (see Appendix). The first set dealt with learning beliefs to determine their views of the techniques of learning science. The second set dealt with their reasoning about inquiry, including their understanding of experiments, and their initial ideas for experimental design. The third set dealt with their intentions to employ inquiry-based learning strategies in their future teaching of science. All interviews were digitally recorded and transcribed verbatim.

Data Analysis

Data collection and data analysis occurred throughout the period of the study. Right after finishing each interview, the interview was transcribed and analyzed in three major stages: open coding, selected emergent themes, and focused coding (Emerson, Fretz, & Shaw, 1995).

In open coding, we read transcripts of data for each participant line-by-line to identify and formulate all ideas, themes, or issues they suggested, no matter how varied and disparate. During this stage, we wrote initial memos reflecting a variety of ideas to begin the preliminary analysis of data. After arranging all data and coding them, we again reviewed the data and attached meaningful notes, defining the core themes and subthemes that emerged from the analysis. In the focused coding, we subjected our data to fine-grained, line-by-line analysis on the basis of topics that we identified as of particular interest from the open-coding analysis. In this stage, we combined the coded data under our selected themes and wrote reflective memos on each theme (Bogdan & Biklen, 1998). In reviewing the interview transcripts, we identified patterns or themes emerging from the data (Glesne, 1999) and organized them into broad categories. We carefully cross-checked the themes that emerged from each subject's transcripts to enable ourselves to link related data from different interviewees. Then we grouped them under one theme and marked them with accompanying interpretive notes.

As in any qualitative study, rigor is a major factor that shapes data analysis. To ensure the rigor of the findings of this study, the researchers followed Patton's (1990) strategy of triangulation. Patton recommended considering multiple data sources to support proposed themes. In this study, both participants' interviews and researchers' observations were considered to be the main sources of data gathering. Member checking was another strategy that the researchers used to ensure the rigor of their findings (Glesne, 1999). To do this, the tentative results of the data analysis were checked by a number of authorized faculty members to ensure that the data were analyzed correctly.

For the purpose of this article, since the language of all collected data was Arabic, all interview excerpts used in the Results section below were translated into English (Sperber, Devellis, & Boehlecke, 1994) by three bilingual faculty members from the Faculty of Educational Sciences at the Hashemite University. Furthermore, to confirm that the translation process was accurate and reflected the meaning that the interviewees intended, each participant was given a draft of the translation, and their feedback was considered in correcting any comments from the participants.

Results and Analysis

The analysis of the collected data revealed three important themes: (a) the merits of learning biology through inquiry, (b) the mismatch between beliefs and

actions, and (c) suggested changes in the course. The following passages discuss these general themes in detail.

Theme One: The Merits of Learning Biology through Inquiry

Most participants mentioned that the inquiry-based biology courses were beneficial. However, their responses were focused on both the value of the course content as well as the way that these courses were taught. Most (7 of 11) participants—who were given pseudonyms (Ala'a, Bayyan, Amal, Reem, Elham, Rawan, Sameera)—favored the content of the course and explained that their topics were connected to their everyday lives. Moreover, they indicated that the content was comprehensive, easy to understand, and a good source of valuable information that helped them in reasoning many natural phenomena that they encountered.

> The material of our course is tightly related to our real life. I greatly benefited from it and used it to explain some of my surrounding phenomena … smoking, for example, was one of the most favored topics that I liked. From that topic I had a good understanding of how the lungs of a smoker person appears and how difficult for him to exchange gases via his alveoli. (Bayyan)

> The content of our course was very easy to comprehend. The topics are organized in such a way to help the student follow up. The content is practical and activity oriented and speaks to our real-life perspectives … I personally made use of it many times in my life. (Amal)

On the other side, the other four participants (Sameera, Bayda'a, Rawan, Areej) disagreed. These participants mentioned that the material was not relevant to their everyday lives and was not interesting to them at all.

> I think that most of our topics are redundant and known by myself at least. (Bayda'a)

> I don't see, at least from my perspective, that the topics we learned can be applied in my everyday life. (Rawan)

> I guess the course added some new information for me, but I think that some of the topics are redundant as we took them during high school. (Sameera)

However, with respect to the way the courses were taught, a large majority (9 of 11) of the participants agreed that the inquiry-based teaching strategy helped them in building a better understanding of the content and the way it can be applied in their life situations.

> My previous knowledge about science learning was really different than what I had experienced throughout the semester. The way we learned this course changed my beliefs about the whole process of science teaching and learning. I believe that inquiry teaching strategy is so helpful and I am planning personally to employ it in my future teaching. (Amal)

> Inquiry-based teaching strategy is the best way to teach science because it compels the students to think and investigate for the sake of arriving to the needed knowledge. Therefore, that knowledge stays in the student's mind longer. (Elham)

> The inquiry-based teaching strategy is so helpful as it encourages the student to search for the knowledge himself. It also increases the self confidence of the student and pushes the student to rely on himself to find the knowledge. (Bayyan)

Theme Two: The Mismatch between Belief and Actions

Although most participants valued the use of the inquiry-based teaching strategy, further analysis of their interview excerpts showed a level of contradiction between what they believe about learning biology through inquiry and their actions about using it in their future teaching of biology. For example, Sameera conveyed a high level of contradiction with regard to the use of an inquiry-based teaching strategy: "I did not like the inquiry-based strategy employed in this course. I, personally, feel more comfortable with the traditional way of learning science." But she believed that trying new strategies of science teaching (e.g., inquiry) is worthy. She said, "It is not wrong to use inquiry-based learning strategies, as learning science mainly depends on experimentation."

Similarly, Bayda'a expressed a high confidence in the traditional way of learning science: "I prefer to learn science using the same old traditional strategies as I believe it will benefit me more." But this personal belief did not prevent her from expressing her conditional support to continue using an inquiry strategy by employing both the traditional and inquiry-based strategies at the same time. She said, "Because, I think that science differs from other disciplines, as it requires understanding more than memorization, I encourage the use of both the traditional and the inquiry-based science learning strategies." Likewise, Areej, who believed that learning biology should be through laboratory activities, she did not believe that

every topic in biology requires the use of the laboratory: "I believe that the use of lab in teaching biology is very important but I don't believe that every topic in biology needs to be learned in the lab."

Theme Three: Suggested Changes in the Course

The preservice elementary teachers who participated in this study provided suggestions for course changes that would make it more meaningful. From their suggestions, four areas to focus on for improvement emerged: (a) the existence of an assigned textbook, (b) a slight increase in the complexity of inquiry activities, (c) more time, and (d) more equipment in the laboratory.

Bayda'a, Areej, Sameera, and Rawan expressed the need to have an assigned textbook for the course. Sameera confirmed that inquiry methods were beneficial; however, she discovered that inquiry was "very difficult to implement because of the need of a written document or textbook." Rawan complained that without a textbook she "feels lost and confused" as she is accustomed to using traditional science learning strategies. Bayda'a also confirmed that "teaching this course would be more beneficial if the professor provided a written textbook for the students." Areej demanded "a written manual of all the activities that the student will learn throughout the semester." Ala'a wanted more time allocated to do the inquiry activities. She appeared to believe that the more time spent inside the laboratory would enhance her learning: "spending more time inside the lab would probably make the biggest difference in our quality of learning.'' Bayyan asked for more equipment in the laboratory: "we need to have more equipment in the lab in order not to bring any additional stuff from our homes."

Discussion

The participants in this study were generally supportive of the use of an inquiry-based learning strategy as they saw value in the research experience provided from their courses. The following section includes two major issues related to the three previously discussed themes. In addressing the first finding regarding the course value, we discuss (a) the experiences in the course and (b) the beliefs and practice to explicate the finding of mismatch between participants' expressed beliefs and their observable actions.

Experience in the Course

Overall, participants in this study expressed appreciation for the course climate in that it provided opportunities to experience similar frustrations to what

their students would possibly encounter in the future. These experiences appeared to be valuable as they were looking to employ progressive teaching strategies in teaching science. Therefore, this experience offered them the opportunity to experience the difficulties of conducting inquiry laboratory activities, which had not been presented to them during their earlier educational preparation. The benefits of experiencing inquiry-based learning for these participants revealed their limited knowledge and exposure to alternative teaching approaches. It was noticeable especially during the early meetings in the course, where most participants began experiments by testing one variable per single sample without considering the other interfering factors.

Another interesting observation of these participants was their preparedness to conduct their experiments using appropriate scientific methodology. Due to their limited experience with open inquiry, some of them expressed disdain in designing and controlling the variables of their experiments. For example, Areej stated, "I truly regret taking this course through inquiry strategies but I honestly found no way but to take it this semester.… I really don't know how to employ the scientific approach in my science learning." A similar complaint was expressed by Rawan:

> I did not like the way I learned this course, although I am open to change, but I prefer the traditional way of learning as I see it easier and I know exactly what to do without going onto the hassle of designing an experiments and controlling the variables.

However, later in the semester, these participants slowly realized that the answers were not going to be given to them directly and that they would have to learn from each other and use the scientific approach to find their answers. Therefore, they had to ask the questions, design the experiments, analyze the results, and then present conclusions. By forging through the awkward and uncomfortable feelings of the experimental unknown during the inquiry-based science course, the participants experienced an authentic inquiry environment. Elham commented on her initial feelings:

> At the beginning of the course I was lost; I did not know what to learn and what to do. But later in the semester, I realized that inquiry approach is a very good way to learn science and especially biology … therefore, I highly encourage other teachers to use it as it helps learners keep their information longer.

The fact that several participants reported that they enjoyed experiencing some reform-based pedagogical

strategies (e.g., inquiry-based learning) further supports the notion that the science education courses had positive effects on learners. Admittedly, the extent to which participants implemented inquiry consistent with the international reform-based science teaching strategies is not addressed by the data collected in this study; but, based on the descriptions of instructional practices provided, it seems likely that the participants claiming success with the use of inquiry were at least moving in the right direction (i.e., less emphasis on traditional approaches and more emphasis on student-centered approaches).

The participants' views on teaching, particularly with respect to reform-based pedagogies, can be interpreted in at least two ways. Rust (1994) suggested that it is not uncommon for prospective science teachers to maintain their idealistic views of teaching. For example, the new teachers often approach their first-year classrooms clinging to two of the most commonly held beliefs about teaching, which are (a) that teaching is not really that difficult and (b) that learning to teach is something that is accomplished in college during preservice teacher education programs (Huling-Austin, 1992; Murphy & Moir, 1994). However, these views typically change as they transition to full-time professionals

This perspective suggests that the participants' focus on inquiry and other student-centered pedagogies will be overwhelmed by the perceived impediments. While some participants certainly did cite several reasons that inquiry did not work with them, most still appeared to believe that it was an ideal approach to teaching science. Loughran (1994) provided a different, slightly more optimistic interpretation:

> The effect of preservice education is not so much 'washed out' as repressed. Among the competing demands and complexities of teaching, the ideals once held in preservice education lose out in the real world of school. There is not so much an attitude shift (they still espouse to the notions of learning encountered in their preservice program), rather an acceptance of what is possible at this point in their careers. (p. 383)

Moreover, Richardson (1994) emphasizes that the careful selection of mentor teachers who model inquiry-based approaches appears critical. He mentions that alternative ways to provide models of inquiry-based environments may include video-based case studies of what this instruction might look like. Furthermore, research into constraints encountered by first year teachers that might deflect a preservice teachers appear necessary for preservice teachers to sustain the gains made in their understanding of how to craft inquiry-based instruction (Gilmer, Hanh, & Spaid, 2002;

Lunsford, Melear, & Hickok, 2005; Schwartz, Lederman, & Crawford, 2000).

Beliefs and Practice

Some participants in this study demonstrated a mismatch between their beliefs and predicted actions with respect to employing inquiry-based teaching strategies. This mismatch was not surprising as these participants had never been exposed to using inquiry-based teaching strategies before. However, that mismatch could mean that their experience with these two inquiry-based courses helped them challenge their traditional beliefs about science teaching.

Research literature has widely shown that preservice teachers hold strong orientations and beliefs about teaching before they come to university. In order to enable prospective teachers to begin teaching model-centered scientific inquiry as opposed to using primarily didactic approaches, and in order to help them develop their skills and practice in this approach, these prior teaching orientations need to be addressed, reflected on, and challenged (Friedrichsen & Dana, 2003; Gess-Newsome, 1999; Hayes, 2002).

Furthermore, prospective elementary teachers need several aspects of pedagogical content knowledge and skills for enacting reform-based science teaching approaches such as model-centered inquiry (Grossman, 1991; Shulman, 1986). They need to understand scientific knowledge and practices including understanding the nature and purpose of inquiry and modeling (Schwarz, Meyer, & Sharma, 2007), which is important for understanding the nature and purpose of reform-oriented pedagogy. Prospective elementary teachers must also have skills for enacting reform-based approaches in their science teaching (Schwarz & Gwekwerere, 2006).

This study hoped to help its participants to develop and refine their pedagogical content knowledge and teaching orientations through exposing them to an inquiry-based biology course. This exposure served as a way to both help remind them of what they needed to include in planning their lessons and to scaffold their beginning skills for inquiry-based science teaching. Indeed, and as indicated in the data of this study, this exposure did work with these participants and was successful in expanding their potential teaching orientation from a didactic orientation to a reform-based one.

Implications

This study tried to fill some of the gaps in the literature of inquiry teaching by focusing on prospective teachers. It mentioned some of the inhibitors that could potentially avert preservice

teachers from using inquiry strategies in their teaching. Furthermore, it suggested some strategies that might help prospective teachers to overcome their challenges. However, it is important to note that considerable changes in preservice elementary teachers' pedagogical skills and orientations are often extremely difficult to foster but success in these areas is critical for reform-oriented science teaching. Therefore, tools and methods that encourage such change deserve our attention in preservice science courses for potential elementary teachers, in teacher education programs, and in professional development projects. The changes represent a relatively high level of adoption by participants in this study of reform-based teaching strategies. These transformations, while substantial within these courses, would undoubtedly change over time with the constraints and realities of schools (Bright & Yore, 2002). Nonetheless, we believe that the success of our science content and methods courses offers some intriguing and possibly fruitful use of such tools for other science methods courses.

Therefore, this study suggests that meaningful support should be devoted to encourage the continuation and development of inquiry-based laboratories in the science foundation component of teacher education programs. All participants left the laboratory with a better understanding of the processes and purpose of experiments in science. Initially, most participants were at least mildly interested in the laboratory, as indicated in their interviews where they expressed their preference to learning science through inquiry.

Another important suggestion is that instruction in reform-based strategies may be beneficial to preservice elementary teachers. This could take the form of teaching the thinking strategies of scientists, including forming alternative explanations, active questioning, and constructing new explanations. Collaboration between postsecondary science teachers and science education specialists could promote understanding of meaningful learning in science courses.

At the end, it seems important to carry out a follow-up study on the elementary teachers who participated in this course to find out whether they employ the inquiry-based approach in their classroom. Another important future research idea is conducting a training session to promote and enhance the inquiry-based approach to science teaching among both preservice elementary teachers and inservice teachers.

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Appendix

Part I: Learning Beliefs.

1. Describe a classroom situation where you felt you were really learning a subject well.
2. What do you think are your responsibilities as a student?
3. If you are studying a certain topic, like photosynthesis, how do you know when you really know the information?
4. Do you ever try to use science concepts in everyday life?
5. What motivates you to learn in science classes?
6. What was the science topic you found most difficult to learn and why? What did you do to learn that topic?
7. In your opinion, what is a good science teacher like?

Part II: Scientific Epistemologies.

1. What sets science apart from other disciplines, like literature or art?
2. Where do you think scientists get their ideas for what they want to research?
3. In astronomy, some scientists think the universe is expanding, some think it is contracting and others believe it is in a static state. How can these different conclusions be possible if these scientists are all looking at the same types of data?
4. Once scientists come up with an explanation or a theory, does it ever change? Why?
5. Please define scientific inquiry, based on what you already know.

Part III. Reasoning about Experiments.

1. In your opinion, is the following an experiment? Why?

Astronomer making predictions and then observing medical student dissecting a cadaver neurologist testing the effects of the concentration of a drug biology student making predictions and then observing a mini ecosystem field biologist covering one section of the meadow to investigate effects of light

2. Imagine a scenario in which fertilizer from a soccer field runs off into a nearby lake.
   - Will the fertilizer influx change the ecosystem in your opinion? Why do you think so?
   - What kinds of tests could you do to see if fertilizer changes the ecosystem?
   - Describe any other experiments you would do or data you would collect to see if fertilizer affects the ecosystem.

The RAP: A Recreational Activities Project, Academic Service-Learning Course and Qualitative Research Study

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The author (a university instructor) and her community partner (a public school teacher) have collaborated in teaching an academic service-learning course in special education. This collaboration, the RAP (recreational activities project), was completed by university undergraduate students and young adults with cognitive impairment and/or developmental disabilities. The author discusses the results of this six year project, and implications for both university students in teacher training programs and young adults with disabilities. This article analyzes the quality of social relationships of young adults with and without disabilities and discusses the benefits of a union between qualitative research methods and academic service-learning.

Parents and people with disabilities assert that young adults with disabilities frequently experience feelings of loneliness and isolation (Fain, 1986; Kleinert, Miracle & Sheppard-Jones, 2007; Modell & Valdez, 2002; Smith, 1999). In the past, individuals with cognitive impairment or developmental disabilities have not been included in community recreation and leisure activities to the same extent as individuals without disabilities have. There are many possible reasons cited for this omission including people with disabilities being overlooked (Bedini & McCann, 1992); professionals not understanding leisure activities (Fain, 1986); people with disabilities having no perceived freedom to chose their leisure activities (Lanagan & Dattilo, 1989); and those activities that are offered are planned, rather than spontaneous, when people with disabilities are included (Wilhite, Devine, & Goldenberg, 1999). It is also agreed that teachers can appreciably affect the quality of recreation/leisure skills of their students (Modell & Valdez, 2002; Strand & Kreiner, 2005).

This article presents a method of teaching (Academic Service-Learning AS-L) which allows the user to combine needed, integrated recreation and leisure for adults with disabilities and a way of monitoring the activities through qualitative research methods.

Review of Literature

Participation in community activities of people with disabilities is significantly less than that of people without disabilities (Hoge & Dattilo, 1995), and for people with cognitive impairment/developmental disabilities, less than for people with other types of disabilities (Wagner, Caldwallader, Garza, & Cameto, 2004). This social isolation has been a continuing problem for people with disabilities and their families. These patterns of leisure activity have been reported for school-age youth (Kleinert et al., 2007), adults with disabilities (Hamilton & Anderson, 1983) and particularly, adults with cognitive impairment(Crapps, Langone, & Swaim, 1985; Green & Schleien, 1991). Previous reports on the community involvement of people with disabilities have been discouraging. According to Wagner et al. (2004), one in ten youth were reported to never see friends, and fully one quarter of youth with cognitive impairment were found not to have received a social invitation from a friend during the previous year. Hoge and Dattilo (1995) reported on the patterns of adults with cognitive impairment and found significantly less participation in social activities by adults with cognitive impairment than those without disabilities. When individuals with cognitive impairment do participate in leisure activities, they participate in more passive leisure pursuits, such as watching television or listening to music in their homes (Fain, 1986).

Barriers to Participation

One potential barrier to participation in leisure and recreation activities reported by Wilhite and colleagues (1999) is that of a lack of spontaneity. Most activities are planned for in advance, and/or, usually, offered through formal recreational programs. This indicates persons with disabilities do not have the choice to engage in community services on a par with persons without disabilities due to merely not being asked by anyone. Centro, Schleien, and Hunter (1983) agreed that participation in leisure community activities should be based on the same preferences and decision making for people with disabilities as for people without disabilities. The principles of normalization (Ittenbach, Abery, Larson, Prouty, & Spiegel, 1991), least restrictive environment (Hoge & Dattilo, 1995), incorporated into the Americans with Disabilities Act (Bedini & McCann, 1992) have been cited as blueprints

for implementation of recreational activities for people with disabilities. Bedini and McCann (1992) suggested further that a barrier of omission, whether intentional or not, constitute an obstacle to participation equivalent to any physical barriers. Perrin (1992) also described a major barrier to community participation as being a feeling of persons with disabilities of not being welcome. The idea of social inclusion was analyzed by Abery (2003) and seen as a desirable outcome that is too often not realized for persons with disabilities. This article describes a process for including adults with cognitive impairment/developmental disabilities naturally into the mainstream of community recreation and leisure.

Ittenbach, Abery, Larson, Spiegel, and Prouty (1991) proposed three barriers to recreational/leisure integration faced by individuals with cognitive impairment (as cited in Beirne-Smith, Ittenbach, & Patton, 2002). First, is the lack of someone with whom to do the activity. Lack of companions with whom to socialize could be the lack of spontaneity referred to by Whilte and her colleagues in 1999. Second, is the lack of guidelines available for including this population in recreational programs. Third, is a lack of skills or knowledge of an activity on the part of the individual with cognitive impairment. Other proposed barriers include few opportunities for socialization available to people with disabilities (Crapps et al., 1985) and a lack of feeling welcome to participate in community activities (Perrin, 1992). This study attempts to fill the gap these barriers leave. The purpose of this study has been to increase community presence, and thus social inclusion, of adults with disabilities in their communities.

Method

Participants

The participants in this study have been university undergraduate students in the author's introductory class in cognitive impairment, her community partner's young adult students with developmental disabilities, and individuals with disabilities from local communities who have, or whose families have, requested inclusion in the project. The number of university students has ranged from 30 to 60 each semester, and has been on-going for six years. The students in the community partner's class have numbered 14 to 17 at one time over the years. As the project has gained publicity and more widespread attention, other classes for young adults with disabilities, as well as individuals residing in the community, have been added to the RAP. The current participation in the RAP has grown to include two sections of university students per semester, three

classes from area school districts, and approximately 20 individually recruited community members. Individually recruited participants are those people or their family members who have requested participation in the RAP. The class of young adults with disabilities has remained stable over the years because the students in that class remain there for up to seven years. The ages of the young adults with disabilities ranges from 18 – 26 years. The ages of the university students is comparable for the most part, with only about one percent of them being older, non-traditional university students, having ages from 26 -50 years. The university students are urged to partner with same-age peers with disabilities, however some students may choose to get to know a neighbor better, or pursue a closer relationship with an extended family member.

Academic Service-Learning (AS-L)

Although the project was first begun in order to fulfill a social need for young people with disabilities, it metamorphosed into a teaching method for the university students, as well. The teaching method, academic service-learning, is based on the philosophy of "learning by doing," first put forth by John Dewey (Giles & Eyler, 1994). Rather than participate only in classroom learning, students are expected to participate in some aspect of community living as well. Since the university students participating are all pre-service teachers of students with developmental disabilities, it made sense to engage them in activities with the population with which they would one day be working.

Academic service-learning is uniquely suited to a qualitative study due to the methods used by each. These techniques, academic service-learning and qualitative research methods, share several qualities that make it natural to put them together. Both academic service-learning and qualitative research have evolved into being bigger over time than at the onset. Instead of the instructor/investigator controlling the parameters of the project, the parameters were set by the students/participants. For instance, many students had formed ideas of whom they wanted for a RAP partner that the investigator had not considered. Some students envisioned the RAP as a venue for including family members with disabilities who had previously been excluded from family functions. For these students and their families, the RAP had a more long-lasting effect than the investigator could have predicted. The project grew beyond what the author and community partner first imagined it would be. This is evidenced by the university students' varied reactions to the RAP, from establishing new relationships in their communities to bringing family members with disabilities into the mainstream of activities. In the end, it was the students and their partners who determined

the nature of the RAP, not the investigator. It was also not anticipated that community members with disabilities and their families would request participation in the RAP. The participants, both university students and young adults with disabilities, have determined the course the RAP has taken.

Both academic service-learning and qualitative studies rely on participant feedback for validation of the investigation/course requirement. As an academic services-learning component, the RAP is a course requirement. The university students are required to spend at least 20 hours over 10 visits during the semester socializing with their partners. All students are then required to write journal entries about their experiences that relate to course content being studied. The students are given suggestions of activities to do, but then allowed to do whatever they and their partners decide. During the semester, the instructor guides the class discussion to frequently include RAP experiences, and students are encouraged to discuss and compare their experiences with their classmates. There are class assignments based on the RAP, and in-class member checks and focus groups are periodically established. In fact, everything done in class to explain the RAP is also used as validation for a qualitative research study.

Finally, the RAP is an example of participatory research (Glesne, 2006), as well as an academic service-learning taught course. The RAP is aimed at changing neighborhoods' acceptance of people with disabilities. All participants were also researchers in the joint endeavor of bringing about social change. Each time any RAP partners went out together, they were advocating for the visible acceptance of people with disabilities within their communities. The instructor and principle investigator took on the role of facilitator of the project. Table 1 directs the reader in the development of an AS-L model. Readers are invited and encouraged to duplicate the project because duplication will lead to further inclusion of all people with disabilities in social settings, as well as be of benefit to university students.

Procedure

Methods employed in this study were used to establish trustworthiness, credibility, and dependability (Lincoln & Guba, 1985). The first techniques to be employed were used in order to establish credibility. Because this study was over the duration of six years, and is still on-going, the prolonged engagement lends itself to repeated themes by the students of various semesters. These themes were expressed in student journals, in-class focus groups, and member checks. Along with these repeating themes, the students expressed similar experiences and concerns in their pre and post-meeting questionnaires over the years. Those

themes encountered most often were thought of as carrying the most value to the participants, and examples of each are given. The same information was uncovered by different means, thus adding credibility by triangulating the sources used. Much of the data overlapped in participant responses, through class discussions, journals, and questionnaires. Both in-class and out of class focus groups were used in the manner of Heyne, McAvoy, & Schleien (1994) for problem solving issues as they arose. In class, the instructors put students into small groups for the purpose of discussing and comparing their RAP experiences. All participants were given ample opportunities to tell us what they thought about the process, whether they enjoyed the RAP, whether they wanted to participate in it again, and why. Both the author and community partner monitored participation of his/her students, giving help and clarification as needed. Out-of-class focus groups were assembled as new issues were uncovered. For instance, at one point in the project, young adults, their parents and teachers were assembled and asked if the RAP benefits outweighed possible adversities. This focus group was established on an ad hoc basis, but remained in effect for two of the six years.

Both pre- and post-journal questionnaires were kept. These are included in the appendix. The pre journal questionnaire is given to the students prior to their meeting their partners in order to focus student thinking about the project. Students are encouraged to keep these questionnaires for comparison with their journal entries and post questionnaire. The post RAP questionnaire is more detailed, intending for the students to reflect upon their experiences and describe those experiences to each other. Questions are open-ended in order to elicit the true observations of the students. Students are asked by their instructor if their materials can be kept and used for research purposes. Only those who agree hand back their materials for photocopying to the instructor. Table 2 summarizes the methods used in implementing the RAP. Care needs to be taken in preserving the integrity of the project, the clarity of purpose, and the intentions of all participants.

Results

Feedback from the university students was divided into five possible categories: (a) Friendship, (b) Hesitancy, (c) Discovery, (d) Frustration, and (e) Course Assignment. Within these categories, various themes developed. Most of these themes were the same year after year, as each new group of students experienced the RAP. For instance, under the category of friendship, there were some students year after year who found they were building new friendships with their RAP partners. These themes are discussed within the category each was mentioned most often.

Table 1
Establishing an AS-L University Course

Steps	Activities
1. Proximity	House class for young adults with disabilities on a university/college campus
2. Collaboration	Instructors of both classes work together to develop the service to be provided by the university students
3. Joint activities	Offer joint activities for the class members, such as getting together for coffee at the student union
4. Course requirements service to be offered	Determine exact requirements/components of the
5. Project parameters	Include in the university syllabus all components of the project

Table 2
Validation of the RAP

Criterion	Technique Employed
Credibility	triangulation (for information gathered, ie, journals, questionnaires, member checks)
Transferability & Dependability	prolonged engagement, large sample size
Trustworthiness	in and out of class focus groups

Representative quotes from some of the students have been included in each category.

1. Friendship: "Building a true friendship was the best part of this project."

The first category is reflected by student expressions of friendship or a close relationship developing. The theme most often recurring was that of friendship. Many university students wrote that they had found a new friend. "I made a great new friend and learned a lot from the experience. I will continue to spend time with my RAP partner." Some students wrote that they wanted to share their experiences with others. "I just hope that he has had the same great experience that I have had. I wish more people could see how much people with cognitive impairments have to offer."
When asked what they had learned that surprised them, many students said they were surprised to find a new friend. As one student wrote, "I really enjoyed the RAP assignment. I enjoyed getting to know my RAP friend and plan on continuing our friendship." The adults without disabilities looked forward to the possibility of making a new friend.

2. Hesitancy: "using people for a grade"

The second category is comprised of students who were hesitant to complete the project because they believed it was unfair to the individuals with disabilities. Some students said they did not want to do the RAP and felt it was "using people for a grade." These people worried that their partners would not benefit from the experience, but possibly be emotionally upset by it. This position was demonstrated by comments such as, "I'm afraid my RAP partner will not understand why I am seeing him every week for ten weeks and then will suddenly stop when the semester ends." Along the same thought, one year a mother of one young adult complained that her son was very disappointed that his RAP partner did not call anymore. When asked why she allowed her son to participate, she said that he was an adult and he wanted to. Although some people felt young adults with disabilities were "being used for a grade," the young adults themselves were eager for the experience. The community partner, himself a dedicated advocate of the young people he taught, expressed the idea that young people are entitled to experience all of life's experiences, good and bad.

Another young man who was repeatedly stood up by his partner (whose journals were fabricated) was asked if he wanted to participate in the RAP anymore and answered, "Yes," and asked who his next semester's partner would be.

This partnership did bring up the possibility of fraud and the emotional damage that could be done to participants. A group of parents, teachers, and young people was assembled to discuss this issue. The young people insisted they wanted to participate in the RAP and that having someone to do things with was better than not being able to go anywhere at all. As the community partner had earlier expressed, it was not doing the young people a favor to shelter them from adverse experiences, and that, quite the contrary, the young people needed to experience negative situations in order to learn how to handle things that happened to them in the future.

3. Discovery: "I never knew that I would develop such a new respect for people with disabilities."

The third category is comprised of student comments of discovering different things about their partners. This group had many reservations about the RAP, but came away with positive comments about their experiences, and their partners. Some typical comments from this group were reflected by their answers to questions included in post- RAP questionnaires. To the question, "What happened that you least expected?", one student reported, "I did not think I would get as close to my RAP partner as I did. When we spent time together, it was very enjoyable." Some people expressed the idea that they not only got to know adults with cognitive impairment, but had also increased their comfort levels with associating with them. "I knew that it would be awkward in the beginning when we first met, but I didn't expect to become as comfortable as I did," one participant said of her RAP experience. The university students also commented on being pleasantly surprised that their partners were not so different from them. As one student said, "I really didn't expect my RAP partner to have so much in common with me." Expressing the same sense of surprise, another commented, "I never anticipated meeting a new friend." When asked what one thing was memorable about the RAP, a representative response from this group was, "The amount of comfort and knowledge I have gained from this interactive experience."

4. Frustration: "He didn't even know he was being rude."

These students expressed the theme of being frustrated at certain aspects of their experiences. These students looked forward to completing the RAP, but did not have good experiences for different reasons. Some factors that contributed to student disappointment with the RAP over the years include (a) physical exertions, such as, pushing a heavy wheelchair uphill, (b) emotional disappointments, such as not sharing interests or preferred activities, and (c) intellectual realizations, such as a realization of a lack of social skills or exhibition of rude or self-centered behavior from their partners. Comments representative of this group were, "We just didn't have anything in common, so I know we won't stay close." Students expressed their frustrations with their RAP partners' lack of social skills or social awareness as reflected in comments such as, "I wanted to apologize for the way he acted," and "I was so embarrassed, but she didn't even notice." Many students in this group commented on outside factors over which they had no control, such as the way parents interacted with their adult children. Some complaints were that parents were overprotective, not allowing students to go out in the community, or always accompanied the partners on their outings. Some students noticed their partners' personalities changed when around their parents as opposed to peers and felt they didn't have as rich an experience because of that.

5.Course assignment: "Projects such as the RAP bring light into the communities…"

There were two major themes that emerged from the students in this category. The category is composed of comments that reflect the nature of the course assignment. One theme is best described as neutral. The students didn't see any benefit or detriment involved with the RAP. As one student said, "It was an assignment. I did it, and made the grade."

Many students in this category, though, did express the idea that they benefited from the RAP experience. "I was really able to get a sense of the importance of making people more aware and knowledgeable of individuals with disabilities." "I cannot even stress the amount of knowledge that I have acquired because of the field experience in this course. I do know that I will be a better educator in the future because of my experiences, though." Many students commented that they learned more about the individuals they someday want to teach, individuals with cognitive impairment (CI): "I liked that I had to find new ways of dealing with different situations and I had a first hand look at the life of an adult with CI." This comment was typical of many responses from students who felt better prepared to be teachers. "I learned so much about myself, as well as adults with CI."

Discussion

One interesting aspect of this project was that every student interpreted the RAP in his/her own way. As with any course, each student seemed to get out of it as much as he/she put into it, or expected to learn from it. The evolution of the RAP over the years has given a unique perspective to relationships between young adults with and without disabilities. A similar project (Families and Communities Together Coalition – FACT, 2001) was previously completed in Kalamazoo, Michigan. This project was a collaboration of faculty at Michigan State University and city officials in Kalamazoo with the purpose of bringing together youth with and without disabilities to participate in recreational programs. Though the project has ended, developers reported that many former participants continue including each other in recreational activities. The wish to continue including others in recreational activities was present in the current study as well.

Other studies done with university students as participants were done prior to the RAP (Green, Schleien, Mactavish, & Benepe, 1995; Hamilton & Anderson, 1983). As with the Green et al. study (1995), university undergraduate students were paired with same-age young adults with cognitive impairment/ developmental disabilities. In both cases, the students were to meet socially as equals for a specified number of weeks during the school semester. In both cases, the university students were fulfilling a course requirement. In both cases, it was found that both university students and young adults with disabilities wanted to establish friendly relationships. As reported by the Green et al. study (1995), most university students approached relationships with adults with mental retardation with "cautious optimism."

The study by Hamilton and Anderson (1983) also used undergraduate students as participants, but the students were grouped with individuals with physical disabilities. Although individual demands may have been different based on specific disabilities, the premise is the same though: attitudes toward people with disabilities can be changed through joint participation in recreational activities.

There are major differences among the RAP and previous studies. In both prior studies, the university students were enrolled in recreation courses, not in a special education teacher training program. This is one major difference in this study and that done by Green et al. (1995): the participants in the current study are students in special education studying to become teachers of students with mental retardation. Because of this, the special education students may have been initially more open to establishing friendship relationships with their partners and perceived friendships more readily than the students in the Green

et al. study; however no studies were found using special education students as participants. Green & Schleien (1991) did notice that staff who worked with individuals with disabilities tended to accept individuals regardless of social skills deficits. This phenomenon may also have been affecting the students in the RAP, since they expected to someday teach individuals with similar characteristics.

Some of the students in the RAP had prior experience with individuals (either adults or children) who have cognitive impairment or developmental disabilities. In fact, it may be possible that they had more experience than the students of the previous studies. However, prior experience with adults was not usually the case, and some students commented that they had never had any experience with an adult who has a cognitive impairment/ developmental disability. Prior to taking this introductory course in cognitive impairment, the students are expected to have taken at least one other course in special education, and possibly more. Due to their special education backgrounds, the students in the RAP may have demonstrated a heightened awareness of the issues facing adults with disabilities, and so were possibly more prepared in what to expect than the recreation students. During the present course, as well, issues facing adults with cognitive impairment are frequently discussed and referenced to the RAP. As an AS-L course, the service component (the RAP) is closely aligned with course content, so students are continually hearing the RAP being compared to theory and issues in cognitive impairment.

Another major difference between the RAP and previous studies is the large sample size. A major strength of the current study is length of time it has been in operation. As a matter of fact, it is still on-going, with no plans to end it in sight. Although exact numbers are not available due to students not completing the course or the project, numbers of class sizes are available, and attrition of participants was minimal. For the first four years of the project, 60 students per year were enrolled in the course. For the last two years, more sections were offered, so the count was 100 students per year. If everyone enrolled had completed the project, approximately 440 participants would have gone through the RAP. As it was, based on grades given, 420 persons completed the RAP over the past six years. Given this large a sample size, and the prolonged nature of the project, the investigator can be more confident that the results obtained are truly representative of undergraduate university students who are completing a teacher preparation program in special education and the type of relationships they tend to establish with adults who have cognitive impairment/developmental disabilities.

Limitations

There are several limitations to the RAP study that need clarification. The first one is the lack of a specific number of participants in the project. Due to the nature and popularity of the RAP, it was impossible to keep exact numbers of participants. Frequently, participants included their friends or family in RAP outings, and this was encouraged. Since the whole idea of the RAP is to encourage normalized relationships among people with and without disabilities, it wasn't even desirable to keep count of the numbers of participants. In this way, the RAP could not be duplicated exactly.

Although not necessarily a limitation, but worth mentioning, is the possibility of investigator bias. Since the investigator and instructor are the same person, it is inevitable that the way the investigator envisioned the RAP would influence the classroom proceedings (Glesne, 2006).

Another limitation involves the sample used in the RAP. The university student participants are completing the RAP for a grade; it is a course requirement. For this reason, the level of commitment by the students to the underlying principles of the RAP is unknown. It is also unknown how the students chose to complete the project. Students may have chosen to not go out in the community, or were prevented from doing so for a variety of reasons. There is a possibility of fraud, students fabricating journals, and not doing what was reported to have been done. These limitations need to be weighed carefully against the possible benefits of the RAP.

Directions for Future Research

The RAP needs to be instigated in many more communities before the visible integration of people with disabilities is commonplace. A university campus is an ideal place to begin. University students who are training to be teachers are perfect candidates to integrate people with disabilities into the mainstream, and sharing recreational and leisure activities is fun. It is possible that students would meet someone who has a disability and go out socially with that person, but the RAP makes the possibility a certainty. Students in special education are learning about advocacy of people with disabilities. Through AS-L projects like the RAP, students can practice that advocacy, and become better future teachers. The combination of academic service-learning and qualitative research allows instructors and their students to make a positive and lasting contribution to the social lives of individuals with disabilities.

This study added to the growing body of literature expressing the recreational/leisure needs of young adults with disabilities. At the same time, this study explored the utility of employing academic service-learning as a teaching method and employing qualitative research. There have been both benefits and drawbacks to everyone involved. The RAP has been continued in the belief that the benefits outweigh the disadvantages. By continuing to send university students into the communities where they live with same-age peers with disabilities, we are heightening community awareness of people with disabilities, increasing their visibility in society, and teaching university students to advocate for individuals with disabilities.

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Appendix

Pre-journal Questionnaire

1. What are your concerns about the RAP?
2. What are your interests in the RAP?
3. What are your expectations of the RAP?
4.

Post-journal Questionnaire

After being assigned to your group, appoint one recorder to write the answers to these questions. Spend approximately four minutes per question comparing each group member's experiences. Appoint one spokesperson to discuss the results with the entire class.

1. What have you learned from this project?
2. What happened that surprised you?
3. What happened that you most expected?
4. What happened that you least expected?
5. What made you feel the most uncomfortable?
6. How do you think #4 should be dealt with?
7. What did you like best about this project?
8. What did you like least about this project?
9. What was most memorable for you about the RAP?
10. What changes would you recommend for this project?

Communities of Practice and Students' Professional Development

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The application of Communities of Practice (CofP) can potentially serve as an effective learning strategy for higher education classrooms by contributing to student professional development while fostering a desire for life-long learning. The purpose of this qualitative study was to assess the effectiveness of this learning strategy and help educators understand how integrating CofP experience in the higher education classroom can help students become more engaged in lifelong learning. Students involved in CofP during two different graduate courses provided their reflections on this learning strategy through their papers and journals. Findings indicated that, despite the often individualistic nature and constrained graduate course environment, participants felt that the use of CofP was beneficial for enhancing relationship skills and acquiring knowledge about topics of interest quickly and effectively.

"What type of career can I have if I get this degree?" This is the primary question of students in higher education today. It is an important question because the era of cradle to grave employment is gone. Therefore, it is valuable to give students strategies for seeking lifelong learning opportunities. The challenge of higher education in the 21st century is to provide academic rigor while fostering students' professional development in the workplace (Attle & Baker, 2007). The use of Communities of Practice (CofP) as a learning strategy in higher education can be an effective means of contributing to students' professional development while fostering the desire for lifelong learning. During their professional careers, students will need to engage in learning outside the formal classroom setting, especially in the context of their professional lives. CofP can prepare them for their careers because they "create value by connecting the personal development and professional identity of employees to the strategy of the organization" (Wenger, McDermott, & Snyder, 2002, p. 17).

CofP are composed of individuals connected by a common passion or problem. As a community, they explore ways to build expertise about their common interests. CofP are currently used in the corporate world to enhance professional development of employees (Wenger et al., 2002), as an alternative method for corporate training models (Choi, 2006), in the field of health care (Conner, 2005), as well as in education (Wenger, 1998). "Interest in communities of practice (CofP), which is a community that shares and creates real knowledge is increasing" (Choi, 2006, p. 143). However, the impact of using CofP as a learning strategy for students in higher education has not received much attention in the literature.

The principal researcher developed a learning strategy incorporating CofP in graduate classes, as a tool to enhance students' professional development. To address the gap in the literature, this research assessed the effectiveness of this strategy from the learners'

point of view in a higher education context. The following questions guided this study:

1. How did the learners' experiences of CofP in a graduate level class affect their learning and professional development?
2. How does this experience of CofP compare to other types of collaborative learning?

This study contributes to the knowledge base by examining the learner's experience of this strategy as both an activity and learning opportunity. Finally, it provides an assessment of the potential effect on the way learners engage in learning and professional development in higher education.

Literature Review

This section discusses the relevant literature as background to this study about CofP. It reviews definitions of lifelong learning and professional development, explores the literature on self-directed learning and collaborative learning in general, and delineates the aims of CofP.

Some common threads run through this literature. The first is the theory of situated learning (Lave, 1993; Lave & Wenger, 1991). Situated learning's core idea is that learning is, by its nature, a social activity. Used as a framework for creating learning, it stresses the intersection of the learners, tools, activities, and the social context of the learning situation (Hansman, 2001). The second thread, the constructivist paradigm, is also instrumental. In this paradigm, "Learning is an active process of *constructing* a system of meanings and then using these to *construe* or interpret events, ideas or circumstances… [emphasizing self-direction as] the combined characteristics of active inquiry, independence, and individuality in a learning task" (Candy, 1991, p 278, emphasis in original). Constructivism stresses how shared meanings are

created among learners as they construct knowledge on individual and collaborative levels, within socio-cultural contexts using meaningful activities (Hung, Tan, & Koh, 2006).

Both situated learning and constructivism generate recognition of the need for authentic activity and assessment, involving actual situations rather then simulated ones (Wilson, 1993). One example of authentic activities and assessment would be apprenticeship education (Lave, 1993). McLellan (1994) suggests that "context can be the actual work setting, a highly realistic or 'virtual' surrogate of the actual work environment, or an anchoring context such as a video or multimedia program" (p. 8). Situated learning design elements anchored in the constructivist paradigm provide authentic contexts stressing the use of knowledge in real life. They include activities that support collaboration while using authentic assessment relating the learning to the real-world tasks (Herrington & Oliver, 2000).

The effectiveness of the CofP approach is rooted in the authenticity of the context (Innes, 2006) where the transferability of skills across multiple subject areas is a key characteristic of authentic activity (Jonassen, 1991). "When learning is embedded in authentic contexts, student can connect their own experiences within the learning environment to their previous experience and their future experience working in organizations" (Innes, 2006, p. 752).

Professional Development and Lifelong Learning

"Effectiveness as a professional is based on applying a body of knowledge [and] it is critical that professionals keep current with the latest ideas and techniques in their fields" (DeSimone, Werner, & Harris, 2002, p. 351). Professional development can include formal education in a higher education context, continuing education, and engagement in professional associations and conferences. Many students return to school to maintain their professional skills in an ever-changing economic environment. Therefore, it is critical for higher education institutions to help students engage in professional development while they acquire academic knowledge. Barab and Duffy (2000), citing Senge (1994), point out the need to create "practice fields in which students in schools engage in the kinds of problems and practices that they will encounter outside of schools" (p. 126). Kohl (2000) reported, in the first decade of the 21st century, estimates are that "one third of all jobs [in the US] are in flux each year, meaning that they have recently been created or soon will be eliminated from the economy" (p. 13). Scholars report that professional development is a primary concern for students at both the undergraduate and graduate levels (Busacca & Wester, 2006; Jackling, DeLange, & On, 2007).

The knowledge base in many fields is changing rapidly. Those who consciously strive to engage in lifelong learning will obtain the most success in their careers (Olesia & Simona, 2006). Chalmers and Keown (2006) argue that lifelong learning includes more than technical skills training. They suggest, along with Bell and Gilbert (1996), that lifelong learning involves professional, personal, and social development (Chalmers & Keown, 2006). In 1980, the ERIC database added the term lifelong education to the Thesaurus defining it as the "process by which individuals consciously acquire formal or informal education throughout their life spans for personal development or career advancement" (Chalmers & Keown, 2006, p. 140).

Self-Directed Learning

Professional development requires employees to use self-directed learning skills. Merriam (2001), citing Tough's (1967, 1971) research in this area, notes that self-directed learning is "widespread…occurs as part of adult's everyday life… [and] is systematic yet does not depend on an instructor or a classroom" (p. 8). The literature provides a rich discussion about the definition of self-directed learning. Tough (1979) and Knowles (1975) viewed it as learner driven within a "context of the systematic process of designing such activities" (Merriam & Brockett, 2007, p. 138). The PRO model developed by Brockett and Hiemstra (1991) draws attention to the individual's internal characteristics that "predispose one toward taking primary responsibility for the learning" (p. 29). Finally, Candy (1991) divided self-direction into two domains: learner centered, where the learner has primary control of the learning with some teacher control and "autodidaxy, in which no teacher is present and the learner may not even be conscious that he or she is learning" (as cited in Merriam and Brockett, 2007, p. 139).

Regardless of the focus of the definitions, self-directed learning is an important skill for lifelong learners. Educators and administrators in institutions of adult and higher education need to consider "the potential exponential effect of self-directed learning" (Black & Henig, 2005, p. 26). CofP can contribute to adults' abilities to be self-directed while providing a synergistic method for acquiring and applying knowledge. However, before proceeding to a discussion of the concepts of CofP, we will focus on collaborative learning as another means of helping learners acquire knowledge.

Collaborative Learning

Organizations value the skills of employees who are able to work effectively as part of a project or team. Employers are even more interested in employees who contribute to the creation of a learning organization to help them maintain their competitiveness (Senge, 1990). To prepare students to engage in successful careers, many institutions in both graduate and undergraduate classrooms are using group projects, team-building exercises, and other community learning models. Educators recognize and value the enhanced learning that occurs with the use of these types of strategies.

There are many forms of collaborative learning in use in the educational arena. One form is a group project to complete a pre-determined assignment. In this instance, the educator establishes parameters; learners divide the work and then assemble the parts for the finished project. A second form might be a team-building exercise. Here, the purpose is not to complete a project, but to build a spirit of trust and cooperation among the team members. An example of this type of experience would be Ropes Courses. "Ropes Challenge Courses are often used in conjunction with other forms of training or education, such as in physical education, in orientation programs, and for staff development" (Neill, 2006, ¶6). Team building in the organization or classrooms is similar to team building in sports. Individuals may be talented, however, people need "to learn how to pool their individual abilities and energies to maximize the team's performance" (Forsyth, 2006, p. 161).

Collaborative inquiry is a third form. "Collaborative inquiry is a systematic process consisting of repeated episodes of reflection and action through which a group of peers strives to answer a question of importance to them" (Bray, Lee, Smith, & Yorks, 2000, p. 6). These inquiries could occur in many settings, from formal education to one organized by the learners, perhaps for professional development. The focus on collaborative learning in higher education has become a dominant paradigm both in the literature on on-line learning and in group work with students in face-to-face situations.

Communities of Practice

A learning strategy that advances beyond these concepts of group projects, discussion, and teambuilding is CofP. This strategy provides forums that meet learning needs as they arise. Given the need for institutions to prepare learners for careers, professional development and tools to engage in lifelong learning, this strategy can be a powerful tool for educators and administrators at all levels.

The basis of this strategy is the formation of communities who create knowledge for the community members, as well as managing this knowledge for others outside of the community (Wenger et al., 2002). Lave & Wenger (1991) introduced the concept of CofP as learning that occurs in real-life, real-time contexts. Organizations striving to be learning organizations are developing and applying this concept (Marsick, Bitterman, & Van der Veen, 2000). CofP shift the focus from individual acquisition of practical skills and knowledge to the development of one's identity as part of a profession (Lave, 1993). The identity work is a motivating force, "shaping and giving meaning" to the professional development activities (Lave, 1993, p. 65). Increasingly technology can function to fulfill the professional's need for fact-based information; however, professional development is about becoming a reflective practitioner (Schön, 1995). CofP can aid in this development.

Within higher education, "the term 'learning community' describes a learning event with fixed time limits and existing for a more or less specific purpose" (Pedler, 1994). The design brings together peers to meet personal learning needs, primarily through a sharing of resources and skills offered by those in the community (Rigg & Trehan, 1999). Learning is a social activity where the autonomous student takes responsibility for his/her own learning (Lea, 2005). In a similar fashion, a CofP provides resources and facilitation of learning by using the time, expertise, and knowledge of a collection of individuals in a real-life, real-time context.

However, a CofP has some significantly different characteristics. First, by their nature, CofP are generally self-forming and self-governing. Second, a CofP is a "group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al., 2002, p. 4). Third, they can occur in any area of an individual's life. For instance, they occur in the context of organizations (Wenger et al., 2002) or formal educational settings (Wenger, 1998). A broad sweep of the literature about CofP ranges from the principles to create and maintain communities within organizations (Wenger et al., 2002), the interrelatedness of learning, meaning, and identity because of engagement with a CofP (Wenger, 1998), and how discourse and language shapes CofP (Barton & Tusting, 2005). Fourth, Wenger (1998) proposes that learning, the creation of shared meaning, and identity formation occur because of engaging in CofP. Finally, learning is situated in the context in which it will be used. This is an important component of this type of social learning. Its value lies in moving learning beyond the individual through collaboration out into the world of practice.

Methodology

The purpose of this study was to assess the effectiveness of this learning strategy from the learner's point of view, in a higher education context. The following questions guided this study:

1. How did the learners' experiences of CofP in a graduate level class affect their learning and professional development?
2. How does this experience of CofP compare to other types of collaborative learning?

Educational Context

The educational context of the study is described in the next section. The sample is two graduate level courses in the Adult Learning and Development program at an urban midwestern United States university. The courses and the study were conducted between 2005 and 2008. The instructor was the principle researcher while the second author contributed, as her graduate assistant, to the data collection and initial data analysis for this study.

Human resources and organizational development for adult educators. While developing the curriculum for a course entitled "ALD 646 - Human Resources and Organizational Development (HROD) for Adult Educators," the idea of using a CofP learning strategy emerged. The literature pointed to its growing use in organizations (Wenger et al., 2002). This led the instructor to decide to introduce the students to a CofP experience.

One current challenge in HROD is to create an environment that elicits the dedication of employees to an organization that is more committed to "rightsizing" and profits than to their dedicated employees. One way for HROD to meet this challenge is to help employees become "career resilient" (Waterman, Waterman, & Collard, 1994). Under this model of career resilience, employers and employees form an adult-adult relationship. It is important to maintain a balance within this relationship. One side of the balance is the employer's need to maintain a flexible workforce to ensure organizational success. The other side is to provide employees with the tools they require to remain competitive in the workforce. One approach to maintaining this balance is a CofP. For instance, Samsung Electronics Corp. is supporting a CofP system as part of their training program. Employees can choose to join a CofP to help them acquire the skills and knowledge they want to learn (Choi, 2006).

Reflecting on the needs of the students, the instructor realized the value of the CofP experience as a tool within the classroom. She determined that it could be useful in enhancing the students' professional development. The course focused on organizational development, training, and career development. The instructor utilized this CofP learning strategy while teaching the course on three different occasions over a three-year period.

Adult education in a changing society. After the instructor's first use of CofP as a learning strategy in "HROD for Adult Educators," she decided to incorporate it in a more theory-based course (Monaghan, 2007). The objective was to provide the students with the opportunity within a CofP setting to create their own collective strategy to learn more about the provision of adult education in society. The overall purpose of this course per the syllabus was to provide an "overview of the field of adult education; study of the philosophies of adult education; discussion of historical development, future alternatives, and contemporary issues and trends as they affect adult education in diverse settings." In keeping with the context of this second course titled "ALD 607 - Adult Education in a Changing Society," she made some minor modifications in the original assignment. Specifically, in this course, the individual CofP needed to relate the topics directly to the provision of adult education. Utilizing this strategy, the instructor taught the course four times over a three-year period.

Learning strategy description. The primary purpose of the CofP assignment, as outlined in the syllabus, was to provide the students with the opportunity to "(a) experience the process and (b) have an opportunity to explore a topic in depth from the vantage point of an individual learner and as a member of a community." The assignment, in both courses, consisted of four parts.

For the first part of the assignment, the students developed their CofP and learning plans. Students began by exploring the expertise and knowledge of each community member as it related to the course content. Next, the CofP identified specific knowledge gaps and relevant topics to focus on during the semester. After selecting topic(s) and a supporting learning question, the CofP devised a learning plan. The tangible evidence for this part of the assignment was a paper that summarized the current knowledge of each member of the CofP, the knowledge gap they chose to explore, and the learning plan. The second part of the assignment involved inviting the instructor to one of their CofP meetings. The instructor's purpose was to observe the dynamics and interactions of each CofP and discuss with the members any developmental issues or concerns.

The third element of the assignment asked each member to write a three-to-four-page reflection paper about his or her individual CofP experience. This paper addressed the learning that occurred, the contributions of the members, and the student's plans to transfer the

knowledge to the professional sphere. Finally, the students assessed this CofP experience in light of previous group work experiences. This reflection paper was the basis for the data collection for this research.

Finally, the fourth part of the assignment, and an essential ingredient of the CofP process, was for each community to disseminate the knowledge they created. This was accomplished by giving a presentation to the larger class community. As part of the presentation, each member included a short personal reflection on the use of CofP in adult education settings.

A Qualitative Approach

Qualitative methods of collection and analysis were used because it is "the preferred strategy when 'how' or 'why' questions are posed" (Yin, 1994, p. 1). Yin (1994) also suggests this approach when the intent is to study a contemporary phenomenon within a real-life context. When looking at learning strategies, individuals vary in both their interaction and use of the strategy. While the "individual nature of learning is a fundamental tenet of experiential education, it is still important to stand back from the individual experiences in order to look at the patterns of change that cut across the specifics of person and circumstances" (Patton, 2002, p. 525).

Participants

The participants were members of graduate level classes in the Masters in Adult Learning and Development program at a midwestern urban university. The findings are based on the written reflections of 17 masters and doctoral students who agreed to be part of this study. Since the data was obtained confidentially, no demographic information was collected. However, in the program as a whole, the makeup of the students in this program is as follows: 25 % males and 75% female, 1% Hispanic, 35% African American, and 64% Caucasian. The age ranges are from 24-60, with the majority of the students in their 30s and 40s. "ALD 607 – Adult Education for a Changing Society" is a required core course in the master's curriculum while ALD 646 is an elective.

Data Collection and Analysis

With the approval of the Institutional Review Board, students were asked to volunteer to submit copies of their final paper for this research project minus identifying information. These papers were collected separately and analyzed after the end of the course. They constitute the raw data for this study. As explained earlier in this article, the final paper directed the students to assess and reflect on their experience in

a CofP during the semester. In addition, the graduate assistant's journal maintained during one of the classes is part of the data. Data was collected from both courses in which this learning strategy of CofP was a significant assignment.

The constant comparative method of analysis was used to categorize and answer the research questions (Bogdan & Biklen, 1998). The authors coded the data separately and then collaborated on the development of common categories (Bogdan & Biklen, 1998). Then categories were compared across participants to arrive at themes inductively. Additional sorting and categorization occurred to refine the themes. The criteria for including a theme were because at least half of the participants individually talked about a particular theme in their reflection papers.

Limitations

There were several limitations to this study. First, the data of the reflection papers were part of a graded assignment; therefore, it is important to recognize that the agenda of the instructor and the learning environment potentially influenced the students' reflections. In addition, the topics of the two courses were substantially different. One course focused on theory and the other one focused on the practicalities of HROD, and there is the possibility that one of the two might be better suited to using CofP as a learning strategy.

Findings

Three themes emerged to describe the experience of the students in a course using the CofP learning strategy: (a) acquisition of content knowledge, (b) interrelationship skills, and (c) a new process for lifelong learning.

Acquisition of Content Knowledge

In the CofP experience, four significant factors affected the acquisition of content knowledge: (a) synergy in learning, (b) use of experience, (c) engagement in real-life contexts, and (d) knowledge transfer.

Synergy in learning. Many respondents agreed that an advantage of the CofP experience was the rapid and comprehensive accumulation of knowledge about their areas of interest. The CofP became a synergistic means to acquire knowledge. One participant noted, "This process's advantages are that you are able to gather a lot of information quickly compared to if you were working by yourself, or in a group." A sense of collective motivation also contributed to the synergy, as captured by this comment: "The main advantage is

when you get a group of people together who have the same interest. This will increase the motivation of the group to learn more and rely on each other to increase the community's knowledge base." The intentionality of the acquisition of learning also created "synergy between willing participants." Finally, the emphasis of a CofP on leveraging an individual's strengths and expertise created a structure where "Project tasks were distributed in such a way that responsibilities were assigned to each member based on individual strengths and weaknesses. This synergistic aspect of the CofP made the experience richer and more beneficial for me as a member."

Experience. The use of a student's experience was valuable to the acquisition of knowledge because it informed his/her interests and the way they participated in the CofP. As a result, many participants expressed "A new confidence that prior experience and knowledge was an asset to the community….Everyone came in with some level of knowledge…so prior knowledge was beneficial to the community." The result was that "Through discussion about the topics, and our prior experiences, we were able to 'refine' our ideas and 'discard' the ones that were out of line with our thinking."

Real-life context. Participants were able to include their knowledge and experiences and translate them to real-life contexts. This transfer furthered their understanding of past, current and anticipated experiences in their professional lives. Because the CofP engaged the learners at the levels of their experience, it was learning that was "more pertinent to real life circumstances." In addition, a participant noted that the CofP was important as a space "to share life experiences, information, and research especially the opportunity to include life experiences."

However, the use of CofP as a learning strategy had some artificial elements to it. The majority of the participants felt time constraints in a higher education graduate course were an important artificial constraint. Both those who experienced the CofP in the short six-week format and those who took a semester length course of 15 weeks felt there was not enough time for the experience. One participant maintained that time limitations "forced quick membership and formation because the need to be part of a CofP." Another stated, "The ability to extracting a greater amount of knowledge from each member of the community, based on their expertise, would very likely have intensified my learning experience. Nevertheless, this issue has more to do with an abbreviated time frame rather than the actual design of the community."

Overall, the participants found the CofP to be useful, in spite of the time constraints. One commented, "While I felt that the limited amount of time we had in which to practice as a community impeded the process,

I was able to get a flavor for the dimensions, and dynamics involved with this opportunity and view it as a microcosm of a more prolonged experience." Another participant felt, "The compressed nature of the class really cut down the time we would have had to make a true community come to maturity. We did need to force things to happen more quickly than I would have liked since it was part of a class. I did enjoy the experience, but just when it started it seemed like it was done."

Transfer of learning. One objective of this learning strategy was to help learners transfer the learning to their professional lives. An important indication was the desire of students to use what they learned outside of the classroom. One participant expressed this ability to transfer knowledge beyond the classroom as a "diversity of experience [which] created a potential pool of practical knowledge that extended through the community and beyond. In addition, because there is no real end point, the community and learning can extend beyond the limits of the classroom." The graduate assistant noted in her journal, "It's interesting how I set out to learn more about CofP and alternative learning, but also learned about myself, my comfort zones, and my discomfort zones! I also built my confidence and look forward to implementing CofP in varying situations and capacities!"

A majority of the participants agreed that they would like to be involved in CofP in the future. One expressed this desire as "a nice tool for the toolbox for my future endeavors." Some students even began CofP of their own. As one participant disclosed, "As a result of this class and engaging in this experience, I and a group of students from my doctoral class have decided to form a CofP for our comps and dissertation process." Another felt, "I would definitely participate in a community of practice in the future. I think the hard part, at this point in my life, would be finding one [and finding the time] to fully engage in one."

The CofP learning strategy allowed the members to gather information quickly, use each member's strengths, knowledge, capabilities and experiences, increased motivation based on a common interest, and base the learning in real world experiences. One participant captured the entire cycle from knowledge acquisition to transfer observing,

> The cycle of learning is that information is collected from individuals and returned to the whole community where it is used to generate more ideas….It is an ongoing transfer of knowledge which creates an efficient way for members to keep up with new trends in different areas of the field….The information gathering is fluid and open-ended and provided knowledge that I would not have gained otherwise.

Interrelationship Skills

Careers and professional development depend on employees abilities to engage in constructive relationships. Networking and the ability to deal with conflict appeared as two important components of relationship skills related to the CofP learning strategy.

Networking. The CofP strategy provided space for students to new connections, reignite old contacts and in one case resulted in a new consulting assignment. In terms of networking among learners, the participants felt the CofP was "Beneficial not only for class purposes but also for further career exploration….a great networking opportunity…it helped to underscore and strengthen the value of networking – not just in the present but in the future as well…" Another participant articulated, "It fosters the opportunity for learners to cultivate relationships." Participants also commented on the CofPs helpfulness in getting to know other learners at a deeper level: "I found it to be an enormously valuable tool because it provided an opportunity to really get to know your classmates." Many of the participants noted that one of the best benefits of CofP was the relationships that developed among the community members allowing them to gain the perspective of others and establish professional relationships with their classmates. As one participant pointed out, "Through my community of practice I have established a solid professional connection with each member. Members of this group feel that they could contact each other professionally at any time and it is my hope that we do." Most importantly, we found that the networking extended beyond the classroom and CofP. One participant explained, "In addition, my interviews and knowledge gathering allowed me to network with fellow doctoral candidates and reconnect with colleagues. One interview even resulted in a new job assignment for my business."

Conflicts. The ability to deal with conflict and develop consensus is important to career success. Students felt that conflict was a part of the CofP experience. Some students used the conflict in a positive manner to apply previously acquired learning and tools to transform the situation. The graduate assistant wrote the following in her journal:

> One member sent out an e-mail regarding a decision about restricting our group membership (which I and another CofP member had not condoned) and copied the professor. I was under the impression that CofPs were fluid and allowed the ebb and flow of members as needed. The situation had escalated to a conflict that I then chose to actively address with that CofP member and the other parties upset by the chain of events. I

was able to utilize what I had learned in my earlier elective class, *Conflict Management*, to plan for and handle the challenging situation with one classmate and friend. Besides building my confidence with conflict management, I also learned the importance of letting others take responsibility for their own actions.

This particular experience did incite some anxiety and frustration, however. She felt this conflict initially lead to temporary disengagement from other classes and a potentially damaged personal relationship.

Most participants saw conflict as a hindrance to the learning, with one pointing out "…conflict amongst us only helped disrupt our ability to function as a source of knowledge, and may have hindered the learning process for those group members that by nature avoid conflict." Conflict in some cases resulted in disengagement from the CofP. One participant revealed, "The knowledge that I brought to this community of practice is implicit knowledge of communication barriers. I was not able to share, discuss, or distribute information on communication barriers within my community. The community of practice that I am currently involved in has been operating independently." The student felt invisible, if not ignored within the community. What is ironic about this situation was that the topic of the CofP was "Communication in the Workplace."

In contrast, some CofP experienced very little conflict and felt that their community worked well. One participant explained in the reflection paper,

> The community experienced very little conflict and the conflict that was experienced was resolved quickly and positively. The CofP was successful in quickly establishing rapport. Members were interested and supportive as we took turns sharing our professional journey with each other during our first meeting.

Another participant identified trust as the key in dealing with conflict: "A certain level of trust is necessary for the open exchange of ideas."

Some students perhaps are better prepared to handle conflict in the midst of engaging in a new learning strategy. Others, however, may need more tools. Nevertheless, a number of participants felt that conflict affected their ability to engage in this learning strategy. One reason for this conflict may be the artificial nature of CofP in general and the limited amount of time for students to get to know one another before becoming part of a CofP. Unlike a CofP in a real-life context, the process of group formation affected the relationships and resulting conflict in a substantial manner. In most instances, the integration of new members, after the initial meeting created conflicts

and challenges to the CofP: "A fourth member joined the community only after a conclusion was reached as to an area of inquiry. In the interest of time, [the CofP] went forward with the established topic." A second participant noted, "An example of such a [conflict] scenario became evident in our community when the group member that joined the community late, because all the other communities were already established and running, seemed to be at odds with the direction the group was taking, resulting in one conflict after the other between her and the group."

However, one element that seemed to moderate the conflict was the ability of the CofP to discover their common passion about a topic. One participant had this comment: "I have discovered that all members must embrace an equal amount [of] passion for a topic during the critical formation of the community in order to benefit fully from participation."

Overall, the participants in the study agreed that a common passion for a topic could enhance and sustain relationships when members dealt with conflict, and that networking was a beneficial outcome of using this learning strategy.

A New Process of Lifelong Learning

CofP foster two significant ways of engaging with lifelong learning: self-directedness and collaboration. Usually these two ways of learning are viewed as opposite ends of the spectrum. However, in CofP, the combination allows for greater learning to take place.

Self-directed learning. Most participants were surprised at the amount of self-directed learning that is required for a CofP. One participant expressed it in these terms: "Our society prefers clear boundaries with goals, and it may be challenging for people (as was the case for our CofP) to negotiate the uncertainty and realize the full benefits." Another felt that the lack of structure and resulting ambiguity of a CofP was a disadvantage. A participant explained,

> …I found I am one that does better with structure and deadlines. The other disadvantage is because not everyone in the community had ever experience[d] anything like this it was difficult to know exactly what to do (at first). This assignment felt very free and I like structure. I am an organized person and being in a community of practice feels like everything is up in the air.

They were further surprised that once they got past the initial anxiety of this new form of learning that they actually enjoyed it. They felt they learned more than they would have in another setting. Many of the anxieties and resistance to the self-directed nature of the CofP can be attributed to the nature of higher education classes, where grades are an important part of any course. A participant complained, "Also, some students are only 'C' students, whereas others are 'A' students. When you combine these two types of students, stress is created. The 'C' students feel like they do not have to participate within the community and leave all the work to the 'A' students." We live in a society that talks about teamwork and community, but it rewards members in all spheres, including higher education, on an individual basis. This presented challenges to the learners as they struggled to stay with a process that had an individual grade attached.

Collaboration. Collaboration was an aspect of the CofP learning strategy that the participants valued. The previous discussion about the synergy created in the learning context is one example of this. It illustrates how collaboration operated within the framework of this learning process. Many participants directly spoke about the value of collaboration: "My experience with CofP has caused me to look for ways to leverage my skills by combining them with others who share the same vision, but bring a different perspective." Another pointed out, "Each of us took turns committing to a certain responsibility."

The graduate assistant posed questions regarding obstacles that may prevent effective collaboration in a CofP: "Could prior experience in group work or project teams actually create some difficulties for those with that particular background to transition into engaging in a CofP and carrying out collaborative inquiry? In addition, would bad experiences in the past also create barriers to true collaboration and heighten anxiety?"

Comparison to Other Forms of Collaborative Learning

The second research question asked how this CofP experience compared to other types of collaborative learning. Since the use of group work is an important learning strategy for the Masters in Adult Learning and Development program, most of the comments from the participants compared their CofP experience to group work. In addition, many students work with groups or teams in their professional environments. Therefore, in comparing CofP to other group work in a higher education setting, the participants viewed it as both similar to and different from group projects. We think that the differences contributed to the themes that emerged in the previous discussion about the first research question.

Different from group work. In discussing how group work and a CofP was different a participant shared that it "created more opportunities [than group work] for educating and learning….We were able to generate more knowledge as a community than as an individual, in terms of both diversity and breadth." A second participant noted that "I experienced more

interactions and dialog than is usually found in my previous group work experience." Finally, a third participant said, "the difference between the CofP and group work is that there are a lot more opportunities for people to learn from one another…."

Some participants understood the synergy from belonging to a CofP. One participant pointed out, "In CofP, you do split the work up, but you come back together and discuss the information you find, leaving no gaps in what one person takes away from the experience."

Similarities to group work. Some participants felt that the structure of the assignments created a feeling of group work. One participant reflected, "I believe that a community of practice is extremely similar to a group or team project. Within an educational setting, there are assignments that need to be completed." Another participant remarked, "Within a community of practice, there are some similarities to group projects: deadlines, sharing information, common goals, and an unofficial leader to mention a few." Still another felt that "As our CofP was forming our decisions and activities seemed to reflect a common desire to complete a project rather than gather knowledge." Finally, one participant observed, "After we agreed on norms, we moved into action planning mode, which is very representative of group work. We also set timelines and actions for upcoming assignments. We then talked about our objectives…"

Conclusion

The data from this study reveals the inherent value of the use of the CofP assignment as a learning strategy. It also reveals some limitations in the nature of a graded assignment given the competitive nature of higher education. It is crucial that higher education, in all disciplines and programs, offer students opportunities to develop their professional development skills. There are many benefits to utilizing a CofP learning strategy to achieve that end.

Three conclusions can be drawn about the use of CofP as a learning strategy in higher education classrooms. First, CofP provide a means to promote self-directed learning and collaboration simultaneously. The study reveals that CofP are important learning tools because they allow learners to contribute their experiences and knowledge in significant ways to co-create knowledge. They align with learners needs to be self-directed. Even learners who initially lacked confidence in their abilities to be self-directed experienced an increase in their capacity for self-direction. Finally, the relational or networking aspect of CofP is stronger than in other types of collaborative learning, providing learners with associations that can

be useful for lifelong learning that takes place well beyond the end of the semester.

A second conclusion is that this learning strategy fosters the ability of students to learn about real-life contexts while encouraging them to transfer learning to a professional environment. Third, CofP model for students a type of professional development increasingly used in many organizations as an alternative learning model for creation of knowledge (Choi, 2006). Current CofP research is demonstrating the effectiveness of this alternative model to the individual and the organization (Zboralski, Salomo, & Gemuenden, 2006). Based on the theme of Interpersonal Skills focusing on networking and conflict, further research regarding the role of personality styles or team preferences guiding the success of a CofP could yield some interesting answers, as well as more questions. For instance, Belbin (1996) and DiSC instruments (Marston, King, & Marston, 1931) administered at the formation of a CofP may provide insight for each member about themselves and other, as well as help members promote positive, transformative conflict management.

Some important challenges need to be considered when using this learning strategy. First, the selection of who joined the CofP presented raised issues and conflicts. While it is important that students try to develop a CofP that involves common interests, it is also important to promote diversity across the membership. As a society, we tend to affiliate with those who are most like ourselves. However, one of the goals of higher education is to help students broaden their exposure to many types of people and experiences. One way to accomplish this is to discuss the importance and benefits of having a truly diverse CofP in relation to experience, knowledge, race, ethnicity, age, gender, sexual orientation, work style, personality, etc. A second aspect would be to include the following criteria for CofP membership: (a) shared interest in the topic and (b) diversity in membership. The hopes are that the superficial differences and power struggles will be equalized by embracing a diverse participant base in a CofP structure. However, scholars are challenging "this model of social learning as a method that gives power to the learner where societal inequalities disappear or are at the very least inconsequential for learning" (Monaghan, 2007, p. 15).

Another challenge is the integration of a new member after the initial meeting of the CofP. Our experience has been that the situation generally ends in the CofP engaging in more than the usual amount of conflict over the course of the semester. While conflict cannot be avoided, it can be minimized. One way to do that would be to assign the student to be on the periphery of multiple CofP and then engage in

facilitating a session that brings together the common strands for the larger community.

A third challenge is the artificial nature of CofP as a learning strategy. Students may feel as though they are forcing a common interest, topic, or membership. In this instance, the instructor can acknowledge that it is artificial in some respects stating that the purpose is to provide the students with an approximate experience where they can learn to be more self-directed and collaborative.

The use of CofP as a learning strategy can be incorporated across a wide range of curricular content, from business courses to history courses, to name a few. In this study, the learning strategy was used in both a practical skills course and in a theory-based course with successful results. The context of the courses in this study occurred at the graduate level in an adult education program; however, this strategy is appropriate for a variety of courses at diverse types of institutions. The CofP learning strategy is applicable to different course content, class levels, experiences, and interests of the students. It provides space for students to learn the skills of self-directed learning in a collaborative environment and enhance their professional development abilities. Finally, this strategy can enhance the transfer of knowledge from the classroom to a real-life context, which is an important aspect of professional development.

What does the use of the CofP model as a learning strategy mean for professional development and lifelong learning for higher education students? It provides learners with the opportunity to learn how to create and utilize CofP. CofP support the objective of helping students to acquire the collaborative, self-directed learning skills that are part of the arsenal for maintaining career and professional development.

In summary, CofP as a learning strategy in a higher education setting provides an opportunity for learners to explore a process to help them create and sustain both their career and personal lives. This type of classroom activity provides a forum for self-directed learning on a community level and helps learners to establish networks that are important for future life success. Of greatest importance, it can help them link their education to their career and their careers to engagement in professional development and lifelong learning.

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A Model for Quantifying Student Learning Via Repeated Writing Assignments and Discussions

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In this study, we assessed small and large group discussions and repeated writing assignments with the intent to objectively measure the values of these learning pedagogies. We crafted a model where students researched a question, formulated a written answer, discussed it with their peers, and revised their answers. Then, we did it with repetition to provide practice and experience. Improvements in understanding due to discussions were measured at 12%, while improvements of writing skills increased 29% during the course of the semester. Because we carefully structured the methodology and intent of the assignments, we suggest the assessment data could be used for quantitatively measuring student learning.

Active techniques, such as discussion, writing, interactive labs, and collaborative exchange, have been lauded as a way to increase learning in the classroom, particularly when compared to more passive approaches such as lecture (Davis, 1993; Lawrenz, Huffman, & Appledoom, 2005; McKeachie, 1999; Meyers & Jones, 1993; Wurdinger, 2005). Active techniques have been well documented, providing instructors with a variety of options and guidance tips that can be tailored to unique classroom situations. In many cases, the students take control of the learning process (e.g., discussions, laboratory experiential activities, group assignments, game simulation, etc.) with seemingly positive results (Clark & Smith, 2004; Lauer, 2000; 2005; Orvis & Orvis, 2005; Sutherland & Bonwell, 1996). Despite this plethora of methodologies, the inferred value of active learning is difficult to assess and may not be readily apparent from a single activity or event (Stiggins, 1995).

A lively and productive class discussion on evolution, for example, may be beneficial to students, and many identify this type of activity as being an effective learning tool (Gullette, 1992; McKeachie, 1999; Meyers & Jones, 1993; National Research Council, 1996). We also believe discussion structures conversations and enables participants to present, understand, compare, examine, and understand both similar and variant issues (Pestel, 1997; Wilen & White, 1991), promoting a higher level of thinking (Gall, 1985). Gall and Gall (1990) indicate the learning outcomes of classroom discussion include mastery of content material and an increase in problem solving skills. But, how much more do students learn using this pedagogy compared to a lecture? Moreover, how might it compare to alternative active learning techniques that have been shown to have merit? Answers to these questions rely on the ability to assess the activity without confounding interference. Stiggins (1995) and Black, Harrison, Lee, Marshall and Williams (2004) provide approaches and guidance that should be followed if assessment for measuring achievement is the goal.

The deficiency in science writing skills by students has been documented by a number of science educators (Jerde & Taper, 2004; Koprowski, 1997; Moore, 1994; Rice, 1998; Tessier, 2006) with the composite suggestion that writing can be improved with guidance, feedback, and repetition. If identifying compositional/grammatical areas that need improvement coupled with repeated assignments does improve technical writing skill, why is this technique not commonplace in the classroom? We suspect the instructional effort needed for this approach is beyond the logistical abilities of most teachers given their other course duties, unless the course is classified as writing intensive. However, writing can also be used as an active technique for learning content material (Moore, 1993, 1994). The act of putting thoughts on paper forces students to clarify ideas, for example, by postulating hypotheses, organizing facts, etc. in a way that is rarely possible otherwise (Feldman, Anderson, & Mangurian, 2001). Thus, the act of writing in the classroom may produce duel benefits to the student that most instructors cannot otherwise duplicate.

In this study, we assessed the value of writing assignments and small and large group discussions from the perspective of both the instructor and the students. We did so with the intention to assess the value of both writing and discussion activities quantitatively. Three questions emerged: (a) Were there improvements in technical writing skills using repeated writing assignments with detailed feedback?; (b) What was the value of discussion in the classroom for learning biology?; and (c) Did the student's attitudes change pre/post about technical writing and discussion, and did they feel it aided their learning of biology knowledge and increase their writing skills? Although the pedagogy in this study was biological in nature, the methods and scope of our model could easily be applied to any discipline.

Methods

Classroom

The students evaluated in the study were enrolled in a Department of Biology course (Limnology; 3 credit hours) at Ball State University and included junior, senior, and graduate students studying biology or a related discipline. The course met three times a week: two 50 minute lectures and one 110 minute lab for 15 weeks. During the first week, students were provided a syllabus that explained the course objectives, with specific emphasis and clarification on the writing assignments and our reasoning for them. Although this study was conducted in an upper division course in a four year university, the authors feel it could provide a model (Figure 1) that transcends grade and could easily be used in middle school, high school, or first year college courses.

Every two weeks a writing assignment was given (for a total of six throughout the course). Each followed a similar format. Assignments emphasized manuscript evaluations, concept evaluation, or textbook reading (examples in Table 1) where the student would need to apply, analyze, or synthesize information, typically identified as a higher-order cognitive skill (Bloom, 1964; Lord & Baviskar, 2007) as advocated by Zoller (2000). Prior to giving an assignment, searches were done on the Internet (e.g., Google®) to determine whether students could find answers they could use directly or peripherally. If so, the question was altered or eliminated to avoid the temptation of plagiarism following Gibelmen, Gelman, and Fast (1999). In general, the subject matter for the assignments was not discussed in previous lectures, and students were required to formulate answers based on individual scholarly pursuits. These answers were most often in the form of an argument, defending a point of view. This approach minimized plagiarism and mimicked the kind of rhetoric found in the "discussion" portion of scientific publications. Students were cautioned against collaboration, although we remained open to questions or clarifications at any time. Length was limited to 250 words and assignments were submitted electronically via email attachment prior to class time on the day it was due. A paper copy was also brought to class that was used for the day's discussion.

On the day assignments were due, students (N = 16) were placed into one of four groups with composition of the groups varying with each assignment. When the class began, students were asked to discuss their answers within their group. As the instructors, we would interact with the groups, but only in a probing way to help students clarify or collaborate their answers. Care was taken to not provide the students with our response or interpretation of the assignment. Following this period, individual groups would present their answers to the remainder of the class, initiating a whole class discussion. When this discussion was complete, we would provide comments and thoughts verbally, summarizing the information provided by the students and correcting any misconceptions. At the end of the class, students were given the option of re-writing their assignments based on what they learned from the discussion.

A rubric (Table 2) was used to assess student performance and was divided into two parts: assessment of grammar/writing style (10 points) and biology content understanding (10 points). Evaluation and commentary were additionally provided on the assignments using the "Track Changes" and "Insert Comment" functions on Microsoft® Office Word 2003. Both positive aspects of the submissions and areas that needed improvement were identified. In addition, efforts were made to show how problem areas could be corrected. If a student re-wrote a paper based upon the class discussion, the student only saw and received the grade from the re-written version. In these cases, we compared the original and the re-written versions side by side electronically to determine what changes were made by the student with the re-write and how it affected the grade. The grading effort was extensive and precluded use of more than a single grader, despite the advantages of this latter approach in supporting the study findings. A content grade was additionally recorded for the original submission that would be later used for comparative analysis.

Prior to the first assignment, a questionnaire (pre-test) was given to the students (Table 3) that assessed their attitudes toward science writing and discussion in the classroom. Students were asked whether these pedagogies had an impact on their learning, and whether they have a place in the current course. Likert scale scores ranged from strongly disagree (1) to strongly agree (5). At the end of the semester, a related questionnaire (post test) (Table 3) that was virtually identical with the pre- test was given to the students. Data from the pre/post test analysis provided evidence as to whether students' attitudes changed while using these techniques.

Analysis

Changes in writing grades for grammar/writing style were compared over time using a repeated measures ANOVA with students (N = 16) as a random factor and assignments (time: N = 6) as a fixed factor. The assignment scores used for this test were the revised submissions, if done, or the original submission, if not done. It was felt the revisions were made based on changes in content understanding following the class discussion, not any further understanding or

Figure 1
Schematic Model Described in the Text Depicting the Flow of Assignments,
Student Responses and Instructor Assessment

Instructor gives topic for
written assignment

Students do research,
email instructor with
completed assignment,
and bring written copy of
completed assignment to
class

Small group discussion
in class on topic (3-4
students per group)

Whole class discussion
on topic with summary
comments by instructor

Optional
Students revise assignment
based on small group and class
discussion and submit to
instructor electronically

Instructor grades original assignments to determine
accuracy of content and understanding. Following
discussion revised assignments (if received) were
graded for content understanding and growth from
discussions. Grammar grades are also assigned
(original assignment, or revised assignment if
submitted). Both use detailed rubric that can be
analyzed for feedback. Repeat process.

Instructor measures grade improvement for
content using discussion, and grammar
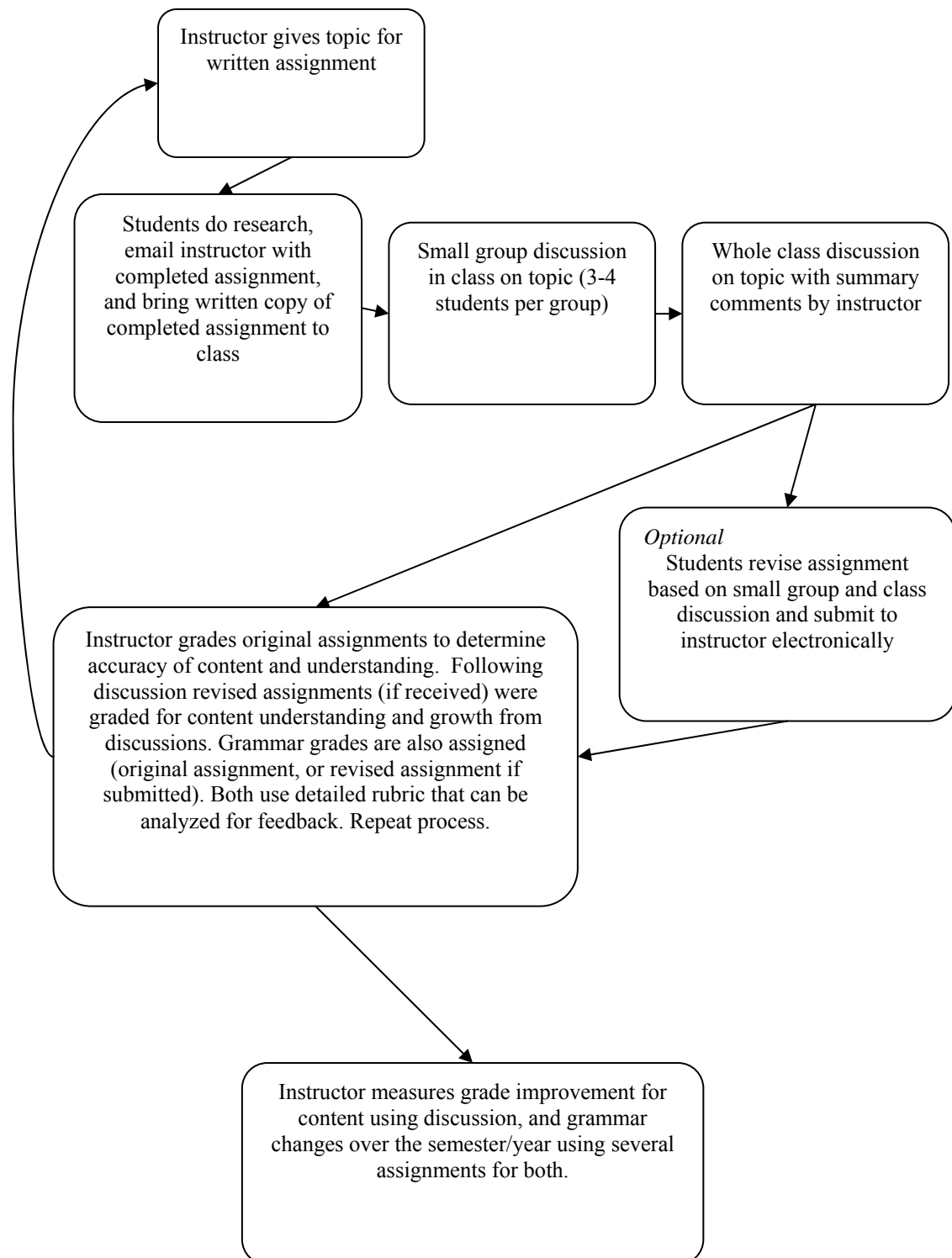changes over the semester/year using several
assignments for both.

Table 1
Examples of Questions/Assignments Used for the Six Assignments Given During the Study

1. Using a scientific paper review:
   Evaluate the following scientific paper (insert appropriate reference for your discipline here) and provide me with (1) the most important contribution and (2) the most significant limitation.

2. Using several related concepts from the text:
   Describe the relationship between lake mean depth, area, and primary productivity.

3. Using a concept from the text and relating it to current natural resource management application.
   How does the ecological concept of "top down effect" described in your text relate to the trout and salmon stocking programs currently used in Lake Michigan?

Table 2
Rubric Used to Assess Student Written Assignments ($N = 6$) During the Semester

Grading Rubric:
1. Grammar/writing style: .... 10 points total

Equal emphasis was placed on each of the eight categories, e.g., 1.25 points/category, with not all points totals equaling a whole number (e.g., 7.5/10)

The writing was grammatically appropriate for scientific communication and standard American English, including:
   a. used correct spelling
   b. composed complete sentences
   c. expressed using clear word choice and absence of awkward and ambiguous words
   d. expressed using clear sentence structure and absence of awkward and ambiguous sentences
   e. wrote with an absence of punctuation errors
   f. drafted a logical paragraph beginning with a well-defined topic sentence followed by sentences that all support the topic sentence
   g. included a logical transition to the next paragraph or topic
   h. reflects a style of scientific writing appropriate for the discipline

2. Content evaluation .... 10 points total

Equal emphasis was placed on each of the five categories, e.g., 2 points/category

The student showed a grasp of the content of the assignment as indicated by the following:
   a. used the concepts germane to the assignment and defended their choice.
   b. synthesized known facts with unknown facts
   c. generated a hypothesis regarding the content
   d. persuaded the reader to accept a point of view
   e. provided information that was technically accurate

clarification of grammar/writing style. Thus, the evaluation used here was based on the assignment grade the students actually received. The intent was to evaluate whether students' writing grades improved as the semester progressed and was unrelated to the class discussion.

The class discussion was evaluated by comparing the content grades of the original assignment submission (pre- discussion) with the re-written assignment (post discussion) grades using a paired t-test. Only assignments that were re-written ($N = 59$) could be included in this analysis. Both grammar/writing style and discussion tests were used to assess quantitatively the impact of the teaching pedagogy.

Changes in attitudes in the classroom were described using the pre- and post test data. Since attitudes are a type of qualitative assessment not easily quantified, changes were identified using median scores for pre- and post questions and compared using a non-parametric Mann-Whitney test. All tests used $\alpha = 0.05$.

Results

Individual grammar/writing style scores for the six assignments ranged from 5 to 10 (out of a possible 10). Mean (*SD*) scores ranged from 6.56 (0.72) to 8.43 (1.01) and increased with each assignment from 1st to the 5th assignment, while assignment 6 showed a slight drop to 8.19 (1.01) (Table 4). These values were significantly different from each other and suggested grammar/writing skill improved as the semester progressed. Examples of the original submissions coupled with the editorial suggestions and comments on grammar/writing style are found in Table 5.

Two students submitted only one revision (post discussion) for content understanding, while another only submitted two revisions. All other students

Table 3
Pre- and Post Assignment Questionnaires Used in Class to Evaluate Student Attitudes on Writing and Discussion

Please answer the questions below using the following scale:

1 = Strongly Disagree	2 = Somewhat Disagree	3 = Agree
4 = Somewhat Agree	5 = Strongly Agree	6 = Not Applicable

Pre- Questionnaire

1. Written assignments increase my learning.

2. I expect my technical writing skills to improve in this class.

3. If you have done writing in other biology classes, answer the following -- I would have valued more constructive criticism/comments/feedback on my technical writing skills.

4. If you have had small group discussions in other classes, answer the following – *Small group* discussions have helped in my learning and comprehension of the content material.

5. *Whole class* discussions have helped in my learning and comprehension of the content material.

6. I learn more technical writing skills from several short writing assignments when compared to one long writing assignment such as a lab report vs. a term paper.

7. Writing assignments in which you are given both written and content feedback are a fair and reasonable expectation for this class.

Post Questionnaire

1. Written assignments increased my learning.

2. My technical writing skills improved in this class.

3. I valued the constructive criticism/comments/feedback on my technical writing skills.

4. The *small group* discussions have helped in my learning and comprehension of the content material.

5. *Whole class* discussions helped in my learning and comprehension of the content material.

6. I learned more technical writing skills from several short writing assignments when compared to a single long one.

7. Writing assignments in which you are given both written and content feedback were a fair and reasonable expectation for this class.

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submitted at least three revisions out of six possible ones. Individual grades for the biology content material from the assignments ranged from 4 to 10 (out of a possible 10). Mean (*SD*) grade for the pre- discussion assignments was 6.9 (1.25), while the post discussion mean grade increased significantly to 7.80 (1.05) (Table 6). This was a 12.3% increase in content material.

Data on student attitudes (Table 7) seem to agree on the value of writing and discussion from the pre-questionnaire (median Likert scores = 4). The post questionnaire identified changes in student attitudes for both the value of writing and discussion. First, students' attitude regarding specific and detailed feedback they received on their technical writing skill (question 3) seemed to trend upward during the semester (post discussion median score = 5). Students indicated they learned more from several short assignments when compared to a longer one after experiencing this approach (question 6). There also seemed to be a change in their attitude (question 7) about having writing assignments as a fair expectation for the class, although it wasn't significant ($p = 0.12$). Lastly, students indicated they learned more during the semester from the whole class discussions (question 5).

Discussion

Our data demonstrated that over the course of the six writing assignments with detailed feedback, a single evaluation showed there was an improvement in grammar/writing style (e.g., spelling, punctuation, clear sentence structure). Improvements in writing using a repeated assignment technique have been noted by others (Koprowski, 1997; Moore, 1994; Rice, 1998; Tessier, 2006). We acknowledge a more rigorous method of assessment could have been employed if other graders or a more detailed breakdown of the rubric sub-categories were employed. However, we suggest that even with these limitations and possible bias, improvement in student writing skill was demonstrated. Jerde and Taper (2004) found the only significant factor improving scientific writing performance was prior scientific writing experience. This concept of learning to write by writing was endorsed by Rice (1998), who, as was done in this study, provided detailed instruction and feedback to his science students. The merging of science and writing using "writing-across-the-curriculum" approaches had been touted as having merit, but it is not without problems (Fulwiler, 1984; Griffin, 1985). However, we do agree with Raimes (1980) that writing should not simply be *taught* in all courses, but rather, writing should be *done* in all courses as a pedagogical method to teach content. She further suggests that writing itself improves logic, clarity, and objectivity, all components used to learn subject matter, clearly obligatory in the sciences. Moreover, this concept is not restricted to a single age group or class, but rather, is applicable to all pedagogical environments where students read, write, discuss, and assess information.

Table 4
Grammar/Writing Style Grades (Mean and Standard Deviation) for the
Six Assignments Given During the Course of the Semester

Assignment	N	Mean	SD
1	16	6.56	0.78
2	16	7.16	0.57
3	16	7.62	1.30
4	16	7.97	1.36
5	16	8.44	1.01
6	16	8.19	1.01

Note. Changes in grades were significant (repeated measures ANOVA, $df = 5$, $p < 0.001$).

Table 5
Examples of Student Submitted Text, the Correction Advice Given as it Pertained to Grammar/Writing Style, and
the Specific Comments Detailing the Advice

Student submitted text	*Instructor revised text*	*Comments*
Other observations noting an increase in phytoplankton production as Secchi disk values have decreased.	Other observations have noted an increase in phytoplankton production as Secchi disk values decreased.	Tense out of sync, deleted "have" as unnecessary,
Light is the main source of energy through out the world. As discussed in chapter nine, the sun is the main source of light. All organisms depend on light/energy to be able to function, grow, and reproduce.	Sunlight is the main source of energy throughout the world and all organisms depend on this light energy, directly or indirectly, to be able to function, grow, and reproduce.	Throughout misspelled, clarified light/energy usage, improved awkward sentence structure
The focus of Cole's chapter 9 in his *Textbook of Limnology* is the role of light in aquatic ecosystems.	The focus of Chapter 9 in Cole (1994) is the role of light in aquatic ecosystems.	Incorrect text citation, not appropriate for the discipline.
Having sufficient nutrients isn't enough for high productivity. The nutrients must be obtainable to those that use them.	Having sufficient nutrients won't always promote high productivity, as the nutrients must be available to autotrophic organisms.	Clarified awkward sentence structure and text meaning
The author tells you the scientific name and the common name so if you wanted to look up the fish you could more easily find them.	In addition, the author provided the scientific and common names for easy reference.	Awkward sentence structure
The rising of pH is done by changing carbon dioxide to O_2. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$	During the day photosynthesis raises the pH level of water, based on the equation $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$.	Punctuation (period), equation not included in sentence, awkward sentence structure

Table 6
Content Grades (Mean and Standard Deviation) for the 59 Students That Chose to Revise Their Assignments
Following the Class Discussion.

Content	N	Mean	SD
Before discussion	59	6.94	1.25
Following discussion	59	7.80	1.05

Note. Changes in grades were significant (paired t-test, $p < 0.001$).

Table 7
Likert Test Question Response Values Showing Changes in Attitudes Regarding Writing and Discussion at the
Beginning of the Course (pre) and at the End (post). Questions are shown in Table 3

Question	Pre test			Post test			Mann Whitney
	N	Mean	SD	N	Mean	SD	*p*
1	15	3.73	0.80	16	4.19	0.91	0.11
2	17	3.88	0.99	14	4.07	0.80	0.95
3	16	3.94	0.93	15	4.53	0.83	0.06
4	17	4.18	0.95	16	4.19	1.11	0.81
5	17	4.18	0.88	15	4.87	0.35	< 0.01
6	17	2.76	1.10	14	4.64	0.50	< 0.01
7	17	3.94	0.90	15	4.50	0.89	0.12

The act of researching the assignment and writing a response to the question forced students to read and to try to understand the material prior to class discussions. Although some students' thoughts may not have been scientifically correct, they came to the discussion with a complement of information that could be evaluated, clarified, and refined. This writing to learn pedagogy has been advocated often (Glynn & Muth, 1994; Keys , Hand, Prain, & Collins, 1999; Kirkland, 1997; Moore, 1994; Tessier, 2006).

The assignments assured every student had a written response prior to beginning the discussion, and thus, blank stares and excuses were minimal when asked to participate. Students could assess their answers in the small group environment and could clarify their scientific concepts in the whole class discussion. The researchers acknowledge that other factors could contribute to the content learning of the students, but our inference from changes in scores on our assessment data pre- post strongly suggested content learning did take place. The level of student learning from the discussion was positive and consistent when comparing the pre- vs. post- discussion assignments. The discussion type of learning is typically more productive than lectures (Pestel, 1997), unless well crafted (Cronin-Jones, 2003), and is more in line with the active learning approaches advocated by many (Angelo & Cross, 1993; Bonwell & Eison, 1991; McKeachie, 1999; Sutherland & Bonwell, 1996). Lastly, because students were allowed to re-write their assignments (N = 59) to change content, researchers in this study inferred learning continued after the discussion was completed. Thus, these students were actively engaged in the learning processes before, during, and after the discussion.

The written assignments generated two types of assessment data. First, by comparing the progression of grammar/writing style grades over the semester, learning to write could be measured, demonstrating both direction of change (increase), and the quantity or extent of change. This latter value was not difficult to calculate, but it did require repeated scores. Using the classroom approach of writing a single "term paper" without developmental feedback, this type of assessment would not be possible. The multiple writing assignment concept used here and by others (Miller, 1999; Rice, 1998; Tessier, 2006) promotes a positive learning environment and one that can be quantified. Although some have argued a single written paper can be productive for the student (Bob, 2001; Bowman & Stage, 2002), in our opinion it still requires guidance, review, and revision to be effective.

The second set of assessment data measured the change in biology content scores between the original assignment (pre- discussion) and the revised assignment (post discussion), and gave an indication of the value of the discussion. The discussion facilitated peer assessment and we infer it prompted students to reflect and self-assess their own work. Many (N = 59/96) took the opportunity following the discussion to re-write their assignments – typically to improve their score on a paper that was (at the time) ungraded. We infer students used the peer and self assessment approach (Black et al., 2004) provided them in the classroom discussion to modify their assignments. Although many have argued the benefits of a good discussion (Angelo & Cross, 1993; Ebert-May, Brewer, & Allred, 1997; Gullette, 1992; Weimer, 1987), the ability to quantify the value of discussion escapes most. Our finding identifying an improvement in assignment grades of 12% following discussion is novel, based on our review of the literature, and should be viewed in this context. Although it could be argued this exact percentage improvement may not accurately define the improvement actually due to the discussion, it does give an indication of this technique's value and its potential as a pedagogic tool.

The student response to writing assignments, based on the pre- and post questionnaire that identified their attitudes, did not change regarding the value of writing assignments and the expectation of improvement during the semester (questions 1 and 2). However, the change from "somewhat agree" to "strongly agree" for the remaining questions has several implications. First, the preferential responses of learning more from several short assignments (question 6) and valuing constructive criticism/comments/feedback (question 3) aligns itself with the pedagogy for writing achievement postulated by Moore (1994) and Jerde and Taper (2004). We were concerned the detailed and extensive criticism given may create a negative attitude for students (Ehrlich & Zoltek, 2006). However, this wasn't the case, as the students appeared to take and appreciate the comments with the intent for which they were given. Second, writing assignments with feedback were strongly agreed upon as a fair and reasonable part of the course curriculum. This acknowledgement not only suggested we should structure our course curriculum to include writing assignments, but this inclusion is endorsed by the students. Lastly, the high agreement by students that discussions in both small and whole class formats aided in their learning of the course material is not new pedagogy to instructors. However, it was heartening to see the students' approbation.

Conclusions

This study assessed students' written skills and content learning as influenced by (a) repeated writing assignments with opportunity for revision, and (b) small

and large group in-class discussion using objective measures. From our viewpoint, we crafted a model where students researched a question, formulated a written answer, discussed it with their peers, and revised their answers. Then, we did it with repetition to provide practice and experience. Because we carefully structured the methodology and intent of the assignments, we suggest the assessment data could be used for quantitatively measuring student learning. Furthermore, we infer that the feedback given on the active writing assignments allowed the students to refine their understanding of scientific concepts.

The methodology used in this study lays out a model of teaching and learning that could be followed across disciplines. However, it is ultimately the type and amount of student learning that is paramount in the process. Placing that onus on the student, regardless of grade level, will provide a higher level of achievement.

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Acknowledgements

Enhancing Graduate Education: Promoting a Scholarship of Teaching and Learning Through Mentoring

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This article highlights the importance of mentoring processes in the education of future scholars. The purpose is to recommend that scholars link the process of mentoring graduate students with promoting a scholarship of teaching and learning (SoTL). It suggests that through this process graduate students will acquire some of the skills they need to be successful in careers that require teaching as a central component of their work. Recommendations are provided for informal and formal mentoring initiatives.

A promising path to improving graduate education is the relatively new emphasis in academia on broadly implementing a scholarship of teaching and learning, also referred to as SoTL. A scholarship of teaching and learning emphasizes learning and reflecting on pedagogical techniques as they relate to our academic disciplines. The purpose of this article is to recommend that scholars begin to link the process of mentoring graduate students with promoting a scholarship of teaching and learning. We argue that it is not sufficient in the current academic job market for graduate students just to acquire strong research skills. Instead, they also need to learn to be strong teachers as that has become a major component of most academic jobs. We hope that this discussion will lead academicians to reflect on how to better prepare future scholars and teachers for the realities of their careers.

In the introductory essay of *Universities and their Leadership*, a collection of written works celebrating the 250th anniversary of Princeton University (1998), Frank Rhodes, Emeritus President of Cornell University wrote the following:

> We need our best scholars to be our teachers, and we need them to give the same creative energy to teaching as they give to scholarship. We need to identify, support, and reward those who teach superbly. There is no antithesis between teaching and research. Great teaching can, in fact, be a form of synthesis and scholarship. (p. 11)

Yet, as Burton Clark suggested in *The Academic Life* published by the Carnegie Foundation in 1987, excellence in teaching is seldom fully valued. In fact, in a study about the promotion and tenure process, Tierney and Bensimon (1996) depicted the current situation with respect to junior faculty:

> Good teaching is not particularly valued, and service is often seen as a waste of time. Research is pursued not because of any intrinsic interest, but in order to attain job security. Collegial relationships are sporadic at best and intellectual conversation appears to be on the verge of extinction. (p. 128)

A serious contradiction in contemporary U.S. academic life is that while most professors teach extensively, this is not an activity that is primarily rewarded by the academic profession nor very valued by the higher education system at large. Further, professors who are invested in teaching are often penalized for their efforts as it is thought that they may publish fewer articles and books and have less time for research (Tierney & Bensimon, 1996). Such notions ultimately affect their annual evaluations as well as promotions.

Most graduate students embark on an academic career because of their desire to engage in scholarly dialogue and collaboration, to teach, and to conduct research. However, our current system of graduate education, with its primary focus on research, tends not to prepare recent graduates for the actual realities of their jobs (e.g., Eitzen, Bacca Zinn, & Gold, 1999). This broad assessment of graduate education is also reflected in the fields of family studies and human development. Most departments continue to stress research, publication agendas, and the securing of external grants in their graduate programs and new hires. As a consequence, graduate students have few opportunities to teach or to engage in reflective activities that may allow them to develop their own strengths in the classroom. Thus, new academics are often bewildered by a system that had one set of expectations for their future roles while they were in graduate school, and another set of criteria once they enter jobs at either a university or college. They come to the professoriate unprepared as teachers and uncertain of where to devote the bulk of their energy (Boice, 1992; Sorcinelli, 1994).

To better prepare future academicians, we need to revise graduate education to serve the needs of the students we teach, and in turn, re-think some of the

broader goals of our programs. One path to improving graduate education is through implementing stronger mentoring programs which promote a scholarship of teaching and learning. By expanding mentoring to promote a scholarship of teaching and learning, pedagogical concepts become part of the formal and informal education of graduate students. As our world becomes increasingly diverse through globalization, technology, and migration, we need to train our students to work with a heterogeneous student body. This will require graduate programs to re-focus their emphasis on producing not just good scholars but also good teachers.

Delineating a Scholarship of Teaching and Learning

In 1990, Boyer's pivotal *Scholarship Reconsidered* revolutionized the discussion about the relationship between teaching and scholarship. Boyer introduced a new vision of scholarship, one that includes original research but also advocates stepping back from one's studies, to make connections, to build bridges between theory and practice, and to communicate knowledge to students. His work has led to vigorous debates in various disciplines about the nature of scholarship itself and the role that teaching should play in graduate education and promotion reviews. In a recent report, responses from 23,000 faculty, chairs, deans, and administrators from colleges and universities around the United States, agreed that institutions of higher learning were emphasizing scholarship to the detriment of teaching (Halpern, Smothergill, Allen, Baker, Baum, Best, et al., 1998, p. 293). Further, these surveys revealed agreement that teaching needed to be recognized as playing a central, not a marginal role, in academic life. Respondents also concluded that there is no single definition of the scholarship of teaching and learning, nor can every faculty member be expected to excel at every type of scholarship.

In 1995, Diamond and Adams expanded the concept of scholarship of teaching and learning to include the following criteria:

- An activity that requires a high level of discipline-specific expertise
- The activity breaks new ground, is innovative
- The activity can be replicated or elaborated
- The work and its results can be documented
- The work and its results can be peer reviewed
- The activity has significance or impact

Their perspective provided a foundation for arguing that teaching can also be a scholarly pursuit since it shares the same general features as the scientific method. Diamond and Adam's work spurred further discussion of Boyer's (1990) initial ideas and led

Halpern et al. (1998) to write a ground breaking article on the scholarship of teaching and learning in which they argue that teaching can be scholarship and that the distinctions often blur. According to their discussion, the importance given to any particular aspect of evaluating teaching as a form of scholarship will vary with context, and at times, discipline (Halpern et al., 1998).

The scholarship of teaching and learning is currently defined as knowledge that can be shared with and reviewed by a community of peers, and built upon by members of this community (Kreber, 2001). This broad definition permits integration of a scholarship of teaching and learning into graduate programs as well as into faculty development. It is based on the assumption that the growth of a scholarship of teaching and learning can and will emerge from any and all disciplines (Kreber, 2001).

The Importance of a Scholarship of Teaching and Learning to Family Studies and Related Fields

A scholarship of teaching and learning requires knowledge of the discipline as well as knowledge of teaching and learning. This requires thoughtful integration of the two and results in pedagogical content knowledge (Kreber, 2001). However, until recently, pedagogical knowledge has not occupied a significant role in the advancement of the knowledge base of postsecondary teaching and learning. This is particularly true in family studies and related fields where the primary emphasis in graduate education remains on training students to develop formal, often highly positivistic, research agendas. Teaching, to the extent that it is taught in graduate programs in family studies, family and consumer sciences and human development, tends to be treated as an add-on to in-depth knowledge acquisition of the discipline. Further, most programs do not attempt to bring together discipline knowledge and pedagogy. While graduate programs train future faculty in the advancement of content knowledge, few emphasize the provision of the kinds of experiences necessary for future faculty to develop the knowledge and skills they will be required to use to assist their own students. Basically, graduate programs emphasize the education of researchers, and for the most part neglect the advancement of pedagogical knowledge (Kreber, 2001).

One potential arena that has barely been explored in academic writings is how formal and informal mentoring could enhance the education and professional development of graduate students. Mentoring activities that promote a scholarship of teaching and learning could move teaching and teaching related activities to a central position without relinquishing the importance of training students in research methodologies. By shifting

the emphasis from a formal acquisition of disciplinary knowledge to a new model where faculty and graduate students share insight and experiences related to pedagogy, we would be preparing our students to become better teachers as well as to conduct research.

What is Mentoring?

Perhaps the most basic assumption underlying this discussion is that we assume we know what mentoring is. In popular usage, mentoring is defined as "a deliberate pairing of a more skilled or experienced person with a lesser skilled or experienced one, with the agreed-upon goals of having the lesser skilled person grow and develop specific competencies" (Murray, 1991, p. 4). This definition also encompasses the notion that a mentor is to be concerned with the upward mobility of their proteges' careers (Kram, 1985).

According to Kram (1985), mentors play two important roles in the lives of their mentees. On a public level, they provide career advancement opportunities by providing insight into work related situations, fostering visibility and protecting their mentees from deleterious situations. On a more private level, mentors are supposed to be role models and provide counsel and empathy. Research in business environments indicates a positive relationship between the number of functions that a mentor fulfills and the achievements of the mentee. In other words, the greater the involvement by the mentor, the greater the success by the protégé (Dreher & Ash, 1990; Orpen, 1995).

Various models of mentoring co-exist, particularly in business environments. The most common model involves the identification of individuals that are prepared to take over "senior" roles. In this scenario, high-ranking executives are coupled with promising individuals in order to assist in their systematic acquisition of knowledge and skills. The goal of the relationship is to prepare more junior executives to move into the upper ranks of administration (Jowett & Stead, 1994). In this hierarchical model, the primary focus is the well being of the organization instead of the learner.

Another common model is concerned with issues of recruitment. The learners are regarded as "beginners" who are taught the "system" of either an organization or a profession. According to this model, mentors help trainees to acquire their professional qualifications. Perceived benefits go to both the learner and the organization or profession (Jowett & Stead, 1994). Another variation of this model focuses specifically on uplifting disadvantaged groups or individuals. In this situation, mentoring provides role models to someone or a group that would otherwise, potentially, not have an opportunity to enter a certain position or organization (Jowett & Stead, 1994).

A third mentoring model emphasizes more egalitarian relationships and the benefits that can accrue through networking between peers. In this model, peers come together, and with the assistance of a facilitator share their experiences and insights. Mentoring networks are thought to empower individuals by taking the focus off of assimilation and promoting equality (Girves, Zepeda, & Gwathmey, 2005).

While there is no consensus about what elements make mentoring successful, there is a great deal of acknowledgement that it does work and that we need to promote it (Girves, Zepeda, & Gwathmey, 2005). In a recent article describing the need for mentoring in academia, Girves et al. (2005) list the multiple national initiatives now devoted to mentoring activities including the Department of Education's mentoring program grants and the White House's Presidential Awards for Excellence in Sciences, Mathematics and Engineering Mentoring, among others (p. 451). The proliferation of mentoring efforts suggests that this is a phenomenon of increasing significance.

Mentoring in Academic Environments

In academic environments, mentoring is often described as a relationship between individuals that involves passing on traditional academic norms and values (Goodwin, Stevens, & Bellamy, 1998). Mentoring is a way of organizing the activities of professional socialization that are not captured in the simplistic ways that classes, field experience, and advising are usually characterized. As a concept, mentorship, suggests that there is an asymmetric relationship among the faculty and their graduate students. One group has special knowledge or judgment that is not generally available to the other. The appropriate sharing of such insights can prove helpful in the other's development (Goodwin et al., 1998).

Just as there is a lack of consensus about the exact nature of mentoring roles in the business world, there is even greater confusion in academia (Boyle & Boice, 1998; Ehrich, Hansford, & Tennent, 2004; Gibson, 2004). To further muddle the issue, there are very few empirical studies on mentoring in academic settings (Girves et al., 2005). However, Gibson (2004) identified five themes in her research on academic mentoring, that she suggests are more important than agreeing on a definition. These themes are (a) a mentor who really cares and acts in the mentee's best interest, (b) a feeling of connection between mentee and mentor, (c) the mentor affirming the mentee's work, (d) the mentee not feeling isolated, and (e) the mentor helping the mentee understand the politics of the work place and profession. What distinguishes Gibson's description from the models described in the business literature is the informal nature of most of these

relationships. In the academic world there is great variation in how norms and values are shared through mentoring. Mentoring may encompass activities such as professional guidance in grant writing, inclusion on research projects, job placement, networking, writing, and teaching, and, at times, includes social features such as shared meals and outings (Goodwin et al., 1998). Mentoring, as we have seen, can be either formal with specific goals, or informal and more casual. With respect to graduate education, mentoring is primarily an informal activity that occurs based on happen stance and personal inclinations.

What is troubling with the sporadic, informal nature of academic mentoring is that research indicates that these relationships are extremely important to graduate students (Wright & Wright, 1987). Most recipients of graduate degrees identify as the most significant aspect of their professional development (i.e., finishing their degrees and gaining academic employment) is their relationship with a faculty member (Blackwell, 1981; Shalonda & Schweitzer, 1999). Further, collaborating with a mentor is consistently equated with a higher level of academic productivity both before and after gaining, specifically, a doctoral degree (Wright & Wright, 1987).

However, academic mentoring also has certain limitations. For example, Ehrich et al. (2004), in their review of formal mentoring programs in education and elsewhere, found that mentoring relationship can be, at times, detrimental to the mentor and/or the mentee. Among the problems are "a lack of time for mentoring, poor planning of the mentoring process, unsuccessful matching of mentors and mentees, a lack of understanding about the mentoring process, and lack of access to mentors from minority groups" (Long, 1997, as cited in Ehrich et al. 2004, p. 520), sexual harassment by mentors (Feinstein, 1988), and dependency by mentees (Busch, 1985). Thus, graduate students and new academics may be paired in informal or formal mentorship relationships which actually may work to the disadvantage of the parties involved.

A second assumption has been that mentoring occurs naturally and with enthusiasm (Wunsch, 1994). However, Boyle and Boice (1998) note that oftentimes "natural" mentoring of new teachers tends to be irregular and short-lived (Boice, 1990, as cited in Boyle & Boice, 1998; Diehl & Simpson, 1989, as cited in Boyle & Boice, 1998) with three unfavorable results. The first is that, in graduate school, many students go un-mentored, even if they desire mentoring (Cronan-Hillix, Gensheimer, Cronana-Hillix, & Davidson, 1986 as cited in Boyle & Boice, 1998; Knox & McGovern, 1988, as cited in Boyle & Boice, 1998). Second, mentoring becomes less likely once recent graduates are employed in academic positions (Sands, Parson, & Duane, 1991, as cited in Boyle & Boice, 1998). Third, and importantly,

as greater numbers of women and minorities enter the professoriate (Crouse, 2001; Furchtgott-Roth & Stolba, 1999) they are less likely to find spontaneous supports that can assist them with their unique set of issues. The issue of changing demographics with respect to faculty and students is particularly noteworthy due to the fundamental changes this growing diversity will bring to the educational process and mentoring relationships, in particular (Girves et al., 2005).

Currently, nationwide, college enrollments stand at approximately 11.0% African American, 8.7% Latino, 6.1% Asian American, 1.0% American Indian, and 73.1% white (Antonio, 2002). These trends in the student body are not reflected in the composition of higher education faculty. In fact, diversifying the higher education professoriate has been difficult due to a small and decreasing pool of minority Ph.D. candidates. Minority faculty often cite poor mentoring relationships and the problems associated with being the only faculty or graduate student of color in predominantly white institutions, as reasons for the low numbers. Tenure also remains difficult to attain due to a lack of scholarly recognition for work that focuses on ethnic minority populations (Antonio, 2002).

Statistics on diversity, however, mask other forms of difference as well, such as different learning styles, cultural and class backgrounds of students, gender issues, and sexual orientation. All play a part in the types of instruction and advising graduate students receive. As Jones (2002) points out, the disjuncture between the professoriate and the student body leads to elevated levels of stress in the graduate school experience. This poses unique challenges for both institutions and the faculty working and mentoring these students. Faculty may not be aware of particular experiences of graduate students and fail to understand unique challenges they faced in attaining a higher education. In terms of racial diversity, for example, white faculty still represent approximately 88% of all fulltime faculty. They may or may not have had the support structures and experiences of the newer generation of students and are often loathe to self-disclosure. For international or culturally/racially diverse students or professors, issues of communication, acculturation, and isolation arise repeatedly during their career development (Rastogi, Fitzpatrick, Feng, & Shi, 1999). "Not receiving instrumental mentoring may translate into significant and cumulative professional disadvantage," according to Moody (2004, p. 48). Revisions to graduate education need to be particularly sensitive to these issues of diversity. Informal and formal mentorship programs in academia can play a crucial role in retaining minority students and assuring successful employment outcomes. By incorporating mentoring processes to promote a scholarship of teaching and

learning, graduate education can better prepare the future professoriate for dealing with the challenges of an increasingly diverse student body.

Using Mentoring to Promote a Scholarship of Teaching and Learning

In a critical analysis of 93 empirical studies of how educators learn to teach in new and better ways, Wideen, Mayer-Smith, and Moon (1998) noted little evidence that merely receiving information about teaching and learning was a highly effective approach. What emerged as a more productive path in learning how to teach was the designing of programs that built upon the beliefs of beginning teachers. At the core of this approach, lies the epistemological stance that learning how to teach is a deeply personal activity in which the individual concerned has to deal with his or her prior beliefs in light of expectations from a university, a school, and society in the context of teaching. According to Boehrer and Sarkisian (1985, as cited in Boyle & Boice, 1998), new teachers benefited more from personal guidance, including mentoring, than from tutelage in teaching skills. Well-designed and implemented mentorship programs can provide a suitable environment for intimate reflection, discussion, debate, and experimentation with regard to teaching and learning that build upon beliefs of teachers as well as on skills.

When mentoring promotes a scholarship of teaching and learning, it provides a vital connection between professors and their graduate students. It allows both future and current faculty to develop their teaching skills, to engage in research, and to interact with students and the material in a dynamic manner. It also introduces students to the best values of the university. Good teachers engage their students and draw them into the material. Often these teachers act as informal mentors, providing discipline-specific information and general life knowledge. They imbue students with the excitement of learning and can instill a passion for knowledge that will pass on the cycle of research and teaching into the next generation. Many academicians entered university life themselves due to the enthusiasm and example of a university teacher. For an academician, mentorship can provide an ongoing forum to engage in debate and discussion about research, teaching, and the more general nature of scholarship (Iowa State University Center for Teaching Excellence, 1999).

Kreber and Cranton (2000) suggest a conceptual path to expanding mentoring to promote a scholarship of teaching and learning. In this model, graduate students are viewed as adult learners who are mentored on various levels including as individuals, as peers, or as participants in formal programs. An important component is that reflection and knowledge transmission be central to the mission. Three types of reflection form the core in this process: (a) content reflection, (b) process reflection, and (c) premise reflection. Content reflection refers to the technical aspects of a course that may include developing teaching materials, preparing lectures, or facilitating discussions. For example, this may include

- knowing how to develop teaching materials such as overheads
- knowing how to facilitate discussion
- knowing a variety of instructional methods
- knowing how to organize or sequence instruction
- knowing how to prepare a lecture
- being able to write learning objectives
- knowing how to construct good tests (Kreber & Cranton, 2000, p. 479)

Process reflection includes strategies used to convey information such as knowledge about learning styles, facilitating collaboration, and providing constructive feedback. This is often characterized by

- knowing how to motivate students with different learning styles
- knowing when to use various teaching materials
- being able to give an interesting lecture
- knowing how to facilitate collaboration among students
- being able to assist students overcome learning issues
- being able to encourage students to think critically
- being aware of pedagogical techniques that develop learning skills
- knowing when and how to provide useful feedback

Premise reflection is the third step of this process. It is at this point that teachers ask themselves why they are teaching a certain way and engaging in critical reflection on the larger goals of the discipline and program steps may include the following:

- judging the quality of course goals
- explaining how a course fits into an existing program of study

- articulating how a course fits a student's learning skills (Kreber &Cranton, 2000, p. 480)

Kreber and Cranton's model explicitly illustrates that, through the growth of a scholarship of teaching and learning, the conceptual isolation of teaching from the primary work of a discipline and of a department is reduced. As an individual's knowledge base increases, the isolation so common to teachers (e.g., Schulman, 1993) decreases, and is accompanied by increased integration of knowledge, as well as interaction around pedagogical and disciplinary issues. The experiences of peers facilitate dialogue and serve to support faculty and graduate students' growth as scholars. These experiences can be integrated into the learning experiences of students who plan to enter academic positions as well as passed on to faculty who wish to improve their teaching.

Some of the strongest most collaborative mentoring relationships occur between individuals who are sharing the same experiences (McGuire & Reger, 2003). Both Jones (2002) and McGuire and Reger (2003) suggest that active learning such as collaboration, discussion, experiential learning and project oriented work allow students to mentor each other. What is important is that neither formal nor informal learning occurs in isolation.

There are multiple means by which mentoring relationships can be strengthened through promoting a scholarship of teaching and learning. For example, mentors can help their partners articulate their goals and objectives as teachers, explore the learning styles and needs of the student population, review course assignments and desired learning outcomes, discuss teaching methodologies, and assess student progress. They can also assist and collaborate with their partners to help them achieve their personal and professional goals as future teachers, scholars, and practitioners. According to Settles, Sherif-Trask, Koivunen, and Madey (2003), some practical and usually successful mentoring experiences are

- discussing graduate and training programs or the job market
- sponsoring students and faculty at professional meetings
- co-authoring together
- writing proposals for research, teaching and program support together
- reviewing manuscripts and resumes prior to their formal submission
- conferencing about teaching portfolio materials
- helping select submission possibilities

- encouraging broader job or training applications
- encouraging collaborations with colleagues at other institutions
- sitting around telling tales of the past that may enlighten the future

With respect to pedagogical training, most graduate programs do not train students in assembling the necessary components to build their teaching expertise. The use of portfolios, reflective journaling, and dialogues about teaching techniques with like-minded colleagues could build the repertoire of budding faculty members. Given the importance put on building a research agenda of publications and grants, these kinds of activities (and gathering knowledge about them) are placed at the low spectrum of importance for many. However, depending on the type of institution where they ultimately find employment, it is precisely knowledge about these aspects of faculty life that may be just as useful to graduate students, as knowing how to obtain a research grant.

As graduate students move through various phases of their professional development, they acquire personal teaching and learning styles through experience and by drawing on the expertise of others. Departments need to assess the effectiveness of all aspects of their graduate programs, and subsequently revise their curricula for preparing practitioners and scholars. Incorporating informal and formal opportunities for mentoring and promoting a scholarship of teaching and learning allow graduate students to acquire the necessary skills to become stronger teachers and researchers.

Formal Mentoring Programs and the Promotion of a
Scholarship of Teaching and Learning

In a meta review of over three hundred research-based articles, Ehrich et al. (2004) found "that mentoring has enormous potential to bring about learning, personal growth, and development for professions" (p. 536). They go on to suggest that it is necessary for administrators and other planners "to be aware of the growing body of research literature on mentoring, the need for program support at various levels, the importance of mentor training, the careful selection and matching of participants, and the need for ongoing evaluations" (p. 536). Their review indicates the primacy that academic institutions need to place on promoting a scholarship of teaching and learning environment through mentoring activities.

Because research has also revealed that not all mentoring is beneficial, attention to formal mentoring programs is important. Ehrich et al. (2004) suggest that

"Potential problems of mentoring are not insurmountable. With careful planning and skillful leadership, most problems can be minimized" (p. 536). They identify several critical factors that optimize the graduate mentoring experience. Among them are that formal mentoring programs require human and financial resources, and that administrators must be willing to commit them as well as time and energy. However, as Girves et al. (2005) point out, while there are some excellent national mentoring programs for graduate students most of these initiatives focus exclusively on the research aspects of faculty life. A notable exception is the PFF (Preparing Future Faculty Program). This national initiative, established in 1993, addresses the mismatch between the education of doctoral students and the needs of colleges and universities that will hire them. Over 300 colleges and universities are currently part of the PFF which operates on a cluster concept. In different geographic areas, one anchor university brings together faculty and students from other affiliated educational institutions in the area for the purpose of professional development. Through the facilities of the PFF, students that belong to various clusters become affiliated with programs and faculty in a variety of institutions. This allows them to observe university life from varying perspectives including teaching, research and service activities. Each program is obligated to present to students a complete scope of faculty roles and obligations (Girves et al., 2005). Current assessments indicate that students who have been affiliated with the PFF achieve greater success in the initial years of academic employment (Girves et al., 2005).

Through the support of the Carnegie Foundation, as well as the American Association for Higher Education, various other programs across the United States are currently promoting a scholarship of teaching and learning through mentoring. For example, over 200 college and university campuses have committed to undertaking efforts of some kind to institutionalize the scholarly side of teaching and learning (Carnegie Foundation, 2005a) while 90 campuses have created 12 collaborating clusters to design, document, and disseminate a scholarship of teaching and learning work related to a variety of topics and issue. In light of the focus of this article on mentoring, the foci of two clusters are of particular interest. The cluster led by Rockhurst University has been concentrating upon mentoring newer scholars of teaching and learning, while the cluster led by Western Washington University is investigating ways to incorporate and sustain student voices in the scholarship of teaching and learning (Carnegie Foundation, 2005b). Both clusters represent current formal efforts on the part of universities to better prepare future academicians by promoting a scholarship of teaching and learning through mentoring.

The discussion above serves as the basis for rethinking graduate education as it is currently conceptualized at many universities. An integral part of this process is mentoring, dialogue, collaboration, and reflection. If scholarly teaching and learning is to advance, academics must address teaching issues and make their findings available to colleagues (Cunsolo, Elrick, Middleton & Roy, 1996). While many faculty members think of teaching as a combination of content knowledge and enthusiasm, mentoring that promotes a scholarship of teaching and learning and links disciplinary knowledge with pedagogical techniques raises teaching to a higher level that is more responsive to the needs of the classroom and our rapidly changing society.

Conclusion

The purpose of this paper was to suggest that scholars utilize mentoring processes that promote a scholarship of teaching and learning to better prepare their graduate students for the teaching component of their future jobs in academia. This path serves a dual purpose: (a) it improves the preparation of graduate students for their roles as teachers, and (b) it enhances the research productivity of faculty and graduate students involved in a scholarship of teaching and learning.

Kreber (2001) points out that virtually all postsecondary institutions stress that a primary educational goal is to teach students to think creatively and critically, communicate and negotiate effectively, argue reasonably, work collaboratively, and learn independently. Simultaneously, rapid social, economic, and technological changes require that people continue to learn for most of their lives. This raises the concern that by educating students exclusively in their disciplines - in the structure, critique, and advancement of discipline specific knowledge – we may not be preparing them adequately for future success. It also raises the question of whether this is a sufficient foundation for fostering the larger educational goal of fostering lifelong learning. On an institutional level, it is important for both private and public institutions to acknowledge the value of mentoring and to incorporate this dimension of professional responsibilities into every aspect of support and evaluation of faculty. One way of accomplishing this is for colleges and universities to promote a campus climate or culture which values a scholarship of teaching and learning. This can be done through various initiatives such as defining a campus as a "Boyer" institution and by joining in collaborative efforts with other like minded organizations.

To date, we have a very limited dialogue about the critical importance of linking mentoring with a

scholarship of teaching and learning. We hope with this paper to spark and sustain a dialogue about the need for linking pedagogical knowledge with discipline specific knowledge and practices and to emphasize that mentoring processes that promote a scholarship of teaching and learning provide a vehicle for better preparing our future academicians during every step of their journey.

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Towards a Sense-Making Pedagogy: Writing Activities in an Undergraduate Learning Theories Course

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This article describes a possible praxis for an undergraduate learning theories course. The philosophies of "a language-based theory of learning" (Wells, 1999), writing across the curriculum (Young, 1994), learner-centered education (Lambert & McCombs, 1998), and critical-thinking (Paul, 1995) are interwoven with the rationale and practice of this course. The paper is structured with descriptions of the institutional context, the theoretical frame, the course organization, the writing assignments and criteria used in this course. In addition, samples of student writing are reviewed to demonstrate students' developing sense-making of the content studied. Possible cross-disciplinary applications and the author's self-reflections about the course viewed through "constructivist dilemmas" (Windschitl, 2002) are addressed in the conclusion.

This instructional article demonstrates the possibilities of a "sense-making" course wherein students were challenged to write, speak, and think critically about theoretical and personal aspects of learning. Much like the intriguing model developed by Ball and Wells (2006), this introductory course was created to model a learner-centered, dialogic-based pedagogy that would "introduce students to the different theories of learning that have been drawn on to explain and shape classroom practices but would also challenge students to explore and critique their own learning practices, their role in educational institutions, and their assumptions about how other people learn" (p. 192). Although rich classroom discussions (Brookfield & Preskill, 1990) and questioning (King, 1990; Wolf, 1987) were a focus of regular classroom meetings, this paper focuses on the writing activities used to guide student sense-making as they studied the psychology of learning.

The paper begins with a brief description of the institutional context within which the course was developed, followed by a sketch highlighting the theoretical streams that were blended in constructing this course. Next, the writing activities and assignments are detailed with student samples provided to emphasize students' thinking. To conclude, the author addresses possible cross-disciplinary adaptations and several "constructivist dilemmas" (Windschitl, 2002) in an attempt to self-evaluate the strengths and weakness of a sense-making pedagogy.

Institutional Context and Course Development

This learning theories course was developed several years ago when I was a new assistant professor. Although I have changed academic institutions, the course rationale, content and pedagogical processes were easily adapted to a different institutional culture. Initially, the course was created with the support of the university Writing Across the Curriculum program (McComas & Lloyd, 2003). That WAC program offered the support and initiation to question my own assumptions about learning as I created a course I had never taught. The course development took place within the context of a year and a half process that included several workshops and one-on-one meetings with a WAC mentor. A primary goal was to create "an experimental course" that would become "WAC certified" through a university-based peer-reviewed process. Once a course was certified, it then became a WI ("Writing Intensive") course. Students were required to take three WI classes to graduate from the university. A WI course never had more than 25 students per section. The course described in the university catalogue was "Applications of learning theories: A study of the psychological principles which are the foundation for learning and teaching." I had the academic freedom to create a syllabus that met this description. There were, however, some institutional goals established by NCATE (National Council for the Accreditation of Teacher Education), departmental goals, and university Writing Across the Curriculum goals that influenced my decisions. The course was a required undergraduate class taken by all education, journalism, health sciences, and physical training majors at a small mid-Atlantic university.

The reflective discipline and creative processes developed through WAC clarified my scholarship towards teaching and learning. The learner-centered foundation made this course easily transferable to my current academic context in a mid-sized Research I university located in the Northwest. The course serves similar program goals by introducing principles of learning to students entering a teacher education program. The same textbook is used and each class meeting is organized with similar agendas. NCATE and departmental requirements still influence the content and structure. My current institutional course catalogue

describes the course as "Reflective inquiry about human learning, development, diversity, and individual differences, examination of implications for teaching and education reform." The theoretical frame, the course content and the activities of the "experimental course" are still used, yet many of the student samples provided in this paper were gathered from my current practice. The course continues to adapt and develop clearly demonstrating the regenerative possibilities of a sense-making pedagogy.

A Blended Theoretical Framework: The Course Rationale

Although I too am neo-Vygotskian in temperament (see Ball & Wells, 2006), the eclectic theory blending for this course includes several theoretical view points. I hold a philosophical preference that "languages are worldviews" (Gadamer, 1994, p. 443) and that language learning serves as a strong model for all learning (Dewey, 1933; Emig, 1977; Gallagher, 2003; Lee, 1997; Wells, 1999). In addition to this linguistic bias, Writing Across the Curriculum (WAC), The American Psychological Association (APA) learner-center principles, and Richard Paul's perspective of Critical Thinking (CT) can be counterpoised to create mutually supportive perspectives on the kaleidoscopic nature of learning through language. Moreover, these approaches emphasize that, given certain institutional and classroom contexts, students can be authors in their own learning, that *learning to learn* requires a balance between structure and openness, that learning necessarily requires learning "new language," and that self-reflective individual thought can lead to improved interpersonal communication and individual self-reflective activity. All four views here cultivate individual human potential and thus can contribute to a more democratic society.

Learning Through Writing

Writing contributes uniquely to learning. Through writing we can create new possibilities not inherent to speaking and observation (Emig, 1977). When we learn a new discipline we acquire particular ways of talking, thinking and writing (e.g., Bazerman & Prior, 2004; Lee, 1997) that assist in creating new thoughts, emotions, beliefs, values and behaviors. Learning a new disciplinary knowledge is a new worldview. Writing is a "literate act" (Flower, 1994) that is simultaneously an individual cognitive endeavor and a socio-historically embedded "negotiation." When learning a new discipline "we cannot separate form from content, writing from knowledge, action from context" (Young, 1994, p. 61). By writing, we learn.

The Writing Across the Curriculum movement emerged in the 1970s with the primary interest in helping students to improve their academic and civic abilities to communicate, and to assist students in becoming critically engaged learners. By visiting the WAC Clearing House home page at http://wac.colostate.edu it is clear that there are numerous WAC programs across America, each serving the unique character of their schools yet each abiding by several key premises: (a) writing assists learning and thinking in implicit and explicit ways; (b) writing is an active learning process key to improving communication (both written and oral) and thinking; (c) writing is embedded within social process some formal, others informal and; (d) writing is primarily (although not exclusively) a social activity (Russell, 1997; Young, 1994). These premises grounded the writing activities used in this course.

Learner-Centered Learning

Closely related with the intentions of the WAC principles are the American Psychological Association (APA) *learner-centered principles* (Lambert & McCombs, 1998). Although arising from a different disciplinary history, these principles resonate with the spirit of the WAC movement. The APA principles were established to address current calls for education reform. The principles provide a framework to create learning environments wherein the potentials of each individual learner are emphasized.

The APA model highlights a dialectic relation between the learner and learning. The focus on the learner "emphasizes that learning is a natural process guided by individual learner's goals arising from the activity itself and interactions with others" (p. 11). The learning principles stress that "teaching procedures such as stating goals to students, summarizing prior learning, clearly presenting information, checking for understanding, modeling successful performance, guiding student practice toward fostering independent learners, and providing correctives and feedback on student performance" (p. 11) will provide the optimal context for individuals to reach their highest learning aspirations.

Applicable to all educational contexts, the APA learner-centered perspective is structured by four mutually reciprocal factors that influence learning and learners alike: (a) Each student has a distinct learning history including a unique combination of emotional, cognitive, and social strengths and weaknesses (*the Affective Principles*); (b) students can constructively engage their past experiences in new learning situations if they are meaningful (*the Individual Principles*); (c) learning occurs best in environments where the students are respected and where positive interpersonal

interactions are fostered (*the Personal and Social Principles*); and (d) learning is not a fixed procedural script that all teachers and students follow everywhere at all times. On the contrary, learning is a natural outgrowth, often spontaneous and unplanned, that emerges in contexts where personal relevance and meaning are highlighted (*the Metacognitive and Cognitive principles*).

These four factors provide a framework with which to think through changes and reformulations in classroom teaching. Although writing is not emphasized as centrally as the WAC perspective, clearly the APA perspective would support using writing as a tool for individual and social learning. In the undergraduate learning theories class described in this paper, these principles are implicitly stated in the course goals and serve as backdrop from which the course was constructed.

Critical Thinking, Critical Learning

In resonance with the effective written communication goals of WAC and the emphasis of learners and learning from the APA principles, critical thinking is the final theoretical strand that completes the framing for this course:

> Critical thinking implies a fundamental, overriding goal for education in school and in the work place: always to teach so as to help students improve their own thinking. As students learn to take command of their thinking and continually to improve its quality, they learn to take control of their lives, continually improving the quality of their lives (Paul, 1995, p. 20).

Paul (1995) equates critical thinking to "higher order thinking" (p. 283), a learning goal emphasized by both WAC and APA. Critical thinking is a set of global principles, not a narrowly defined set of scripts and algorithms. Paul's critical conception of pedagogy contrasts with traditional didactic teaching. For example, (a) Classes with much student talk, focused on live issues is a better sign of learning than quiet classes focused on a passive acceptance of what the teacher says; (b) Students gain significant knowledge only when they value it; (c) Information should be presented so as to be understandable from the point of view of the learner, hence continually related to the learners' experiences and point of view; (d) Depth is more important than breadth of coverage; and (e) Students learn best by working together with other students, actively debating and exchanging ideas (Paul, 1995, pp. 276 -277). Many of these ideas can be realized in a writing intensive, learner-centered, sense-making pedagogy.

In my eclectic application of these four perspectives (language-as-worldview, WAC, APA, and CT) they are mutually supportive of one another, albeit with different historical sources, players, language use, and offer a strong interlacing rationale for the creation of an undergraduate course in the psychology of learning. The following course description demonstrates a possible model for teaching and learning that is useful both *epistemically* (in the abstract big picture) and *phronesically* (in the finer details of context).

The Course Organization

The course content is organized using a respected and ubiquitous educational psychology text: *Educational Psychology* (Woolfolk, 2004). The book is organized into four general areas: *students*, *learning and motivation*, *teaching* and *assessment*. We have a 16 week semester within which to study the content of *Educational Psychology*. Rather than blitzing through all of the colorful, information-packed 579 pages of the text book, our focus is on clarifying some of the "big ideas" (a few concepts, theories, ideas and questions distilled from each chapter) from 12 of the 16 chapters. Four of the chapters are not covered because the content is covered in other courses offered in the program. The goals listed in the syllabus are discussed the first day of class and then revisited occasionally throughout the course and once again at the end of the semester. Checking periodically keeps us focused throughout the semester. This process allows us to informally asses our learning, clarify our questions and offer suggestions for future improvement. The writing activities, in-class activities, and the accompanying class discussions are structured with the following *general* and *specific* *goals* listed in the student syllabus:

General Goals

1. To critically evaluate and make ones' own some of the basic issues presented in the text book.
2. To analyze, synthesize and interpret the readings in your own words.
3. To apply the theoretical and research-based readings into your past, current, and future experiences in education.
4. To become a member of a learning community.
5. To identify, relate, and appreciate the interconnected complexity of learning theory, development, teaching, and educational foundations.

Specific Goals

6. To improve your confidence, craft, and creativity is using *Writing* as a tool to explore, clarify and reflect on the questions and issues raised in class.
7. To begin clarifying and constructing a personal theory/philosophy of learning, development, teaching and education.
8. To develop a working professional vocabulary that will empower you to critically question and interpret some foundational issues associated with learning theory, development and educational practice.
9. To evaluate, synthesize and reflect how (and whether) to apply specific learning theories as they relate to social, emotional, cognitive and moral development.
10. To speak, write, listen, and think confidently and creatively about the multiple dimensions of learning theory, development and education.

A Typical Daily Agenda

Each class session is held once a week for three and a half hours. The agenda is structured to allow for a predictable sequence of classroom events yet it is flexible enough to accommodate the contingencies that arise in a learner-centered environment. On many occasions, much of our class time can be spent debating and discussing "opening questions." Listed on a power point slide, agenda items look like this:

1. *Clarifications*: Assignments, syllabus, reading schedule, etc.
2. *Review*: Big Ideas from last week, readings, writings, videos.
3. *Opening questions*: Student-generated questions, questions from the text and instructor questions.
4. *A Video*: discussion, observations, connections.
5. *Small group discussions*: Summary and textbook-based discussion, other activities.
6. *In-class writing*: (For example, a "one-minute essay")
7. *Large group discussion*: Explicit clarification and "lecturing" by instructor
8. *Projection:* Where will we be next week?

Writing Assignments and Written Assessments

The writing assignments are created to meet course learning goals. In addition, the assignments meet one of my instructional goals to model a formative assessment process. Students create portfolios whereby they systematically collect their various writing activities, daily self-assessments, class notes and other material they find suitable. To study how the writing assignments assisted students in reaching course goals, I collected and analyzed various student-writing samples. Part of this process was required by WAC as a way to evidence student learning through writing. Each assignment has a different *purpose*, *process*, and *product*. Consequently, different criteria, goals and assessment processes are used. Table 1 outlines the purpose of the writing assignments, the intended audience, writing timeline, targeted course goals, and the assessment approach used. For some of the writing assignments I have included several student samples to demonstrate how they meet the course goals, and thus, how they demonstrate student sense-making.

Chapter Summaries

Chapter summaries are created by all students for each chapter we read. There is a simple structure students follow (adapted from Palinscar, 1987): (a) one paragraph summarizing the chapter content; (b) a list of 5 key terms of their own choosing including student-generated definitions for each term; (c) three "critical" questions related to the chapter; and (d) a personal connection/response paragraph where students are encouraged to make connections between their own experiences and the reading content. Some students hand write their summaries while others prefer to type them. The summaries are informal, non-graded and the students are primarily their own audience. I collect several students' summaries each week, I quickly peruse the summaries adding "dialogic comments" that note interesting insights or questions, ask for clarification or elaboration, and/or add encouraging remarks. In opening discussions, I frequently use the summaries from previous weeks to make connections with the current and subsequent weeks.

Students include these summaries as one section of their course portfolios. The major goal of summary writing is to provide a non-threatening context within which students can struggle with the new terms and concepts and prepare for small and large group discussions; the summaries serve as a connecting text between students' interpretations and questions, the textbook and classroom discussions. I often observe students adding new ideas that emerge in class, deleting and/or elaborating on other ideas on their summaries as discussion develop in class. (See Appendix A for an example.)

Most students find summarizing a useful endeavor. Many students find the process of reading, summarizing and open class discussions a powerful process for learning the content of the chapters. One

Table 1
Writing Assignments, Purpose, Audience, Timeframe, Goals, and Evaluation Method

Purpose	Audience	Time	Goals	Evaluation
Chapter summaries Prepare for and contribute to class discussions	Self and other students	Weekly On-going	General (all) Specific (all)	Check +/- Evaluated Weekly
Letter home from Nacirema To address cultural assumptions	Friends Close others	Read Nacirema, then write One week	General (2 and 5) Specific (1, 4, 6)	50 point rubric Evaluated once
Learning autobiography To clarify "turning point" and/or critical incident	Self Instructor Possibly professional	Read "Aria" then write 4 weeks	General (5) Specific (1, 2, 5 and 6)	100 point Rubric Evaluated once
Reflection on learning game video or other activity	Instructor	1– 5 minutes	General (1, 3 and5) Specific (6, 7 and 10)	Check +/- Evaluated once
Mid-term learning summary Reflection on class activities, personal learning	Self and instructor	10 – 15 minutes	General (1, 3, 4 and 5) Specific(6, 7 and 10)	Check +/- Evaluated once
Inquiry project To address a specific academic questions/topic; summarize professional literature.	Instructor Other students Other professionals	13-14 weeks	General (all) Specific (all)	Formative Summative

student wrote in a mid-term reflection activity that "Writing chapter summaries encourages us to read each chapter and working in small groups allows us to get other people's perspectives on the new material." In student evaluations, another student commented on the time-consuming nature of writing weekly summaries: "The chapter summaries became a bit too much at times, but were useful" for preparation and class discussion. Writing summaries was one way students struggled in their sense-making of learning theories.

The Learning Autobiography

After studying chapters on personal development and individual differences in learning (Woolfolk, 2004, pp. 22 – 149), each student wrote a Learning Autobiography. In addition to the text book chapters, students read *Aria* (Rodriguez, 1981), a brief autobiographical account of a significant turning point in this author's life that changed the way he thought about himself, his family, and his public and private identity. *Aria* is a story that connects well across several textbook chapters where self-esteem, identity, cultural difference, and emotional and moral development are introduced. In addition, *Aria* is a well written example of a learning autobiography that fueled the debate on bilingual education when it was published in the early 1980's. The main purpose of the learning autobiography in this psychology course was to challenge students to look proleptically (simultaneously viewing the present in terms of the past while anticipating the future) at significant events in their life that may have changed they way they viewed themselves, others and/or life.

The autobiography is similar to the critical incident research technique (Kain, 2004; Tripp, 1993) that emphasizes discovery of significant events unique to an individual. Tripp used critical incident technique as a way to "problematize" teaching, as a way to challenge teachers to become more aware of professional and personal issues that influence their practice:

> Critical incidents are produced by the way we look at a situation: a critical incident is an interpretation of the significance of an event, to take something as a critical incident is a value judgment we make, and the basis of that judgment is the significance we attach to the meaning of the incident. (p. 8)

Other university instructors have detailed their use of the learning autobiography as a self-exploration process in higher education (Karpiak, 2000).

Students were asked to narrate in writing an event or events that had an impact on their personal worldview. There was no restriction on what could be written about. Some students chose specific events, other chose several intertwining events, while others wrote of gradual changes that took place over several years. Although I served as the primary audience for the autobiography, we discussed the possibilities of expanding their stories in sections of their personal portfolio that might be used in job interviews, professional development courses and as a writing sample for the university wide "writing intensive" requirement.

When assigning this writing, many students looked befuddled and perplexed. One student responded, "I have a learning autobiography?" In class discussions,

many students commented that they did not realize the depth of a particular experience nor did they realize the personal importance of an event until they were required to articulate to another person the "significance" of the event. Many students commented that they were pleasantly surprised to discover that the writing was a "disequalibriumizing" (one student's word) learning process and that the experience they choose to focus on gained new significance after reflecting on, describing, and narrating their experiences. "I enjoyed learning from my learning autobiography," was a comment echoed by many students. Another student added in a subsequent writing activity that "It was an assignment that helped me open up and really assess my thoughts and beliefs." Some of the topics that were included in the learning autobiographies included: losing a loved one in a dramatic death; becoming a majorette; epiphanies within conversations; religious conversion; visiting another country; drug rehabilitation; becoming a parent; the influence of a past teacher; working with animals; specific moral dilemmas; abusive relationships and divorce. (See Appendix B for assignment criteria).

A Letter Home from Nacirema

In addition to reading a text book chapter on Culture and Community (Woolfolk, 2004, Chapter 5), students also read a classic anthropology article entitled, "Body Ritual among the Nacirema" (Miner, 1956). The article presents familiar cultural information about various practices like going to the dentist and the doctor, but describes these activities with language that makes them sound foreign, brutal, and strange. For this assignment, students were to imagine that they were world travelers and they were visiting a foreign place named Nacirema. They were to write a letter home to a loved one that described their experiences in this strange land. In the letter, students were asked to compare and contrast the Naciremian rituals with their own daily rituals "back home" by noting three points of commonality between the Nacireman and the American way of life. As you've probably noted by now, the Nacirema is American spelled backwards. Very few students actually realized this until our class discussions. Much of our discussions focused on the dawning recognition that the rituals we take for granted could be seen strange, obscure even unhealthy if presented from another linguistic perspective. One student sent me an email explaining her continued surprise as she walked home after class:

> I feel like an idiot. I am just being honest. I turned my "letter to home," in today and didn't think anything of it. I went out to eat, came back, and decided to read the article, "Body Ritual among the

Nacirema," again. To my horror, I was right. How could I have not seen it. Nacirema was really the word American. This article was about the American society. I was just writing to you to make me feel better about my intelligence level. After reading the article again, it all came together. It is so weird how reading something in a foreign perspective can make people so stupid. I just didn't want you to think I was an idiot when you read my paper. I am just a little slow.

The sentiments of this response were echoed by many students. (The simple evaluation checklist is included in Appendix C and an excerpt from a letter is included in Appendix D).

Informal In-Class Written Assessments

In addition to the summaries, the learning autobiography and the letter, informal written assessments were used throughout the course. Some of these assessments included a "one minute essay," a mid-term "active learning summary," and reflections on a one week "productivity study."

The one minute essay. The one minute essay was used after the completion of a cross culture communication game (Bafa Bafa, Shirts, 1977). This writing serves as a "debriefing" (Patranek, 2000), as a means to begin making sense of a new learning experience. To play the game, the class is randomly divided into two cultures: The Alphans and the Betans. In separate rooms, each group learns a unique language and culture. After they have mastered their new cultural system, they are invited one-by-one into the other culture where they are challenged to communicate with members of the other culture using only their new mode of communication. For example, the Alphans communicated by close approximation to each other and start each conversation with a comment about the men in their lives, whereas the Betans used a simple syllabic language to conduct trade negations for certain color coded cards. After about 15 minutes visiting their foreign country, they returned to their "home" culture. This cross-cultural travel takes about 90 minutes. After the game was completed, the following writing prompt was used:

Explain what just happened here. What were some of the emotions you experienced while playing? What did you observe about the "others"? What did you learn about learning? How does your experience here apply to our class in learning and teaching?

Here are several excerpts from student responses demonstrating their sense-making:

1. It was fun but crazy. Kind of like trying to speak to someone from a foreign country. I

guess that's how it's going to seem when we start teaching. Like we are walking into an entirely different world.

2. My level of comfort was tested greatly when I visited the Beta culture. I was confused about their form of communication and frustrated at my inability to communicate. Why couldn't I understand them and them me? As a complete outsider without any information, I was much more comfortable retreating into a corner to watch. A very lonely feeling that I believe over time would change to anger. I simply did not know how to act and what to do in order to assimilate.

These comments give an immediate insight into student learning within the context of this game. The confusion of learning a new language, the ambiguity of trying to communicate in another cultural system and the connections to possible classroom scenarios are present in many of these "one-minute essays." These debriefings were used in later class discussions to highlight some of the textbook issues we read including culture shock, cultural assumptions, differential treatment, deficit theory, stereotypes, stereotype threat, proxemics, pragmatics, and empathy emerged in subsequent discussions.

The active learning summary. The Active Learning Summary was another informal writing activity that yielded much insight into student perceptions and learning within this introductory psychology of learning course. The writing activity was given as a mid term reflection "quiz." The open-ended prompts included the following:

1. So far this semester I have learned _____.
2. As a result of what we have studied in this class, I'm beginning to wonder _____.
3. I was surprised by _____.
4. If there is one thing I would have my professor change in this course, it would be _____.

This was a simple but useful in class reflective activity because students gave a brief glimpse of some of the issues they were learning, some of the strengths and weaknesses of the course, and it gave them a chance to summarize up to that point what they had found important in the course. Here are a few of the comments students offered:

1. I have learned various methods of understanding students' thinking (e.g. Vygotsky, Piaget) and teaching skills (e.g.

constructivist, whole-language). Learning to question theories and challenge others ideas has become easier, too.
2. The word "Hermeneutics" and its meaning and how it applies to me.
3. How to annotate articles, a little more about myself (learning autobio), how to work in groups, and cultures and differences (Bafa Bafa).
4. This semester I have learned many new concepts about teaching and the way students learn. I think this class along with the other four I am taking this semester have taught me so many things about the classroom-things I really need to know and that will benefit me in the long run. Most importantly, aside from the text material, I learned a new way of teaching. The "trust" system is great.

Indeed *trust* was a major component of the classroom environment. One student was very clear about what they weren't learning: "So far this semester I have learned a little bit about everything and a whole lot about nothing." Another student realized, "That I am not enjoying my specialization. I do not want to work with young children. If I wasn't so close to graduating, I would change my major."

Yet when another student completed the prompt *I was surprised* by writing, "the revelations my learning autobiography brought about. I never realized how important reading is to my life and how it has affected me. I was able to pinpoint the exact moment my life took me on the path to teaching." Although simple in appearance, the mid-term writing was a powerful clarification for many students' sense-making.

Reflection summary on the personal productivity study. "After this assignment I know that I need to work more on studying." This was a common theme for many students who completed a self-study project during our focus on "Complex Cognitive Processes" (Chapter 8, Woolfolk, 2004). In class we discussed the basic distinction between *strategies* and *tactics* and some basic processes in problem solving. We discussed that *strategies* are general approaches to learning whereas *tactics* are more specific processes involved in learning various tasks. As a group, we agreed that tactics maybe part of a strategic plan. To challenge students to reflect about their own thinking, problem solving, strategy and tactic use, students conducted a one week "productivity study." On a work sheet with labeled columns, they were to keep track of specific "learning tasks," the strategies and tactics they used to accomplish the task, the time they started and

finished the task, and then they were to self-assess their productivity by rating on a scale of one (not productive) to five (very productive). After they completed the self-observation, they were to write a reflective statement about what they learned as they conducted their week-long study. These reflections demonstrate students beginning to question and appreciate their own struggles in sense-making:

1. After doing my productivity study I can see that overall not very much of my time is sent on studying … The way I study it to write notes, read the chapter and then repeat the key points. I'm not sure this works for everything but it's been the way I always study.
2. I learned I tend to be more of a visual learner. I did a variety of different tasks from cooking to writing a paper. It helps if I have a demonstration or watch someone else perform the task.
3. Most of my bad study habits come from a poor studying environment. I also think that I was never taught how to study. Instead I have had to teach myself how to study while in college.
4. From looking at my results I am above average in productivity, I always knew that I worked hard to receive good grades or to get the job done right I did not know, however, that I was this productive … from looking at this study I now know I am more productive than what I thought I was.

From an instructional view point, these informal written assessments (the one minute essay, the active learning summary, the productivity study) were useful in learning more about students' experiences, their concerns, their joys, their struggles and their learning. Likewise, students reported that these writings gave them insight to their developing understanding of learning and teaching, and as importantly, students learned a little more about their own learning.

The annotated inquiry project. This writing activity was the only long-term formal paper required in the course. In addition, this extended writing activity met the larger institutional goals of having students create a "review of research" that was to be included in their graduating portfolio. Students were challenged to focus on a specific topic of their own choosing that was related to the learning, teaching and education. The intention behind this project was for students to explore a topic in some depth that they could begin to study with the aim of revisiting this topic as they developed professionally.

The Inquiry Project proceeds through several phases of writing. We began with brainstorming possible topics during the third week of class. On the seventh week of class, students wrote a project proposal that clarified the focus of the paper. The proposal also included citations for 5 – 7 sources that they would use to draft their final paper. After the proposal has been approved, we wrote on several different class times drafting introduction and review paragraphs. These drafting sessions lasted approximately 30-45 minutes wherein we discussed and revisited the criteria and clarified other issues that individual students might have had. Near the end of the course, students brought a fully drafted paper to class that was exchanged and read/reviewed by another peer in class. Finally, the finished paper include an annotated review of 7 – 9 pages and a "next step" that may lead to constructing a pamphlet, "guidelines," possible research questions, tips for teaching, etc. This writing project is a lengthy project that requires spending time brainstorming, drafting, writing, and revising. The project spanned 13 of the 16 weeks of the semester. The project was comprised of the following phases:

- Phase 1. Brainstorm and clarify several ideas you would like to study in depth.
- Phase 2. Meet in library; participate in "intro to internet research."
- Phase 3. Write a one page proposal with three parts: (a) Your topic and why you chose it; (b) 5 – 7 professional references that will be read and cited; (c) a "next step" describing how you will apply what you learn.
- Phase 4. In class drafting; checking with sample and criteria.
- Phase 5. Peer-edit a draft of another student's annotated project.
- Phase 6. Turn in final paper, give brief oral presentation and discuss your "next step."

Topics that students choose to study included (a) education in Appalachia; (b) components, strategies and benefits of the project approach; (c) interventions for teachers of students with dyslexia in the regular classroom; (d) assessing risk in the inner city and ways you can help; (e) counseling adolescents: Methods and theories; (f) a children's guide to understanding autism; (g) how to successfully detect and instruct children with mathematical difficulties.

All of the above writing activities emphasized the integration of personal and disciplinary language, WAC, APA, and CT skills. The writing served as a tool whereby students could openly explore and elaborate on some of the content we were studying as well as a

tool that would assist in assessing student sense-making in our introductory learning theories course.

Cross-Disciplinary Application

Writing is "one of humankind's most powerful tools" (MacArthur, Graham, & Fitzgerald, 2006). As many of the writing responses demonstrated, students struggle to voice their own definitions, their own questions, their own understanding, and their own learning. In combination with regular reading, daily small group and large class discussions, the writing activities served as a springboard for student learning. Although these activities and dialogic processes are structured within a learning theories course, the theoretical frame and many of the activities are not content restricted. The student-first, language-based theoretical rationale, the daily structuring of purposeful dialogue, and many of the in-class and extended writing activities could be adapted "across the curriculum." For example, summary writing can be used in almost any context where students are expected to contribute and negotiate in class discussions. The questioning that arises from the summaries could lead to discussions of ethical dilemmas in disciplines like business, medicine, and law. The writing of a learning autobiography is adaptable to disciplines like anthropology, history, philosophy, health, economics, and political science that have rich disciplinary language, theories, and stories directly related to human experience. Writing a letter home could also be adapted to a context where students are challenged to explain and describe technical content to a lay audience. One minute essays can be used following the viewing of a video clip or a movie, and after listening to music or a lecture as a way for students to record their immediate thinking. Finally, the extended inquiry project could be adapted to almost any discipline where the goal was to integrate literature, to connect with course content and to assist students in acquiring disciplinary writing structures. I have used a sense-making pedagogy and similar writing activities in an Introduction to Research course, Advanced Educational Psychology, and courses entitled Tests and Measurements and the History of Literacy. In any course where student learning is the primary purpose, writing activities within a sense-making pedagogy can be created and adapted.

Discussion

Constructivism is kaleidoscopic in its meaning and use. Creating a constructivist pedagogy requires wrestling with conceptual, pedagogical, cultural, and political dilemmas simultaneously (Windschitl, 2002). Windshitl's framework offers a useful thought tool that "involves a number of critical questions that can prompt teachers to interrogate their own beliefs, question institutional routines, and understand more deeply the forces that influence their classroom practice" (p. 134). Although the framework was primarily targeted for K-12 teachers, it served as a critical lens for my attempt to create the course described in this paper. As a way to reflect on and discuss the course described here, I will address several of the conceptual and pedagogical dilemmas that I found particularly challenging.

1. Do all activities result in knowledge "construction" by students? No. I can't definitively state that every writing activity for every student resulted in the construction of knowledge. However, by reading the students' writing, some of which I included in this paper, I can be confident students did create personal and professional understandings as a result of the writing and other in-class activities. The writing activities outlined above challenged students to summarize, question, clarify, elaborate, create, argue, reflect back, project forward, describe, and otherwise make their thinking visible by putting their thoughts on paper. That they created new understanding of learning, I think, is evident in their writing samples.

2. If certain ideas are considered correct by experts, should students internalize those ideas instead of constructing their own? It depends. I am unclear who the ultimate authority in learning theories would be. Perhaps my Ph. D. in human development and cognition qualifies me as an expert, yet my own understanding of ideas changes the more I read and study, the more I teach, the more I live. We used Anita Wolfolk's *Educational Psychology* (8th ed.) as our class text. Like any "text," this book represents a certain knowledge bank deemed "correct" by publishers and other educational psychologists alike. Moreover, the text clearly has the majority market share in textbooks on educational psychology demonstrating a certain influence that the book has. Had I chosen another text to use, however, the content, key terms, and presentation would have been subtly different (Holder, 2006). As I tried to demonstrate in this paper, writing played a crucial role in my attempt to guide students in challenging, questioning and, to a certain extent, appropriating some of the "Big Ideas" in the psychology of learning. To the extent that students "internalized" the content (i.e., key terms, concepts, theories) of each chapter with a correct meaning-to-word copy, I am not sure. I am confident, however, that students did demonstrate understanding and insight of key ideas in their various writing tasks. More importantly, their writing demonstrated that they did begin to make sense of the disciplinary ideas by filtering them through their own learning experiences, thus making the ideas personally meaningful. Some students even began challenging "the dominant discourse" of educational psychology (Gallagher, 2003)

and wondered who sets the agendas for an educational psychology text. Most likely, the students in my course will not become educational psychologists or professional learning theorists. However, they will become teachers, counselors, and other social service professionals who will benefit by applying the ideas of the course "text" to their unique personal and professional circumstances.

3. What does it mean for me to become a facilitator of learning? I fancy this paper as an attempt to describe a "liberating praxis" (Gallagher, 2003; hooks, 1994). Throughout the course and on any given day, students were co-constructors and joint interrogators who individually and collectively sought some foothold, a first step in understanding the rich complexities of learning and teaching. A major underlying premise in my own thinking for this course was a belief that "Having to say something is a very different matter from having something to say" (Dewey, 1933, p. 246). Through our writings, discussions, and class activities, students learned from each others' experiences. I encouraged students to make as many connections as they could between our class's content, other classes they were taking and had taken. I encouraged students to challenge the ideas presented in their textbook. Most importantly, I encouraged students to make connections with their past, present, and future life experiences. In this way, I sought to facilitate students' sense making of learning theories.

4. What types of assessment will capture the learning I want to foster? I tried to demonstrate how certain writing activities aligned with a language-as-worldview, learner-centered, critical thinking pedagogy. I also tried to demonstrate here how I saw each writing activity aligning with the course goals. The writing activities spanned a range of informal, in-class writing to formal time-intensive "review of research." Most activities had clear performance criteria and rubrics for successful writing. The writing samples I collected, a few discussed in this paper, demonstrated student involvement, student concerns, student understandings and misunderstandings, students' perspectives, student questions and student doubts about the content we studied. In short, the various writing activities served as key assessment tools in my attempt to foster these students' sense-making.

5. Can I trust students to accept responsibility for their own learning? Yes. Among the many issues I learned was that "writing intensive" for students means "reading intensive" for instructors. Some of my colleagues warned me about the trails and tribulations of collecting student writing. Other colleagues adamantly refused student writing, student voice. It was through reading student writing,

however, that I learned that, given an honest and respectful context, students will make an honest attempt to study, reflect on, connect with, and otherwise learn the content of our course. In short, I learned to trust students' attempts at making sense of learning theories and their own learning. At times, I still struggle with reading student writing. I have learned, however, that the "praxis of charity" (Porter, 2001) is a hermeneutic process that necessitates I too learn to make connections and challenge my own assumptions and weaknesses. Students will be responsible if they see a value in their struggle to learn. Value in learning comes when students are given the space to question the world and voice their experiences.

Making sense of learning theories requires both teacher and student to question, to critique, and to be open to new possibilities. To conclude this course description, one student's unsolicited email demonstrates the possibilities inherent in a writing-intensive, learner-centered, sense-making praxis:

> I'm writing this e-mail on a whim. Yesterday in class, I actually knew the answers to the questions that you were asking. I wasn't looking at notes, and I didn't even need to stop and think about the question. That truly amazed me. I can honestly say that I've NEVER been able to do that, and I only read the material once! I've always had to study and reread everything it seems when it comes to text book material. I guess what I'm trying to say is I actually WANT to read it. It just absolutely befuddles me. I've NEVER ever honestly read a text book except for maybe a chapter here and there or just skimming it, but I'm really truly READING this one! ... I WANT to learn them (referring to ideas presented in the course), I WANT to talk about them, I'm passionate about them!

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Appendix A
An Example of a Student's Chapter Summary

My summary: 3 Big Ideas

1. Some psychologists assume that mental processes exit and that they can be studied scientifically.
2. Knowledge in the cognitive perspective includes both the subject Specific understandings and the general cognitive abilities.
3. Semantic memory is the memory most often used in schools, words, facts, theories, and concepts.

5 Key Terms

1. Automaticity - The ability to perform thoroughly learned tasks without much mental effort.
2. Chunking - Grouping individual bits of data into meaningful larger units.
3. Script - Schema or expected plan for the sequence of steps in a common event such as buying groceries or buying pizza.
4. Retrieval - Process of searching for and finding information in long term memory.
5. Metacognition- Knowledge about your own thinking process.

3 Questions

1. What would you say is the main factor in learning?
2. What is the main reason that we forget things?
3. Are mnemonics used extensively in the school systems?

Personal reflective response

This was a very interesting chapter. I am interested in the way that memory is retained and forgotten. I think that this information can be very valuable in the school setting. I also like how that word "Metacognition" came up again. I think that is a word that I'll hold onto for a long time.

Appendix B
Learning Autobiography Assignment Sheet

Read *Aria* written by Richard Rodriguez (I will give you a copy of this chapter). When you finish, consider the four sets of questions at the end of the chapter. We will discuss some of them during our class discussion.

For the purpose of your learning autobiography, reflect back on your life as a learner. Was there a time, a place, a certain situation that you remember well that really influenced your thinking, your attitudes, and your dreams? Is there a "critical incident" that changed your life? Was there a teacher that really changed your way of thinking? Was there an episode of events that really made you think? Was there a "turning point" one day in your life that changed your worldview? This is an open writing assignment. I have but a few expectations.

1. I expect that you use will use standard written English grammar.
2. I expect that hat you will edit and spell check your paper.
3. I expect that you spend several "sessions" putting this paper together.
4. I expect that this will be frustrating for some of you, painful for a few of you, enlightening for most of you.
5. I expect that you will learn a little more about your self as a learner and possibly why you chose to enter the teacher education program here at Marshall University.
6. I expect that you will be PROLEPTIC: That is, I except that you will carefully reflect back while in the present while looking towards the future!
7. I expect the paper to be from 3 – 5 pages long. If you want to write longer, go for it!
8. This paper is completely confidential. I am the only reader

To accomplish an exceptional paper, you will need to consider and include at least the following.

1. Is your paper coherent? Does your story hang together? Have you spent time describing the situation, the people, time and the place? Does the story have some sort of "movement" a direction?

2. Does your paper contain some of the following? Names: people, places, objects, etc. Visual details of the scene, the objects, the people (i.e., sizes, colors, shapes, features, textures.) Sounds, smells, unconscious impressions. Dialogue; Interior monologue; Expressions of remembered emotions, thoughts insights Suspense, tension, catharsis;Surprise connections with past, present, future; i.e. Prolepsis. Comparisons and contrasts.

3. Have you provided the reader with a context? Is your narrative situated in a specific time, place, scene, etc? Have you carefully chosen details that highlight relevant aspects? Do you have sufficient description and action?

4. Can your reader hear your voice, your attitude and/or your emotional response to the event?

5. Have you spent enough time telling why the event/events were important to you?

6. Does your paper have: Well-chosen details? Well-chosen words? Well -chosen sentence variety? Word play, imagery?

Appendix C
Grading Checklist for the Letter Home

Use this simple checklist to help you structure your "letter home."

1) Did you include a date and opening salutation?
        Yes = 2.5 points. No = 0 points.

2) Does your letter include a paragraph that orients your reader to the place, time and people?
        Yes = 5 points. No = 0 points.

3) Have you discussed at least four specific rituals unique with the Nacirema?
        Yes = 10 points. No = 0 points.

4) Did you compare and contrast the Nacireman way with at least two of your own cultural rituals?
        Yes = 10 points. No = 0 points.

5) Does your letter include your personal feelings and reflections?
        Yes = 10 points. No = 0 points.

6) Does your letter "speak" as if you were really talking to your reader?
        Yes = 10 points. No = 0 points.

7) Did you end your letter with an appropriate closing?
        Yes = 2.5 points. No = 0 points.

Appendix D
An excerpt from one Sample of the Letter Home from Nacirema

Dear Ramon,

       I know you are aware about long-term existing "machismo" in Mexican society.

Now, I want to tell you about the Nacirema people. They are a North American group that live between the Canadian Cree and Tarahumare of Mexico. This cultured existed 20 years ago, in 1985. The Nacirema people spend their time in economic pursuits and also spend part of the day in a body ritual activity. They believe that the human body is gruesome and man can only aid this with body ritual activity.

       Every home has a shrine or many shrines, wealthy and powerful people have many shrines, but poorer people have fewer shrines. These shrines are found in boxes inside the interior walls of homes. They contain charms and potions that these people use. The most powerful of these are the men known as medicine men. The Nacirema people go to these medicine men, and of course for their assistance the Nacirema must pay with gifts. Then the medicine men write ingredients in a secret language for the herbalists to read. Then the Nacirema people give the herbalists another gift in exchange for a charm. After this, the Nacirema people go home and put their charm in their household shrine. …

       Anyway, two similar rituals that my bi-culture has with the Nacirema culture are: the medicine men and the Holy water in the font. In my Mexican culture people pay money (a gift) to the "curaderos" (medicine men) in hopes that their health, body, and mind will become better. Sometimes people get better on their own, but they believe otherwise and go back to the. "curaderos." In my American culture, people use water in the sink (holy water in the font) to brush their teeth and wash their face.

       Wow, I just realized that the Nacirema and my two cultures have a lot in common. Rolando, Medicine men exist here in American and also in Mexico. I guess from place to place, civilization change becomes more appropriate to the culture, right? For instance, the (holy water) at Mexico does not come from the sink or at home. Year after year the Nacirema people visit these "holy mouth-men." If the Nacirema people attract more friends, then I, too, would go to these "holy mouth-men."

Adapting Instruction To Individuals:
Based on the Evidence, What Should It Mean?

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We examine the argument that teaching will be more effective if adapted to individuals -what we call the interaction/adaptation hypothesis. What is likely correct about this hypothesis (but needs more research) is that modality of instruction may need to be adapted to certain types of content (e.g., geometry vs. literature) or to domain of objectives (e.g., cognitive vs. psychomotor). What is also correct (and has much empirical support) is that instruction needs to be adapted to the learners' prior knowledge and experience vis-avis the material to be learned. What is incorrect is that instruction should be adapted to learners' styles. We describe some of the major historical conceptualizations of adapting to individual differences, including summaries of the empirical evidence on these approaches. Finally, we offer an alternative approach--namely adapting to individuals' prior knowledge.

The argument that teaching will be more effective if it is adapted to the needs of individual learners is undoubtedly true, but the instructional inferences typically drawn from that fact are unsupportable. Unsupportable inferences include that instruction should be differentiated or adapted to students' learning styles, aptitudes, personalities, hemispheric preferences, intelligences, or other dispositional traits. For example, a person high in mathematical intelligence would learn best about music when instruction focuses on concepts from the mathematical domain (e.g., ratio of beats per measure), while the kinesthetic learner would learn better by actually playing a basic instrument (e.g., the tambourine), and the visual learner would benefit more from observing music being performed than from listening to a recording. Similarly, a person high in linguistic intelligence may understand math better when examples are presented in a verbal rather than mathematical form, or that someone with strong interpersonal abilities would learn more about history when instruction includes more details about the personal lives of historical figures. These types of assertions—no matter how apparently reasonable or satisfying they seem—are empirically incorrect (e.g., Willingham, 2005).

This notion, which we shall call the adaptation/interaction hypothesis, has long been a pervasive idea in education. In different decades it has been called adapting instruction, aptitude-treatment interactions (ATIs), trait-treatment interactions (TTIs) and, currently, differentiated instruction. As defined by Heacox (2002), providing differentiated instruction "means changing the pace, level, or kind of instruction you provide in response to individual learners' needs, styles, or interests" (p. 5), with styles being defined as "where, when, or how a student processes information" (p. 8). Similarly, Tomlinson (1999) identifies "what,"

"how," and "why" as the foundations of differentiation (pp. 48-49). Furthermore, another popular resource by Gregory and Chapman (2002) also stresses the importance of learning styles differentiating instruction.

Unfortunately (to paraphrase Santayana), those who cannot remember their research history are condemned to repeat it. And our research heritage includes a large corpus of very good quality research that failed to find interactions between learner traits and teaching methods (e.g., Cronbach & Snow, 1977), despite adequate reliability of the measured traits. Instead—and this is good news—treatments that are effective for one type of individual tend to be effective for others as well; that is, treatments show significant main effects on achievement, not aptitude-treatment interaction effects.

What is likely correct about the interaction/adaptation hypothesis (but needs more research) is that modality of instruction may need to be adapted to certain types of content (e.g., geometry vs. literature) or to domain of objectives (e.g., cognitive vs. psychomotor). What is also correct (and has much empirical support) is that instruction needs to be adapted to the learners' prior knowledge and experience, prerequisite cognitive strategies, and emotional readiness (e.g., are there symptoms of learned helplessness?) for the material to be learned.

It is our purpose in this article to describe some of these historical conceptualizations of adapting to individual differences, followed by a brief summary of the empirical evidence on these approaches. Then, we shall offer an alternative interpretation of adapting instruction to learners that respects their individuality (rather than grouping them by traits for instructional purposes, as ironically embodied in the adaptation/interaction approaches).We finish with some general implications.

Cognitive Style and Aptitude

The debate over whether intelligence is a single trait or composed of multiple factors dates back at least to Spearman (1927). Not surprisingly, those who advocated multiple factors attempted to relate such factors to learning and instruction. Over time, various models and theories have been proposed, with the seminal work on individualized learning done by Guilford (1967), Cronbach and Snow (1977), and Messick (1976). Each present models that are intended to predict, based on individual characteristics, the extent to which someone would benefit from a particular type of instruction in a given area.

Guilford (1967) was arguably the most ambitious in attempting to identify and reliably measure intellectual traits. His model included five operations such as memory and divergent thinking, four content areas such as symbolic and semantic, and six products such as classes and relations. These inter-related dimensions could be combined in 120 (5x6x4) combinations that represent distinct intellectual abilities (e.g., divergent thinking/relations). Each of these, in theory, could be used to predict a person's potential to learn or solve problems and, therefore, provide the learner a differential diagnosis and instructional prescription (though that was not Guilford's primary concern).

Going beyond the intellectual abilities identified by Guilford, Messick (1976) combined them with personality traits into what he labeled *cognitive styles*. This more inclusive construct was defined as follows: "Cognitive styles…appear to serve as high-level heuristics that organize lower-level strategies - often including abilities - in such complex sequential processes as problem solving and learning" (Messick, 1976, p. 9). To further delineate the difference between ability and style, Messick offered distinctions in terms of quantity and value:

> Abilities are value directional: having more of an ability is better than having less. Cognitive styles are value differentiated: each pole has adaptive value in different circumstances. The high end of ability dimensions is consistently more adaptive, whereas neither end of cognitive style dimensions is uniformly more adaptive; in the latter case adaptiveness depends upon the nature of the situation and upon the cognitive requirements of the task at hand. (p. 9)

Messick went on to identify 25 dimensions including *field independence* versus *field dependence, constricted* versus *flexible control, and risk taking* versus *cautiousness.* Consistent with the assertion that there is no value attached to being high or low on any

of these dimensions, those who are field-independent focus more on discrete components of their environment while those who are field-dependent have more of a global orientation; those who are flexible can tolerate distractions during learning while those distractions inhibit learning in those who are restricted; and, risk takers are willing to take chances to obtain desired learning goals while those who are cautious focus on goals that can be achieved with a degree of certainty.

Styles or traits are typically determined by having students complete a self-report inventory, and while they are less reliable than achievement tests many inventories have been shown to have acceptable reliability (Hopkins, 1998, p. 436). Reliability of a trait is of course necessary, but not sufficient. And validity for one purpose, for example predicting career performance (Hilliard, 1995; Weiseman, Portis & Simpson, 1992) does not imply validity for another purpose (e.g., rate or ease of learning something). No one understood this better than Lee J. Cronbach (1966), the inventor of coefficient alpha (Cronbach, 1951) for measuring reliability, who also said the following about instruction:

> I have no faith in any generalization upholding one teaching technique against another….A particular educational tactic is part of an instrumental system; a proper educational design calls upon that tactic at a certain point in time in the sequence, for a certain period of time, following and preceding certain other tactics. No conclusion can be drawn about the tactic considered by itself. (p. 77)

With the accumulating evidence that various styles and abilities could be reliably identified, Cronbach (1977) teamed up with Richard Snow to collect evidence on whether and how these traits interacted with particular methods of instruction. This field of research was known as *aptitude x treatment interaction (ATI)*, in which aptitude is defined as "any characteristic of a person that forecasts his…success under a given treatment," where "personality as well as ability influences response to a given kind of instruction," and treatment is defined as "any manipulable variable" such as "pace, method or style of instruction" (Cronbach, 1977, p. 6).

The evidence was negative: while some treatments proved more effective than others for some purposes, replicable ATIs were elusive or nonexistent.

Learning Styles

Despite the seemingly definitive–and negative—evidence, the interaction/adaptation hypothesis did not go away. Rather, it re-emerged with gusto in the 1980s

and '90s under the title of *learning style*. Diagnosed by a variety of assessment techniques (Keefe & Jenkins, 2000), learning styles are most commonly identified via comprehensive self-report inventories (Dunn & Dunn, 1999). These inventories, such as the Learning Style Profile (Keefe et al. 1986-1990) which provides 23 possible scores indicating skills, responses, and preferences, are more typically known as personality inventories.

Not surprisingly, based on the multitude of individual differences presented thus far, learning styles have been conceptualized in a number of ways. Keefe and Jenkins (2000) define learning style as "characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how students perceive, interact with, and respond to the learning environment…Learning style is a gestalt that tells us *how* a student learns and prefers to learn" (p. 52, italics in original). According to Dunn and Dunn, "learning style is the way each person begins to concentrate on, process, internalize, and retain new and difficult academic information" (Dunn & Dunn, 1993, p. 2; Dunn & Dunn, 1999, p. 11; Dunn, Dunn & Perrin, 1994, p.2). They also offer this definition:

> Learning style is the way that students of every age are affected by their (a) *immediate environment,* (b) *own emotionality,* (c) *sociological needs,* (d) *physical characteristics,* and (e) *psychological inclinations* when concentrating and trying to master and remember new or difficult information or skills. Children learn best *only* when they use their learning style characteristics advantageously; otherwise they study, but often forget what they tried to learn. (Carbo, Dunn & Dunn, 1986, p. 2, italics in original)

They further identify components that make up a learning style, such as sensitivity to light and temperature; motivation and persistence; environmental structure; whether a person has a global, right-brain preference or an analytical, left-brain preference; and if perceptually a learner is primarily auditory, visual, tactual, or kinesthetic (Carbo, Dunn, & Dunn, 1986; Dunn & Dunn, 1993; Dunn et al.l, 1994), with a total of 20 different preferences (Dunn, 1999).

Other conceptions of learning style provide categories that are based on combinations of traits. A person is identified using scales that are polar in nature, such as introversion/extroversion. The Myers-Briggs Type Indicator (Briggs et al., 2001) uses four scales of preference that yield 16 possible categories or styles. A similar model that is based on the Myers-Brigg was developed by Keirsey (1998). In addition to introversion/extroversion, Keirsey's inventory categorizes people by temperament using three

dimensions: a person is observant (S) or introspective (N), tough-minded (T) or friendly (F), and scheduling (J) or probing (P). A person's main orientation is either to be observant or introspective, with two respective sub-categories within each orientation. Thus a person who is observant is either scheduling (SJ) or probing (SP), while a person who is introspective is either tough-minded (NT) or friendly (NF). Keirsey (1998) describes the four resulting temperaments as: (a) *Artisans* (SP), who live and act in the present; (b) *Guardians* (SJ), who have a stoical outlook, particularly in the areas of hard work; (c) *Idealists* (NF), who are well-equipped for the difficult task of influencing people's attitudes and actions; and (d) *Rationals* (NT), who at school typically choose courses in the sciences (and mathematics) and avoid the humanities. The implication is that instruction should be spontaneous for the artisan, structured for the guardian, personal and interpersonal for the idealist, and scientific for the rational.

Unfortunately, as described in more detail later, there is very little evidence for the interaction/adaptation hypothesis in these publications, except for that provided by the foremost proponents of the position—the Dunns and their students—in mostly non-refereed journals. Further, the methodologies used in that research have been questioned (e.g., Coffield, Moseley, Hall & Ecclestone, 2004). There is independent evidence, on the other hand, that despite reliable differences in students' styles and personalities, instructional "…modality matters in the same way for all students" (Willingham, 2005, p.35; see also Kavale & Forness, 1987).

Brain-Hemisphericity

That the brain and all of its various anatomical functions is related to learning is another argument that is undeniably true, but the interactive/adaptive implications typically drawn from that fact are again unsupportable. We speak particularly of the right brain-left brain dichotomy, which has become so popular in educational circles; left brain people are logical and detail oriented, while right brain people are creative and holistic and, thus, they would benefit most from instruction which favors their preferred hemisphere. Ironically, the diagnosis of this trait rarely if ever involves measuring the brain, but rather is inferred from learners' behavior and cognitive strategies. Attempting to connect learning with the physical brain began as a result of the study of (a) brain injury, where a person lacks certain abilities because of damage to a particular area of the brain, and (b) brain surgery aimed at controlling some type of disease or disorder, in particular the severing of the portion of the brain that connects the two hemispheres (corpus callosum) and

identifying where behaviors are localized. Medical advances such as PET (Positron Emission Tomography) Scans have also contributed to the study of the physical brain in learning.

What this research indicated was that we have what is called *hemispheric specialization*.

The left hemisphere is largely the language center of the brain and engages in logical, sequential information processing. Scientists believe that the left hemisphere is analytical and attends to detail, while the right hemisphere may be responsible for generalized concepts. Researchers believe that the right hemisphere processes sensory stimuli and thinks in pictures rather than words. It manages information in a holistic fashion; our intuitive and creative thinking is centered in this hemisphere. (Hardiman, 2003, p. 7)

Research indicating hemispheric specialization led to the development of the theory of *Hemispheric Brain*

Dominance or *Hemisphericity*

The idea that the two hemispheres are specialized for different mode of thought has led to the concept of hemisphericity - the idea that a given individual relies more on one mode or hemisphere than on the other. This differential utilization is presumed to be reflected in the individual's "cognitive style" - the person's preferences and approach to problem solving. A tendency to use verbal or analytical approaches to problems is seen as evidence of left-sided hemisphericity, whereas those who favor holistic or spatial ways of dealing with information are seen as right-hemisphere people. (Springer & Deutsch, 1987, pp. 287-288)

While this distinction was included in the Dunn and Dunn (1999) learning styles model described earlier, it also stands as its own entity as a theoretical model (Iaccino, 1993). This view of the brain is nevertheless "simplistic" (e.g., Hardiman, 2003, p. 7) because processing during most tasks, such as spatial reasoning and visual imagery, involve both sides of the brain (Bruer, 1997). In addition, most learning tasks involve the brain stem as well, activating sites known to be associated with arousal, emotion, and other correlates of cognitive activity.

An alternative brain-based approach attempts to explain, through neuroscience research (e.g., PET scans), how the brain works and provide appropriate instruction. For example, Jensen (1996) indicates that the cortex "quests for novelty" (p. 26) so when designing lessons teachers should be "outrageous and different, *but also focus more energy on designing*

learner-generated projects so that you don't have to be a 'shock-show' to run a class" (p. 27, italics in original). Caine and Caine (1990) assert 12 principles of Brain-Based Instruction that are key for effective instruction and argue that brain research should drive instruction. Ironically, Caine and Caine's (1990) principles (e.g., patterning and challenges) are touted as effective for all students, with only one exception.

So what are we to make of the brain-based rationale for right-brain/left-brain instructional adaptation? Bruer (1997) gives this example:

When I speak to teachers about applications of cognitive science in the classroom, there is always a question or two about the right brain versus the left brain and the educational promise of brain-based curricula. I answer that these ideas have been around for a decade, are often based on misconceptions and overgeneralizations of what we know about the brain, and have little to offer educators. (p.4)

Eventually, he argues, neuroscience may have something to say about teaching practice, but for now such inferences are "a bridge too far." Bruer goes on to argue that, in any case, what are usually cited as principles of brain-based instruction are, in fact, principles of cognitive science. And these principles do bridge the gap between basic research and educational applications.

Multiple Intelligences

Perhaps the most well known and widely adopted conceptualization of individualization is Howard Gardner's Multiple Intelligences (Gardner, 1983; 1993). Each of his domains of intellectual capacity is expected to be relatively independent from the others, which also implies that individuals would show very different profiles of strengths and weaknesses across them. The eight domains follow: Linguistic, Logical-Mathematical, Spatial, Musical, Bodily-Kinesthetic, Interpersonal, Intrapersonal, and Naturalistic.

In keeping with his emphasis on multiple and distinct intelligences (and consistent with Messick's cognitive styles) no importance is attached to the ordering of the list. Furthermore, each is a domain for *biopsychological potential* (Gardner, 1993, pp. 36-37). That is, for biochemical and/or environmental reasons, an individual may be *at risk*, more or less in the average range, or *at promise* with regard to one of these intelligences (Gardner, 1993, p. 29). "At risk" individuals have some disability for that intelligence and need special help, where appropriate remediation can be found, if they are to achieve acceptable levels of skill in this area. Gardner gives such examples as

autistic children as being at risk for interpersonal intelligence, or people with specific brain dysfunctions (e.g., aphasia) as being at risk in linguistic intelligence.

"At promise" individuals, in contrast, are those who exhibit special talent for an intelligence and have little or no need for formal teaching. These are people who come by their gifts without tutelage, though good schools might be helpful to develop their talents fully. For the in-betweeners - the rest of us - Gardner and his colleagues believe that the right kind of education is necessary.

Two points need to be made about multiple intelligences in the current context: First, the intelligences have not proven to be as uncorrelated as researchers would like in order to consider them separate and unique intelligences. In the long run, this may prove to be a fatal flaw in the theory if, for example, it can be shown that a smaller number of factors can account for the same data more parsimoniously (as Gardner & Hatch, 1999, themselves recognized). Second, while many educators might be tempted to think of the multiple intelligences as traits to which instruction might be adapted (i.e., persons high on interpersonal intelligence should be instructed in cooperative groups, etc.), Gardner did not fall into the adaptation/interaction trap. Rather, he advocates that these intelligences be used to expand teachers' repertoires of instructional methods and materials, offering more opportunities for learners to see and explore multiple ways of learning (Gardner, 1993).

Intellectual Styles

The most current and extensive review of empirical research on learning/cognitive styles is Zhang and Sternberg's *The Nature of Intellectual Styles* (2006). Their in-depth examination of this body of literature reflects the numerous variations and conceptions of styles and the ways they have been studied. They conclude that a number of styles are distinct from others and can be reliably measured, although there is, at times, overlap due to differences in the instruments used to measure them. Interestingly, however, Zhang and Sternberg depart from the traditional perspective (e.g., Messick, 1976) with respect to the value of a particular style. They report that particular styles are related to desirable characteristics while others are related to less desirable characteristics. To this end, they identify three overarching styles:

- *Type I*-styles that are perceived as more positive because they generally have more adaptive value.
- *Type II*-styles that are considered more negative because they generally carry less adaptive value.

- *Type III*-styles that are value differentiated (i.e., they can be positive or negative) because they may possess the characteristics of either Type I or Type II styles depending on requirements of a task or situation. (Zhang & Sternberg, 2006, p. 4)

An example of a Type III style would be preferring to work alone versus working with others. In the case of a musician, for example, preferring to work alone may be of value when composing but not when working with an ensemble. Thus, there is no particular good or bad value without evaluating the characteristic in context.

As for Type I and II styles, they are value laden. Recall that those whose who are field *independent* focus on discrete elements of their environment, while those who are field *dependent* are more global in their focus. The former has been determined to be an example of a Type I and the latter a Type II. According to Zhang and Sternberg's synthesis of the research on this construct:

> Field independence was associated with the kinds of personality traits that are conventionally perceived to be positive (e.g., higher level of assertiveness, internal locus of control, higher level of moral maturity, optimistic in the face of threat of frustration, and a better developed sense of identity). On the contrary, field dependence was associated with the kinds of personality traits that are typically perceived to be negative (e.g., lower levels of assertiveness, external locus of control, lower levels of moral maturity, pessimism, and a poorly developed sense of identity). (p. 32)

In addition to favorable personality traits, certain types of styles, such as field independence and being reflective, are consistently associated with overall academic success (Zhang & Sternberg, 2006). This relationship extends to particular subject areas, but not as neatly as they do with personality traits. Those who are field independent tend to excel at computer programming, problem solving, math and physical science, while field dependence favors literature and the social sciences. Thus, focusing on the environment as a whole may be helpful in some disciplines and attending to discrete elements may be helpful in others. It is imperative to note that those excelling in a particular academic domain were *not* taught in a manner to capitalize on or engage their particular style, simply that achievement in a given area was associated with a particular style. While this may seem to indicate those with particular styles will naturally excel in particular domains and are doomed to fail in others, Zhang and Sternberg also report that students are able to adopt a particular style to succeed at a particular task.

Furthermore, for those students at risk for failure, it has been demonstrated that training students in a particular style can improve achievement and locus of control (Zhang & Sternberg, 2006, p. 45). This aligns with Gardner's assertion presented above that rather than adapting to particular traits, we should encourage teachers to teach in ways that will help students develop traits that are particularly effective in terms of a particular domain and/or context.

Noticeably absent from Zhang & Sternberg's chapter on student-oriented research is an examination of the interaction between aptitude and treatment, citing only one study in which achievement was superior when learning materials were matched with a particular style. This likely reflects the inconsistent outcomes of research on the interaction hypothesis (discussed below) and the consistent outcomes demonstrating the effectiveness of particular styles in terms of academic success (e.g., Boyle, Duffy & Dunleavy, 2000; Busato, Prins, Elshout & Hamaker, 2000; Collinson, 2000; Diseth, 2002), even on academic tasks that were thought to be more suited to less effective styles (Armstrong, 2000).

Research on the Adaptation Interaction Hypothesis

What is the evidence regarding the adaptation/interaction hypothesis? To help decide, we first examined the extent to which the terms cognitive style, learning style, brain-based and multiple intelligences have permeated educational literature. Second, we examined meta-analyses of empirical studies on the effectiveness of matching particular learner characteristics to methods of instruction.

To examine the volume of literature on individualization, a search of four commonly used educational databases, Academic Search Premier [1], PsychINFO [2], ERIC[3], and The Professional Development Collection[4], all of which index periodical literature, was conducted on February 6, 2007. Results of these searches are found in Table 1. Further, as a crude but reasonable indicator of the extent to which these articles were empirical in nature (if the authors conducted some type of research that was the basis for the article), these same searches were

repeated with the modification that "*n*=", a very common convention for indicating the number of subjects participating in an empirical study, was in the abstract of the article. As can be seen, a relatively small percentage (approximately 3%) of these publications was empirical in nature. Thus, the majority of the literature about each of these conceptualizations of individualization is discussing its relative importance and/or how to implement it, rather than examining its validity and/or effectiveness. When all is said and done—in educational research as in life—there is a lot more said than done.

Still, there have been over 200 empirical studies and many of those have been included in meta-analyses and other reviews. As the Cronbach and Snow studies before them, the more recent attempts to adapt an instructional treatment to accommodate differences to improve achievement for everybody have proven elusive. Research on individualization indicates modest results, usually finding that matching style to treatment did not improve achievement. According to Willingham (2005) the most current, rigorous review of literature on the effectiveness of individualization was a meta-analysis conducted by Kavale and Forness (1987). They originally located approximately 250 studies, but only included studies which met the following criteria: (a) modality preference had to have been formally assessed, (b) instructional materials had to be specifically developed to capitalize on modality preference, and (c) the results of instruction had to be measured using a standardized instrument. Based on these selection criteria, 39 studies involving 3,087 students at the elementary and secondary levels were chosen. They concluded the following:

> Although the presumption of matching instructional strategies to individual modality preferences to enhance learning has great intuitive appeal, little empirical support for this proposition was found from the quantitative synthesis of the extant research. Neither modality testing nor modality teaching were shown to be efficacious. (p. 237)

Table 1
Database Search Results for Empirical Journal Articles

Search Type	Cognitive Style	Learning Style	Brain-Based	Multiple Intelligence
Title Contained Term	3445	3299	120	783
Title Contained Term and Abstract Contained "n="	110	132	0	7

Klein (2003) drew identical conclusions in his extensive examination of the learning styles and multiple intelligences literature, as did Coffield et al. (2004), and Willingham (2005). In addition to the lack of effect for matching style with achievement, in some cases learning was superior when the style did not match instruction (e.g., Good, Vollmer, Creek & Katz, 1993). Furthermore, often a particular style does not correspond to the learning tasks/activities that the style would predict a person would choose (e.g., Graham & Kershner, 1996).

Similar to achievement in general, in the key area of reading, Snider's (1992) review of the literature found no evidence that matching style to instruction improves achievement. Similar conclusions were drawn by Stahl and Kuhn (1995). More specifically, they conclude, based on Robinson's (1972) study of 448 beginning readers, that there is no value in identifying children as having auditory vs. visual preferences and subsequently teaching to those preferences:

Reading is a linguistic process based, at least in English, on alphabetic principles which incorporate both visual and auditory components. The purpose of instruction in beginning reading is to make children aware of that principle. This connection can be facilitated only through the integration of various modalities, not through their separation. (p. 398)

Thus, conceptualizing the evidence in terms of aptitude by treatment interactions, all of the learner profiles presented here predicted interactions –that is certain methods are more effective depending on learner profile—but did not find them. Figure 1 illustrates the adaptation/interaction hypothesis and the empirical evidence.

It is, of course, impossible to prove that something does not exist simply because we cannot find it—that is, one cannot prove the null hypothesis. Fortunately, there is an alternative conception of adapting to individuals that is not only more educationally sound, but is also easier to implement. We turn to this next. But first, we must address the question why, despite the evidence to the contrary, do teachers accept the interaction hypothesis as being valid?

As noted, learning styles are typically determined by having students complete a self-report inventory, and while they are less reliable than achievement tests (Hopkins, 1998, p. 436), many inventories have been shown to have acceptable reliability. Thus, choosing the appropriate inventory is critical in establishing a person's affective traits (Coffield et al., 2004). In practice, however, much of the classroom diagnosis of students' styles is done quite informally without the benefit of independent measures, validated or not. But

these diagnoses are often informed by the "common knowledge" that students have such styles and instruction that adapts to their preferred styles is best. Or, as Willingham (2005) phrased the question, "If modality theory [what we are calling the interaction/adaptation hypothesis] is so wrong, why does it feel so right?" (p. 35). He explains,

For example, a teacher might verbally explain to a student—several times—the idea of "borrowing" in subtraction without success. Then the teacher draws a diagram that more explicitly represents that the "3" in the tens place really represents "30." Suddenly, the concept clicks for the student. The teacher thinks "Aha. He's a visual learner. Once I drew the diagram, he understood." But the more likely explanation is that the diagram would have helped any student because it is a good way to represent a difficult concept.

Adapting to Individuals Rather than Individual Differences

There are perhaps two major goals of a sound educational program: (a) to expand students' knowledge, skills, and appreciation vis-à-vis a field of study and (b) to refine or improve the capabilities students come with. To take the second goal first, students who are blessed with good acoustic abilities, high musical intelligence, or so-called right-brain holistic intuition sensitivities should indeed be encouraged to use and perfect those abilities. If mastered to a high level, they provide students with marketable skills or a lifetime of avocational pleasure as linguists, musicians, or counselors. If pursued exclusively, on the other hand, other capabilities—e.g., imagery, logical mathematical intelligence, and left-brain skills—will not develop or will atrophy. As brain research demonstrates, *use it or lose it* (Bruer, 1997). Thus, ironically, when educators identify learners' traits and teach them in the manner in which they are already skilled, they do so at the expense of goal #1. They are limiting rather than expanding the students' repertoires (Felder & Brent, 2005).

The way out of this seeming dilemma is the approach Gardner and his colleagues take with multiple intelligences: they help teachers expand their repertoire of teaching methods. Individualization of instruction, in this view, occurs not by matching a child's intelligence profile to a particular method, but by assuring that throughout the curriculum each student has both the opportunity to capitalize on his or her strengths, while continuing to develop and appreciate other strategies and ways of thinking.

If there are different ways of being intelligent in different domains, then it behooves researchers and

Figure 1
Main vs. Interaction Effects for Instructional methods.

A. *Hypothesized* Results of Differentiated Instruction for Different Type Individuals

Conclusion: Where the pre-instruction normal curve shows the distribution of people on some measured aptitude, trait or learning style, results such as these show that Method 1 is more effective in raising achievement for people high on that trait (e.g., introverts) while Method 2 is better for people low on that trait (e.g., extroverts).

B. *Empirical Evidence* of Differentiated Instruction for Different Type Individuals

Conclusion: Any effective method raises achievment for all, whether high or low on a measured trait.

The moral: Contrary to the aptitude x treatment interaction hypothesis, it is not more effective to adapt instructional methods to groups of individuals who seem to be similar on some personality trait or learning style. Rather, good methods are like good teachers: they are more-or-less equally effective in raising the achievement of most if not all students. Moreover, there are many effective instructional methods (but teachers must be skilled in using them). What is most important in adapting instruction to human differences is to diagnose whether students have mastered prerequisite knowledge and skill and begin where *each student* needs to begin.

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teachers to explore which teaching methods are most effective in various domains. Research on teaching methods has demonstrated that a variety of methods have been shown to be effective depending on context and subject matter (Lalley & Miller, 2007), so focusing on styles in lieu of subject matter may severely compromise learning (Coffield et al., 2004). In Willingham's (2005) review of what cognitive science has to offer, he argues that "Teachers should focus on the content's best modality—not the student's" because "…*modality matters in the same way for all students*" (p.35, italics in original). We already cited his example of using a diagram to help students visualize place value, but he cites a large and growing amount of evidence that good teaching methods (e.g., using imagery) are effective in general (i.e., they are main effects), not just for students with similar traits (i.e., interaction effects).

Finally, we return to perhaps the most basic issue of all: we adapt to individuals best by starting with each student's prior knowledge. We present several well-established independent but converging lines of reasoning for this argument, all of which

paralleled and, at times, pre-date the styles movement: (a) from memory research, (b) from transfer theory, (c) from learned helplessness research, (d) from perceptual/cognitive theory, and (e) from instructional theory.

From a memory perspective, new material (facts or skills) learned to a high standard will nevertheless likely be substantially forgotten within hours or days of initial acquisition. As Ebbinghaus (1885) first demonstrated, however, there is considerable savings (of time) in *relearning* that material, and continued practice past the point of initial mastery - called over learning - improves subsequent recall (see also Postman, 1962a). Under optimal conditions for over learning, such as practice to the point of automaticity (e.g., Schneider & Shiffrin, 1977) or distributed practice and organization of the material, such knowledge may become relatively immune to forgetting (achieving "permastore" in Bahrick's,1984a and b, terminology). Of course, material that is not initially mastered shows few benefits of savings or over learning, but instead elicits reactions from students such as, "We never had

this stuff before," despite curricular evidence to the contrary.

From a transfer perspective, the higher the degree of mastery of prerequisite knowledge or skill, the higher the probability of applying that knowledge in new situations (e.g., Jung, 1962; Postman, 1962b). As a century of research beginning with Judd (1908) demonstrates, however, prior knowledge or skill is necessary but not sufficient for transfer. This is so because (a) knowledge and skills are acquired in a specific situation and not easily decontextualized (from situated cognition research; e.g., Brown, Collins & Duguid, 1989), (b) because it is easier to misapply past learnings than it is to recognize which knowledge to apply to a new problem or learning task (from proactive interference research; e.g., Deese & Hulse, 1967; Ellis, 1965), and (c) partially learned material provides students with a false sense of security regarding their knowledge, which is often less complete and more shallow than their "feelings of familiarity" suggest (from feeling of knowing and matacognition research; e.g., Willingham, 2003).

If adequate mastery or partial knowledge does not easily transfer, then little or no mastery virtually guarantees "The Matthew Effect"--that the rich get richer and the poor get poorer.   This effect of differences in prior knowledge leads to the well-known "fourth-grade slump," in which children disadvantaged by poor vocabulary and literacy skills fall further behind, not only in reading comprehension scores, but in the capacity to learn more vocabulary and literacy skills by reading (e.g., Chall & Jacobs, 2003; Hirsch, 2003).

The consequences of not mastering consensus societal goals are probably best described from the perspective of learned helplessness research (e.g., Peterson, Maier & Seligman, 1993; Seligman, 1975). When students who initially failed to master material encounter it again, there is no savings advantage in relearning.   As noted above, they may even believe "they never had this stuff before," and it does not help that their teachers insist that they had.   If on their second attempt they still do not understand, and see themselves as falling further behind those who do, then on subsequent exposures to this material they are likely to say (to their teachers as well as to themselves) "I was never very good at this" or "I could do it if I wanted to, but this stuff is useless" (the former a primarily feminine attribution, the latter primarily masculine; e.g., Dweck & Licht, 1980). Learned helplessness is setting in, producing a kind of proactive interference on cognitive, behavioral and emotional levels for new learning due to uncontrollable failure experiences on similar material in the past. The cure or antidote for learned helplessness is competence on, or mastery of, prerequisites, which can then produce the prior

knowledge, motivation to try, and emotional readiness - in a word, self-efficacy (Bandura, 1977; 1986) - to succeed.

From a cognitive perspective, it is fair to say that the field was built on the assumption that each perceptive and cognitive act is an interpretation or construction of new stimulus information in terms of what is already known (e.g., "analysis by synthesis" in Neisser's, 1967, seminal book entitled Cognitive Psychology; see also Miller, Galanter & Pribram, 1960). Encoding, for example, is commonly defined as "the process of categorizing, labeling, or finding meaning in incoming information" (Gentile & Lalley, 2005, p. 607), which is accomplished by comparing the incoming material to what is already in long-term memory. All of this can then be re-organized to go back into memory for future perceptual/cognitive acts. This active, constructive view of cognitive processes is perhaps best illustrated by the corpus of research on experts vs. novices. The evidence shows that relative to novices, experts have more knowledge, better memories, and superior problem-solving ability, but only on tasks related to their expertise (e.g., in chess, see Chase & Simon, 1973; deGroot, 1965, 1966; and Charness, 1976; in music, see Halpern & Bower, 1982; in problem-solving, see Chi, Glaser & Rees, 1982 and Rumelhart & Norman, 1981). Because they have more accessible knowledge than novices, relative experts can encode "larger perceptual chunks" (Chase & Simon, 1973, p.80) from the task at hand and therefore more fully and more quickly understand the task. These studies also show that there is at least one way in which relative experts and novices are exactly the same--namely, they both try to make sense of any new situation on the basis of their prior knowledge.

From an instructional perspective, researchers have long emphasized the importance of adapting to and activating prior knowledge because, as John Holt (1964) phrased it, "To find a man lost in the woods, we have to go where he is" (p. 103). Such concepts as entering behavior (Glaser, 1962, 1984; Glaser & Bassock, 1989), learning hierarchies (Gagne & Paradise, 1961), advance organizers (Ausubel, 1960,1963), and anticipatory sets (Hunter, 1994; see also Gentile, 1993) have generated empirical evidence as well as suggestions for curricular objectives based on activating students' prior knowledge (e.g., Gagne & Driscoll, 1988; Rosenshine & Stevens, 1986; Shuell, 1988, 1996). As any teacher can attest, however, much prerequisite knowledge is not just missing, but incorrect. This implies that proper sequencing must go beyond just curriculum sequencing to correct diagnoses of students' misconceptions and starting there to assure that each student has mastered prerequisites in readiness for subsequent objectives,

as in mastery learning (e.g., Block, Efthim & Burns, 1989; Gentile & Lalley, 2003).

Perhaps the most famous - and optimistic - statement of this point was Bruner's (1960; p. 33): that "any subject can be taught effectively in some intellectually honest form to any child at any stage of development." This hypothesis was based on the idea of a true spiral curriculum in which rigorous and relevant instruction on the fundamentals of a field make subsequent learning easier. This, in turn, was based on the Piagetian notion that each learning experience must allow--indeed, require--that learners actively restructure their knowledge or schemata. Only then will they be cognitively and emotionally ready for the next phase or stage. When they are, then the proper spiral curriculum activates relevant prior knowledge in the context of the current instructional objectives and thus has the potential of maximizing transfer and/or higher order understanding of that material.

Implications

The overriding implication based on the inconclusive results for the interaction/adaptation hypothesis and the compelling results from research on prior knowledge, is that effective instruction should be tied to students' prior knowledge rather than students' traits. For example, in the area of earth science, for students to understand the effect of pollution on bodies of fresh water such as the Great Lakes, they must first understand the concepts of pollution and fresh water, particularly the damage done by the former and the value of the latter. If they do not, information about pollution on water will have little value. In the subject of history, for example, students must have a good understanding of day-to-day life in a pre-industrialized society to appreciate the impact of industrialization. Similarly, in physics, students must have a firm grasp of the concept of mass before they can understand its relationship to forces applied by gravity and acceleration.

For teachers to assure that students have sufficient prior knowledge to learn from instruction teachers have two options: (a) assure that every lesson is comprehensive and includes all of its inherent skills and information, or (b) implement the procedure of *formative assessment* (Bloom, Hastings & Madaus, 1971). While the first approach would be overwhelming, inefficient and ineffective, formative assessment is a way to determine what students already know, provide feedback about their knowledge and misconceptions, and provide instruction that is just beyond their current level of understanding (see, for example, Heritage, 2007). Formative assessment can take many forms: quizzes, discussions, games, a one-page paper, etc., any method that will provide teachers

with information about students' current level of understanding and allow teachers to adjust teaching accordingly. Formative assessment can be contrasted with *summative assessment*, which occurs at the end of the teaching/learning process and is done with the purpose of determining students' grades (e.g., a final exam).

When using formative assessment, the goal is to determine which students have the least prior knowledge without being in need of remediation beyond the standard scope of classroom instruction. If this seems too low, recall that one inevitable outcome of learning is forgetting. Consider a task that you were once highly competent at but have not done for a while, such as diagramming sentences, doing proofs in geometry, labeling the parts of a frog's digestive system, or explaining how tectonic plates function. It is unlikely that these could be done as well as they once could. The reason: you forgot. The good news is that you can *relearn* such things in much less time than was originally needed, and, each time you relearn something forgetting decreases. So, what is often thought of as wasting successful students' time to benefit those who need more instruction, is actually allowing students in the former group additional practice and improving their likelihood of retention, while the others may be learning critical information for the first time. On the other hand, if there is no formative assessment, the best case scenario is that a teacher runs the risk of teaching only a select group of students in his or her class—so much for "no child left behind" or "all children can learn". Of course, the worst case scenario is that without determining what students know or "finding them in the woods", teaching may be done solely for the sake of teaching and not for the sake of learning.

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Notes

1. Academic Search Premier provides full text for more than 4,600 scholarly publications, including full text for more than 3,500 peer-reviewed journals. Coverage spans virtually every area of academic study and offers information dating as far back as 1975.

2. PsycINFO contains nearly two million citations and summaries of journal articles, book chapters, books and dissertations, all in the field of psychology. Journal coverage, which dates back to the 1800s,

includes international material selected from nearly 2,000 periodicals in over 35 languages.

3. ERIC, the Educational Resource Information Center contains more than 2,200 digests along with references for additional information and citations and abstracts from over 980 educational and education-related journals.

4. Professional Development Collection is designed for professional educators, this database provides a highly specialized collection of more than 550 high quality education journals, including more than 350 peer-reviewed titles.

Changing the Latitudes and Attitudes about Content Analysis Research

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The current research employs the use of content analysis to teach research methods concepts among students enrolled in an upper division research methods course. Students coded and analyzed Jimmy Buffett song lyrics rather than using a downloadable database or collecting survey data. Students' knowledge of content analysis concepts increased after a lecture on the topic of content analysis, but they further improved after participating in the song coding, data cleaning, and writing of results. Additionally, students reported high satisfaction with the project and believed it was an interesting and enjoyable technique for learning about research methods. We provide suggestions for incorporating similar data collection activities in undergraduate research methods courses.

Over the past few decades there has been a push to reformulate the education of undergraduate students in research intensive institutions. Proponents for this reformulation argue that students are constantly failed by universities that separate undergraduate teaching and advanced research (Strum Kenny, 1999). Arguably, the better educational program is one that combines teaching and tools for research so that students have the ability to analyze and contribute to research (Jenkins & Zetter, 2003). Many departments include research methods courses in their required curriculum; therefore, it is important to consider ways these classes might better facilitate critical thought and knowledge of how to perform research. Because it is clear that the connection between the teaching of research methods and the ability to perform research is not automatic, the formation of a research and teaching nexus is critical (Jenkins & Zetter, 2003). Jenkins, Breen, Lindsay, and Brew (2002) suggest utilizing factors from the students' social world as one strategy for linking teaching and research at the undergraduate level. The current article is an assessment of one such training exercise aimed at teaching undergraduate students the research practice of content analysis on a common factor from students' social world -- song lyrics.

The use of activities in a classroom setting stimulates student interest in learning and provides a number of advantages (Bernstein, 1999). First, participation in classroom activities allows students to become actively engaged in learning new concepts. Incorporating activities into the classroom provides students with another method of learning (i.e., learning by doing) in addition to the traditional method of passively listening to a lecture. Second, activities often change the traditional pace of the classroom such that students are regularly challenged to pay attention. Third, participation in classroom activities has been shown to provide both students and instructors with more enjoyable methods of facilitating learning. Marek, Christopher, and Walker (2004) found that

incorporating an active-learning approach to teaching research methods results in greater learning success for students. It is clear that implementing hands-on activities in the classroom can be beneficial for teaching new concepts. In addition to the use of classroom activities, topics perceived by students to be interesting have been shown to be more effective in facilitating learning than topics perceived by students to be monotonous (U.S. Department of Education, 1987). Interesting activities and topics tend to capture students' attention, hold their attention longer than uninteresting activities, and activate students' interest in learning. Additionally, several instructors note that implementing interesting classroom activities results in higher academic performance by students (Garcia & Garcia, 2004; Rajecki, 2002).

Classroom activities involving content analysis have been shown to be an interesting and educational means of teaching research methods. For example, Rajecki (2002) describes the benefits of analyzing the content of newspaper personal advertisements, and Carpenter (1998) illustrates an activity comprised of analyzing the content of articles portraying social stereotypes. Although these two studies demonstrate success with content analysis activities, a quick review of recently published introductory level research methods textbooks shows a relative inattention to this research method. Examining five different textbooks, we found between 0% and 3% ($M = 1.5\%$) of the text pages offered information on content analysis versus 6.5% to 11% ($M = 6.4\%$) of the text pages for survey research (Bachman & Schutt, 2007; Hagan, 2006, 2007; Maxfield & Babbie, 2008; Schutt, 2006).

In accordance with the suggestion by Jenkins and Zetter (2003), we implemented an exercise created to help teach content analysis to an undergraduate research methods class at a large research university. The project required students to code song lyrics written by Jimmy Buffett as a way to incorporate the students' social world, increase understanding of

content analysis specifically, and increase appreciation for research methods generally.

Method

Participants

Twenty-five undergraduate students who were registered for a research methods class (16 women and 9 men) at a large Southeastern university participated in the current class project and all phases of testing. Eighty percent of the students who participated in all three waves were either juniors or seniors; the other 20% were sophomores. An additional 15 students were used as a control group.

Materials

At three different points, each participant completed a 12 question knowledge test that included 11 multiple choice questions about content analysis and research methods. For example, one question was, "If a study was coding latent content rather than manifest content, then we would expect to see _____ inter-rater reliability" (correct answer option: lower). Another question was, "A content analysis researcher interested in a newspaper's commitment to the community might operationalize that concept in terms of_____" (correct answer option: how many different bylines appear on stories about local government meetings). The twelfth question was open-ended and asked the students to develop a content analysis research project on their own to address a specific research question. The question was, "A certain researcher was interested in high school friendships. Describe a content analysis study addressing this issue." At the end of the study, students also completed an eight question satisfaction measure similar to that used by Marek and colleagues (2004). Example questions from this measure included the following: "Overall, I would recommend including a class project similar to this one" and "I enjoyed this class project." Students answered on a scale from 1 (strongly disagree) to 5 (strongly agree) with higher scores indicating more satisfaction with the project.

Procedure

Right before a midsemester break, students took the knowledge test to obtain a baseline measure. When the students returned from the break, the professor lectured on content analysis as a research technique. The students took the knowledge test again during the following class to measure their postlecture knowledge.

The class then started working on the content analysis project. We chose Jimmy Buffett song lyrics because Buffett's career has spanned more than 30 years, his lyrics are readily available on his website, most students knew of him, and researchers have previously addressed the content of his music without doing a formal systematic study of his lyrics (Bowen, 1997; Mihelich & Papineau, 2005). Students developed research questions and hypotheses based largely on the articles that had addressed Buffett's music. For instance, Mihelich and Papineau (2005) note that Buffett's career changed in 1984 when he obtained corporate sponsorship; therefore, students hypothesized that the content of his music changed after 1984. General knowledge of his songs led students to hypothesize that the change would be mostly reflected in lyrics that mention alcohol, drugs, and deviant behavior.

We randomly assigned each student the lyrics from seven Jimmy Buffett songs resulting in two separate coders who were responsible for coding each song. The students recorded information such as year the song was released, whether the song charted, and on how many albums the song appeared. The students coded each of the songs for manifest content such as whether alcohol was mentioned in the title of the song, number of references to criminal activity, and number of references to alcohol and drugs in the lyrics. Students also coded for latent content such as overall theme of the song (e.g., love, humor, and social protest) and whether the song glamorized alcohol consumption. Comparisons between the coders revealed high consistency for the manifest content and lower consistency on the latent content. We used the inconsistency between coders as a class demonstration about intercoder reliability and the importance of clear operational definitions in research. After we resolved the inconsistencies between the coders, we removed duplicate songs so that each song represented one unit of analysis.

In order to demonstrate the concept of inferential statistics, we selected a sample of the songs on which the students performed univariate and bivariate analyses to test their hypotheses. Acquiring the population of songs from which the sample was selected allowed for a demonstration of the concepts of sampling techniques and hypotheses testing. The students wrote their final class papers based on the sample of songs that included the following sections: hypotheses, methods, results, discussion, and conclusions. On the same day their papers were due, the students took the knowledge test a third time and also took the satisfaction measure. The entire process took five weeks from the initial pretest to the final posttest.

Results

Student Learning

Repeated measures ANOVA revealed that student knowledge of content analysis concepts significantly increased between each of the three tests, $F(2, 48) = 55.85$, $p < .001$, *partial eta^2* $= .70$. This increase was linear ($F(1, 24) = 112.66$, $p < .001$), with scores before the lecture averaging 36% correct on the 11-item multiple choice portion of the knowledge test. After the lecture the average score was 56% correct, and after the music lyrics project the average was 72% (See Table 1). The difference was also noticeable on the open-ended portion of the test. Although the open-ended question was frequently left blank by the students (44% blank in pre-test, 36% blank in test after lecture, and 40% blank in post-test after completion of project), no student who attempted to answer this question at the baseline (before the lecture) accurately described an appropriate content analysis project. Students were asked to describe a content analysis study addressing high school friendships, but in the pre-lecture and post-lecture conditions they often described surveys or observational research methods. For example, one student wrote, "Analyze two people who share a friendship over a long period of time." After the lecture (the second test time) all of those who tried were either completely wrong in their descriptions or they made fairly serious omissions. For example, one student wrote, "You could design a study that looked at the type of seating arrangements in a classroom and at lunch if they weren't set by a teacher." After the class project (the third test time), all but one student who attempted this question accurately described an appropriate content analysis project. For example, one student described in great detail a project that involved reading and coding the messages people wrote in yearbooks.

To ensure that the increase in scores was not simply due to testing effects, we administered the same tests with the same time delays (same five week schedule that included a mid-semester break) and the same lecture to a control group in a different research methods class. The control group had no significant differences between the three testing times (percentage correct = 33%, 29%, and 29% respectively) ($F(2, 28) = .55$, $p = .58$, *partial eta^2* $= .04$). In addition, no student in the control group correctly answered the open-ended question in any of the three test times. The slight decrease in scores after the lecture in the control group may be attributed to the fact that the students were not as interested as the experimental group in the topic because their final project was not going to involve content analysis. As discussed above, content analysis is unfamiliar to most undergraduates and the slight differences in mean scores are likely due to differences in student guessing. The control group scores do demonstrate that the improvement in scores for the experimental group was not due to repeat testing effects.

Student Satisfaction

Students' satisfaction as measured by an 8-item satisfaction scale was quite high ($M = 4.00$, $SD = 0.61$, on a scale of 1 to 5 with 1 being Strongly Disagree and 5 being Strongly Agree and higher scores indicating more satisfaction). Overall, the students found the project to be enjoyable and useful in their understanding of research methods and content analysis. The students were also asked to provide their opinions of the project. A few examples follow:

- "[The project was] much more interesting and easy to get into than a random data set forced on us,"
- "I believe it helped me understand the concepts better than to just have lectures on the material,"
- "I think the project was useful because we were involved in every step, so we could see what was going on,"
- "[The project] was excellent and one of the best class projects I've done during my three years in school,"
- and "It was vastly more educational to collect and code the data than just read about it in a textbook."

Discussion

Students reported learning from and enjoying the content coding project, and their knowledge of content analysis improved throughout the project. Students had a basic increase in knowledge after a lecture on the topic of content analysis, but their ability to apply that knowledge and develop their own content analysis project was better solidified after they had done the class project. Arguably, the scores still only reached an "average" level (72%), but that was likely due to the fact that the knowledge test was intentionally difficult, as demonstrated by the extremely low scores at baseline. Additionally, the students were not told that they would be taking the test and, therefore, would not have studied the material. The scores represent what the students knew without actively studying for an exam on the topic.

The open-ended question included in the knowledge test had a fairly low response rate (approximately 60%) even in the posttest condition. We attribute the high rate of non-completion to the

Table 1
Mean Scores for Experimental and Control Conditions

Measure [1,2]	Mean	SD
Control Group (n =15)		
Pretest (before lecture)	3.63	1.80
Test (after lecture)	3.19	1.93
Post (after delay)	3.19	1.74
Experimental Group (n = 25)		
Pretest (before lecture)	3.96	1.62
Test (after lecture)	6.16	1.89
Post (after delay for project)	7.92	1.59
Satisfaction with Project	4.0	.61

[1] A score of 11 was the highest possible correct on the pretest, test, and posttest. A score of 0 was the lowest possible score.
[2] The satisfaction score could range from 1 to 5 with higher values indicating greater satisfaction.

extra effort this question required over the effort for the other questions on the test. Similar to other non-required and non-graded measures (e.g., teacher evaluations), the students likely decided the open-ended question was too much effort. Most importantly, we did see a great deal of improvement in ability to develop their own research questions and methodology for those students who did choose to complete the open-ended question.

Although not part of the formal knowledge test described above, the concepts of hypothesis testing, units of analysis, populations, and samples were also better understood by students. In past semesters when students performed statistical analyses and wrote papers based on a large database provided to them by the instructor, these concepts were often difficult and the questions concerning these concepts were frequently missed on the exams. In contrast, during the semester with the content analysis project, the students' exam scores demonstrated that they achieved a better understanding of these general research methods and statistical concepts.

Content analysis as a research technique is underrepresented in research methods texts and courses, but particularly useful because it easily demonstrates to students how information in their daily life can be sources of research data. It is also an easy way for students to collect their own data without any of the Institutional Review Board difficulties that might be present when using a survey technique. Song lyrics are a practical source of content because most are readily available online and are easily assignable to individual students to code.

Other research methods classes could replicate the current project using the same Jimmy Buffett lyrics or lyrics from another musician, musical group, or musical genre. For instance, Cole (1971)

content analyzed top-10 singles from each year of the 1960s. He coded each song for mood, love-sex, religion, violence, and social protest. A research methods class could similarly examine multiple decades and multiple musical genres. Additional content coding projects could easily be done on magazine articles, newspaper articles, television shows, or any other readily available social artifacts. To capitalize on the popularity of reality television shows and their availability online, a class project could have students code episodes of a reality show for instances of racial and gender stereotyping or stereotype threat. By bringing these elements from our daily world into the research methods classroom we will be able to convey to our students that conducting research is not only accessible to them, but that it is relevant to their daily lives.

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Authors Note

Strategic Questions: A Means of Building Metacognitive Language

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Conversations between educators and students about choices and strategies are an important pedagogical mechanism to examine the abstract concept of learning. Although students have tacit knowledge about their approach to learning, they are often unable to coherently communicate their ideas. Drawing on the theory of metacognition, the technique of strategic questions is outlined as a means to represent, organize, and communicate students' abstract ideas about themselves as learners. Strategic questions provide a metacognitive language that allows students and teachers to examine a learning experience. In particular, reasoning for decisions and action, doubts or concerns, explanation of engagement and effort, and values and expectations. A case study is outlined of the use of strategic questions within a pre-service teacher education degree as a method that supports a reflective practitioner approach to learning.

The context for higher education is rapidly changing. Academics are increasingly required to provide learning experiences using a range of media and technology that promote the active and often independent construction of knowledge. In return the assumption is that students have self regulatory skills, including a capacity to monitor and adapt their approaches to learning in terms of effectiveness and efficiency.

However, we cannot know exactly the decisions a student makes about his or her approach to learning. When we see our students typing in the computer lab or sitting in a lecture, we imagine that this activity signifies a positive response to our instruction. While we can make assumptions about students' engagement or their sense of task value, it is perhaps only through conversations about learning that we can begin to examine how our students are negotiating contemporary education contexts.

The central purpose of this paper is to explicate a means of enabling students to represent and communicate ideas about their personal learning experience. What follows is a definition of what I have called *strategic questions* and a rationale for how this process provides one means of building a language of metacognition. This metacognitive language contributes to building student self-regulatory capacity within contemporary higher education contexts. A case study is outlined of this method in use with teacher education students, as are the implications for higher education pedagogy. This case study is located within a student-focused approach to teaching that encourages self regulated learning and where time is allocated to discuss problems, debate issues raised by course material, and to question student ideas (Trigwell, Prosser, & Waterhouse, 1999).

Students have a strategic approach to learning in reaction to their perception of the requirements of an instructional task (Warburton, 2003). That is, students examine the characteristics of a task and make decisions about the degree of effort they will invest. Perhaps educators in higher education would like to think that the strategic approaches of their students do not include passivity, dependence, surface learning, or inefficient use of learning strategies. Conversations between educators and students about choices and strategies are thus an important pedagogical mechanism to explore the multi-faceted and complex concept of learning. Educators need a way to implement metacognitive discussions that will work within the complex and busy world of the contemporary higher education classroom (Kuhn & Dean, 2004). Methods are needed to support students and teachers critical reflection on instructional tasks. This paper provides a pedagogical technique to frame discussion between students and educators of the contemporary learning experience.

The Concept of Strategic Questions

The learning environment of higher education often encourages independent, self-regulating, student learning behaviour. Tasks structured to encourage student self-regulation are integral in the development of understanding of complex knowledge (Stefanou, Perencevich, DiCintio, & Turner, 2004). A variety of instructional formats support independent learning behavior (see Grinsven & Tillema, 2006); although, all have the common purpose of overtly involving the learner in the learning process (Niemi, 2002). Metacognitive skills are key components of approaches to learning where the learner has to monitor, evaluate, and regulate their own learning strategies.

Metacognition is an important construct in relation to knowledge acquisition that emerged from the seminal work of Flavell (1976) and is concerned with how one thinks about one's own cognition. Awareness of one's own thinking and increasing knowledgeability about cognition and learning processes enable students to learn more effectively (Pintrich, 2002).

Metacognition is usually conceptualized having two components: knowledge of cognition and regulation of cognition (Schraw, 1998). Knowledge of cognition includes a general knowledge of strategies that can be used for different tasks, knowledge of which strategies are effective under certain conditions, and knowledge about oneself (Flavell, 1976). For example when attending a lecture students have a number of strategies for listening, taking notes, and checking ongoing comprehension. Students also are aware of their motivation, strengths, and weaknesses in relation to the lecture topic. Students can also use situational knowledge such as making a judgment about how to access information covered in the lecture though alternative strategies.

Regulation of cognition is where a learner exerts conscious monitoring and control over their cognitive and learning processes (Pintrich, 2002). Brown (1987), for instance, presents four types of regulation: (a) prediction, (b) planning, (c) monitoring, and (d) evaluation. This paper focuses on metacognition as a set of self-instructions for regulating performance on tasks (Veenman, Van Hout-Wolters, & Afflerback, 2006).

Metacognitive development is a gain in knowledge, awareness, and control over an individual's learning, leading to a purposeful improvement of performance. Since metacognition is an abstract concept, it necessarily involves students imaginatively reconstructing thoughts and actions invoked in response to an instructional task. This involves more than simple description and includes analytical and evaluative interpretations. Georghiades (2004) for example, argued "the practice of non-critical metacognition is not possible" (p. 371) and commented that metacognitive reflection involves noting important moments, acknowledging mistakes, and identifying relationships and links between prior and learnt knowledge.

Educators have been urged to support student autonomy and self-regulatory practice by including metacognitive strategy training as an integral part of instructional tasks (Hattie, Biggs, & Purdie, 1996; Veenman et al., 2006); and challenged to provide a framework to support student conversations about learning that is neither prescriptive nor vague (Schwartz & Heiser, 2006). Recent research has emphasized that explicit instructions about metacognitive and cognitive strategies are likely to help students to improve learning and performance (Askell-Williams & Lawson, 2005; Hattie et al., 1996; Veenman et al., 2006), and that students should be provided with opportunities to self-assess as a basis for developing a repertoire of regulatory learning strategies (Zimmerman, 2002). For instance, asking students about what strategies they used, as well as how and when they were used (Cromley & Azevedo, 2006), or they may have to describe what they did before, during, and after a task (Pressley & Gaskins, 2006).

The metacognitive exploration of instructional tasks suggests that students explicitly enter into a conceptual dialogue about learning. The implication is that students need to build and use a language that enables them represent and communicate their abstract, speculative and dynamic thoughts about their metacognitive experience. This is the important point upon which the remainder of this paper hinges.

Students are likely to have, usually in implicit form, unformed ideas that are a potential basis for explicit discussion of learning (Askell-Williams & Lawson, 2005). This tacit knowledge is not always available to communicate, although there may be evidence that such knowledge exists (Pylyshyn, 2002). Asking a student to discuss their ideas about learning disadvantages those students who may not have a rich enough vocabulary to coherently describe their thoughts (Boekaerts & Corno, 2005). Reasons for this include a poor conceptual understanding of the learning, cognitive and metacognitive process, an absence of descriptive labels, difficulty in separating learning processes from other influences (Siegler & Jenkins, 1989), and a lack of experience in monitoring their learning (Boekaerts & Corno, 2005).

Given the probable difficulties of students self-assessing their internal learning processes, there is a need to provide students with a coherent and durable framework that allows them to access, interpret, and use their implicit metacognitive knowledge. Students need to be able to draw upon their knowledge and views about the learning process and variables that affect their thinking to actively self-regulate their classroom learning (Vermunt, 1998). Provision of an explicit framework for metacognitive discussion is preferable to the assumption of many educators that students will somehow indirectly acquire metacognitive wisdom (Pintrich, 2002).

Mackenzie (2007) suggests that asking questions to build and refine understanding is a basis for conceptual dialogue. Asking questions is a part of negotiating experience (Ramsden, 1987), and students may ask questions in order to seek clarification, comprehend information, and test the application of knowledge (Nyikos & Hashimoto, 1997). Gourgey (1998) comments that student passivity and dependence is a function of a "lack of internal dialogue driven by self-questioning" (p. 95). Student learning can be characterized as a process of adaptive reaction to their environment and expressed through personal, often unspoken, questions about a task such as "Is this useful?" (Ramsden, 1987).

Strategic questions are conceptualized here as deliberate questions that students ask themselves to inform the strategizing of their learning. The term

strategic is defined as a conscious choice students make in order to control and regulate their cognition and learning. A strategic question is invoked in response to and indicates an awareness of context, and is an intention to exert control over specific learning experiences. The question "Is this important?" is strategic in the sense that a student has to allocate attention, effort, and energy among competing demands. The resolution of a strategic question requires interaction with metacognitive awareness and shapes metacognitive regulation.

Strategic questions are those questions that a student wishes to have resolved (Haroutunian-Gordon, 2007). They are, to use Dewey's (1944) still salient term, a genuine question, emerging from the student's experience. Such questions can become the focus of the learning and teaching experience (Commeyras, 1995). In simple terms, strategic questions are imagined as the core of a student's reasoning about his or her learning choices.

Strategic questions represent a student's metacognitive awareness and regulatory intention. They provide a language that supports student and teacher conversations about the learning process and the conditions of learning beyond the technical process of task completion (Rudduck & Flutter, 2000). A language allows the modeling of the metacognitive process and, by implication, an improvement in metacognitive awareness (Fielding, 2004).

The conceptualization of strategic questions here raises the issue of whether these questions can be categorized into, for example, surface or deep approaches to learning, or into performance or mastery orientations. Can one question be more strategic than another? While these questions offer possibilities for further research the purpose of this paper is to outline the generation process for strategic questions that support a co-regulated reflection process. The strategic questions provide a language to represent and communicate students' metacognitive experience. The value and meaning of using strategic questions is not in the designation of some questions as more or less appropriate than others, but to discuss the meaning and implications of these questions with the students.

It is acknowledged that strategic questions provide a speculative model of metacognitive language. However, it offers students a focused means to represent, organize, and communicate their abstract ideas about themselves as learners within specific contexts. A student's strategic questions in reaction to an instructional task can also provide the lecturer with a sense of how the intentions of the task are being understood and mediated.

The conditions of the learning environment need to be appropriate to learners generating questions. This includes allocating time for students to generate questions and for group discussion and reflection, allowing students to practice asking and answering questions, discipline-based modeling of the process and importance of metacognition, and designing tasks that require students to make choices about strategy use (Pedrosa de Jesus, Almeida, Teixeira-Dias, & Watts, 2007; Schraw, 1998). The process also assumes that students have the capacity and motivation to devise their own strategic question.

Strategic questions are thus students' attempts to move inner thoughts about themselves as learners, given a specified task and context, to overt exploration of task engagement. They represent student ideas in response to the learning environment and are a starting point for discussion about learning and teaching of discipline knowledge. In simple terms, strategic questions provide a basis for critical consideration of how students strategize their learning.

Case Study: Pre-Service Teacher Education

Learning is an abstract and dynamic concept that teachers seek to understand throughout their classroom lives. Engaging pre-service teaching students in discussion about learning is thus a key aspect of teacher education courses. Including metacognitive discussion as part of an undergraduate teaching degree has the purpose of impacting the students' teaching knowledge and practice. The use of strategic questions is a natural part of a learning environment where pre-service teachers can attempt new ideas, reflect on the outcomes, and co-construct new knowledge about teaching (Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004). This case study highlights the use of strategic questions as a basis for constructing dialogue with students about their learning decisions.

Theories of Learning is a first year unit in a primary teacher education course at La Trobe University, with approximately 200 students enrolled in 2007. The campus where the study was conducted is in a regional area of Victoria with a student catchment area covering central and northern parts of the state. Students tend to be from lower to middle socio-economic areas and most students had recently completed secondary school. While undertaking this unit, the students are often required to reflect on their learning. This study emerged from a personal perception that student reflection was often uncritical and largely descriptive, possibly due to the abstract nature of reflection where students were uncertain about the "correct" answer.

Chiu (2006) outlined a process of reflective practice where the practitioner moves from reflecting on their experience, through representing ideas to critically reflecting in order to gain useful knowledge. This study outlines an attempt to move students from

merely completing the task requirements to critically reflecting by engaging in discussion about their strategic approach to learning (Boyer, Maher, & Kirkman, 2006). Reflection is particularly relevant where students have to react strategically and make choices about their learning behaviour (Evans, Kirby, & Fabrigar, 2003). The use of strategic questions is based on consideration of individual reasoning for choice, and thus provided a basis for the reflection process.

The concept of providing an explicit framework for metacognition is crucial to the overall process, and it was introduced here to the students by asking them to identify the choices they had made over the past day about their own learning. For example, these choices included whether to attend a lecture or tutorial, or whether to complete the required reading.

Students were asked to write down their personal strategic question at the end of a lecture during which the concepts of metacognition and personal learning strategies had been discussed. This was defined as the main question they asked themselves prior to making a decision about their learning within a higher education context.

Students were given an example of two primary school students learning a list of spelling words at home. One student may ask themselves a strategic question, such as, "Who can I ask for help?"; while the other student may ask, "Why is this important?". The first student might ask a parent to help them study, while the other might not bother to study at all until the last minute. In other words, a strategic question was identified as a personal reaction to a task that informed the way the student's subsequent learning behavior. The student responses are detailed in Table 1.

Although an attempt was made to clearly define strategic questions, it is possible that some students may have misunderstood or been unable to clearly write down their thoughts. Two comments can be made about this apparent limitation. First, perhaps it is only through practice that students are able to coherently represent their thoughts about learning decisions in the form of a strategic question. Secondly, the students' attempts at generating strategic questions is the start of a guided reflective process about their intentions and ensuing learning strategies. Both of these points imply that while strategic questions may be somewhat imprecise, it is the subsequent discussion about learning strategies that is important.

The results were given back to the students during tutorials on the day following the lecture and were the basis for discussion about personal strategies for learning. The discussion was structured around the students identifying the choices made about learning as a result of asking their question. Students were asked to define effective and efficient approaches to learning in higher education and to make

recommendations for designing an engaging classroom task.

The lecturer's role was to focus and guide conversation using the strategic questions as a basis for discussion of learning concepts. For example, discussion of the question "Is it worth my time and effort?" can lead to consideration of the concept of being an efficient learner. This approach is coherent with Bigg's (1999) argument that good teaching involves structuring learning contexts so novice students can learn to use the higher order learning processes spontaneously used by expert learners.

Table 1 shows that the students were mainly concerned with the relevance and usefulness of learning experiences in terms of becoming a teacher. The questions also provide an insight into the students' choices about the expenditure of effort. This immediately suggests that theoretical ideas need to be explicitly linked to practical experiences, or to resolution of anticipated future problems.

It is a reflection of my level of cynicism that I had expected questions such as "Is this worth my time and effort?" and "Do I need to do this to pass?" to be more highly ranked. Rather, most of the strategic questions showed a concern with using learning experiences to inform and improve their teaching practice. Students that had asked these questions were able to identify the various complex pressures and competing goals in their lives.

During the tutorial discussion, the students' strategic questions provided an entry point to explore the abstract concept of learning about becoming a teacher. For example, I particularly wanted to discuss the students' ideas about what they considered to be an effective learning experience. Knowing that the students were concerned with the relevance and practicability of learning theories to their own teaching provided a basis for a discussion about how the design of tasks can influence student engagement.

How to design learning experiences that will engage students is an enduring question relevant for educators at all levels. These students will themselves be likely teaching in their own classroom is a few years. Asking questions about what and how they were learning provided a means for the students to consider the relationship between teaching and learning (McAlpine, Weston, Beauchamp, Wiseman, & Beauchamp, 1999). It was hoped that knowledge of their own learning experience would inform both the pre-service teacher's student and practitioner perspective about learning (Goos, Galbraith, & Renshaw, 2002).

It is natural to want to assign the students' strategic questions into categories. Yet is a student who asks, "Is it worth my time and effort to go to this morning's lecture?" a less effective or efficient student than one

Table 1
Strategic Questions Informing Personal Learning Behavior (n = 164)

	%
Is this relevant or useful to becoming a teacher?	22.0
Is it worth my time and effort?	16.4
How can I use this in the classroom?	14.0
Will this make me a better teacher?	10.8
Is this important?	9.2
Will I learn something from doing this?	7.3
Do I fully understand this?	7.3
What is the point or purpose?	4.9
Do I need to do this to pass?	4.3
Is this an interesting idea?	1.9
Other	1.9

Table 2
Potential Outcomes of Strategic Questions

From	To
Undeveloped metacognitive language	Developing and using metacognitive language in the form of strategic questions to conduct dialogue with others about what it means to be a learner within a specific context
Passive and uncritical perspective	A perspective of learning and task performance critically informed by self-awareness and self-monitoring
Teacher has responsibility for design and assessment of learning	Teacher and students use strategic questions to support the co-regulation of learning

who attends every lecture and asks, "How can I use this information in my classroom?"? A number of strategies are available for students and a range of strategies are likely to be equally effective (Wade, Trathen, & Schraw, 1990). This is a direction for future research, using the method outlined here, but with a focus on intensively tracking student choices emerging from their strategic questions within a range of contemporary higher education contexts.

Implications for Pedagogy

In the example of teacher education, it was shown that pre-service teachers were largely concerned with the usefulness of the task to their future practice as classroom teachers. Perhaps students were likely to expend effort in relation to the degree to which the characteristics of the task positively matched their strategic question.

Strategic questions provided support for a process of critical reflection about engagement with learning. The questions from the teacher education students became a fruitful basis for abstract discussion about pedagogy and learning. Table 2 outlines the potential outcomes of using strategic questions as a basis for supporting conversations about learning.

Students' strategic questions can support discourse leading to deeper conceptual understanding of the learning process. On the basis of their strategic questions, students could be asked to construct a self-explanation of the impact of their orientation to learning; generate further questions; challenge their view of learning; construct their own version of

effective learning; or design an instructional task (Graesser, Person, & Hu, 2002). Strategic questions can thus provide a metacognitive language to examine learning experiences, specifically reasoning for decisions and action, doubts or concerns, explanation for engagement and effort, and values and expectations. This is a means to increase self-awareness of personal choices made in response to learning experiences (Lin, 2001).

If metacognitive experience improves capacity to complete tasks efficiently (e.g., Gourgey, 1998), then students need to continually develop a language that enables them to build conceptual knowledge about learning. Students who are able to monitor, think, and communicate about themselves as learners can be said to be metacognitive (Lin, 2001).

This method would be useful in a learning environment where independent questioning learners are encouraged, and where a relationship is developing between a dynamic body of theoretical knowledge and practitioner questioning of the effectiveness of learning strategies. The use of strategic questions provides one method for use within disciplines that encourage a reflective practitioner approach.

Moving students from passive to active learning requires considerable effort on behalf of the lecturer. Metacognition is a complex and abstract idea for students to negotiate. Instructional tasks need to be carefully structured, including provision for metacognitive discussion. Strategic questions are a means of moving students from seeing tasks as something to be done and then submitted, to building metacognitive knowledge about their learning and

cognition. Although further research is needed, the generation and examination of strategic questions offers potential to improve students' knowledge and regulation of their learning.

There are residual questions about critical reflection, including whether methods like strategic questions will result in students using this knowledge and language in future practice. Also, any metacognitive capacity building requires repeated guided practice. There is no definitive causality established in the case study between building metacognitive language and improving learning performance. Rather the focus of this article has been on a means for students and educators to engage in dialogue about student learning and cognition.

Final Comment

Ramsden (1987) suggested that it is important to examine how our students learn and understand what we teach them. In this sense, the strategic questions can also act as a form of self-assessment for both student and educator about the task design. This information can be used to strategically adapt pedagogical approaches. The strategic questions generated by my students provided a number of hints about designing tasks to be more cognitively engaging.

The introduction of strategic questions offers an entry point to the development and use of a language of learning. As students negotiate their understanding of discipline specific concepts, learning about their reaction to tasks helps develop a critical perspective about their engagement with learning. In simple terms, the method of strategic questioning supports deliberate and purposeful thinking about the strategizing of learning and teaching behavior.

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Improving Writing with a PAL: Harnessing the Power of Peer Assisted Learning with the Reader's Assessment Rubrics

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In response to widespread concern that many American students do not write well enough to meet the requirements of higher education and the workplace, the College Board's National Commission on Writing in America's Schools and Colleges has called for a writing revolution. A key component of this revolution is evaluation, with particular emphasis on the need to align writing standards, writing instruction, and writing assessment. Teachers of writing want to provide their students with the kind of quality feedback that coaches and personal trainers provide their clients, but large classes and heavy teaching loads often frustrate their intention. Peer assessment can alleviate this problem. In fact, research indicates that when students are given valid and reliable assessment instruments to guide the process, feedback from peers can be as effective as—or more effective than—feedback from professors. As a direct response to the Commission's call for curricular alignment, Jackson State University has launched the Reader's Assessment Project, a project that seeks to harness the power of Peer Assisted Learning by developing and applying a series of analytic Peer Assessment rubrics for specific rhetorical modes. While analytic rubrics are useful in identifying broad areas for improvement in student writing, such rubrics are sometimes difficult to use because they address general qualities of effective writing without reference to the way those qualities operate in specific rhetorical modes, such as comparison/contrast or process. Analytic scoring also tends to be time-consuming.The Reader's Assessment Project at Jackson State University seeks to overcome these drawbacks by developing mode-specific analytic instruments that are aligned with the reading process. In this article, members of the Reader's Assessment team review the relevant literature, outline the conceptual framework and methodology of the project, and explain how they have harnessed the power of Peer Assisted Learning with the Reader's Assessment rubrics through a strategy that they call CARE (creating a reassuring environment).

In response to widespread concern that "the level of writing in the United States is not what it should be," the College Board has established the National Commission on Writing in America's Schools and Colleges (National Commission, 2003, p. 24). While the National Commission (2003) concedes that students do possess a modicum of basic writing skill, the problem is that students do not write well enough to meet the requirements of higher education and the workplace. So serious is this problem, the Commission argues, that nothing less than a "writing revolution" will suffice to solve it (2003, p. 24). In its sweeping agenda, the Commission calls for "making writing a centerpiece of the curriculum" (2003, p. 26), for at least doubling both the time and the financial resources allocated to student writing, for applying existing technology and developing new technology to facilitate writing instruction and writing assessment, and for providing the requisite professional development to faculty in all disciplines. In addition, the Commission places significant emphasis on the role of evaluation, stressing the need to align writing standards, writing instruction, and writing assessment. The assessment instruments presented in this article constitute a direct response to this call for curricular alignment and can contribute significantly to the Commission's writing revolution at both the local and the national levels.

The Frustrations

As any English professor will tell you, large classes and heavy teaching loads exacerbate the problem addressed by this writing revolution. That is precisely why the National Commission's (2003) call for increased financial, technological, and human resources is so significant—and so welcome. Nevertheless, English professors are not holding their breath. It has been 86 years since Edwin Hopkins (1923) published his groundbreaking study *The Labor and Cost of the Teaching of English*, and English language professionals have been calling for smaller classes and more humane teaching loads ever since. The National Council of Teachers of English (1980) has issued relevant policy statements for the elementary, secondary, and college levels. Some progress has been made, but not nearly enough and not in nearly enough places. As Popken (2004) observes, "To this day, for many hundreds of writing teachers…, composition is still very costly labor" (p. 63)

Peer Assessment to the Rescue

So, until the needed resources arrive, what can be done in the meantime? Part of the answer to this question can be found in the writing process itself.

Many writing teachers have found Peer Assisted Learning (PAL) to be helpful. Topping (2001) defines PAL as "the acquisition of knowledge and skill through active helping and supporting among status equals or matched companions. PAL involves people from similar social groupings…helping each other to learn and learning themselves by so doing" (p. 2). Simply put, then, PAL is learning with a pal. An important form of PAL is peer assessment, which involves "formatively and qualitatively evaluating the products or outcomes of others in the group" (Topping, 2001, p. 3). An important part of learning to be a writer is learning to assess one's own writing and the writing of colleagues, learning to give and to receive effective feedback. In training students to engage in this mutual assessment process, professors are building additional quality into writing processes and products, preparing students for business and the professions (where peer review is an important part of the workplace), and transforming classes into learning communities (Heinrich, Neese, Rogers, & Facente, 2004). Research studies have demonstrated the effectiveness of peer assessment as a component of writing instruction across a broad spectrum of disciplines and educational levels: from agronomy to zoology (Liu, Pysarchik, & Taylor, 2002), from elementary school (Mullen, 2003), to graduate school (Heinrich et al., 2004; Topping, Smith, Swanson, & Elliot, 2000)—including students with special needs (Ammer, 1998). At the undergraduate level—the focus of this study—researchers and practitioners provide impressive testimony for the benefits of peer assessment (Topping, 1998). Among these benefits are the following:

- Peer assessment helps students develop important social skills as they learn to give and receive frank, tactful, and respectful feedback from others (Ammer, 1998; Heinrich et al., 2004).
- Peer assessment contributes to students' professional preparation because peer assessment is a vital component of work in academe, business, and the professions (Liu, Pysarchik, & Taylor, 2002; Venables & Summit, 2003).
- Peer assessment fosters positive attitudes toward writing and builds the self-confidence of student writers (Light, 2003).
- Peer assessment promotes learning about the disciplines and learning about the writing process itself (Venables & Summit, 2003).
- Peer assessment is timely and efficient. As Walberg (1998) observes, "Working alone or during teacher presentations, learners can carry forward or even practice mistakes. In a small group, or in pairs, however, they need not

wait; they can quickly compare and correct their understandings" (p .x). Moreover, in contrast to an overloaded professor, who has many student essays to evaluate, a peer reviewer can concentrate on the one essay assigned to her and more easily provide a rich, detailed response (Topping et al., 2000; Venables & Summit, 2003).

Research indicates that peer assessment tends to be more accurate when its stated purpose is formative (improving a work in progress) rather than summative (assigning a grade to a finished product) (O'Donnell &Topping, 1998). Research also suggests that feedback can be enhanced by the use of assessment instruments, variously called guides, checklists, or rubrics (O'Donnell & Topping, 1998; Soles, 2001). When students are given valid and reliable assessment instruments to guide the process, feedback from peers can be as effective as—or more effective than—feedback from professors (O'Donnell & Topping, 1998; Topping, 1998).

Not only do valid and reliable rubrics serve as evaluation tools, but they also serve as teaching tools because they specify the expectations for assignments (Saddler & Andrade, 2004). As Soles (2001) asserts, "Shared rubrics empower students, they urge students to become active participants in the writing process, and they substantiate the connections among teaching, learning, and assessment" (p. 15). Soles' insights are consonant with Huot's (2002) call for a re-articulation of writing assessment in terms of its impact on teaching and learning. They are also consonant with Isaacson's (1999) call for "instructionally relevant writing assessment" (p. 29). As Isaacson affirms, "Student self-assessment and peer review are the principal means of bringing assessment and instruction very close to one another" (p. 40).

The Jackson State University Reader's Assessment Project

In keeping with the findings of research and the testimony of educational practitioners, the Jackson State University Center for University Scholars has funded a project to develop the Reader's Assessment Series, a group of instruments to assess essays in various rhetorical modes. Students can use these instruments as a guide for planning an essay and as self-assessment or peer assessment tools for improving an essay in progress. Professors and graduate teaching assistants can use the instruments as summative assessment tools when essays reach final form. The Reader's Assessment instruments are analytic assessment instruments, but they are not

analytic instruments of the kind that teachers of writing usually encounter.

The usual approach to constructing an analytic evaluation scale is to identify (i.e., list) the desired writing qualities and to include a rating scale for each quality. While analytic instruments of this type are useful in identifying the broad areas for improvement in student writing, such instruments are sometimes difficult to use because they address general qualities of effective writing without reference to the way those qualities operate in specific rhetorical modes, such as comparison/contrast or process instruction. Another drawback of analytic scoring is that it tends to be time-consuming (Mertler 2001). The Reader's Assessment Project seeks to overcome these drawbacks by developing mode-specific instruments that are aligned with the reading process. We have already developed instruments for assessing essays in the comparison/contrast and process instruction modes. We are currently developing an instrument for assessing research-based argumentative essays, and we plan to develop an instrument for classification essays.

Five assumptions undergird the development of the Reader's Assessment instruments:

Assumption 1: The act of reading an essay involves the reader in five experiential phases, which the reader experiences in the following order: the title, the introduction, the body, the conclusion, and the total impact.

Assumption 2: The qualities of effective writing are interactive in their effects on a reader.

Assumption 3: The qualities of effective writing interact differently at each experiential phase of the essay.

Assumption 4: The qualities of effective writing interact differently for different rhetorical modes (e.g., comparison/contrast, process instruction, classification, argumentation).

Assumption 5: The effectiveness of assessment instruments can be increased by developing them in a manner consistent with Assumptions 1-4 and by aligning their format with the reading process.

In accordance with these assumptions, the format of each Reader's Assessment instrument is aligned with the reading process. The basic procedure for constructing each instrument is to operationalize the qualities of effective writing (i.e., development, unity, coherence, and technique) in the form of criterion statements for each experiential phase of an essay in the particular rhetorical mode of interest. The basic procedure for constructing the scoring guide is to define each point on the rating scale for each criterion statement in terms of observable features of the writing. Because we have used a five-point scale, we have tried to identify five features that would mark performance at the top of the rating scale for a particular criterion statement. Scoring is thus simplified, for if all five features are present, the essay receives the top score on that criterion. If only four of the features are present, the essay receives the next-to-highest score and so on. Thus, while our approach to assessment is decidedly qualitative, we have tried to facilitate the scoring process by defining the scoring levels in terms of observable and countable markers of quality. As an example of how this works, we have included the assessment instrument for process instruction essays (Appendix A) and its accompanying scoring guide (Appendix B).

Not only is the instrument distinctive in its format, but it is distinctive in its method of development as well. The Reader's Assessment instruments have been designed as tools of Peer Assisted Learning and, appropriately, the development process has involved a great deal of Peer Assisted Learning among our faculty and our students. Five phases are involved in the development of each instrument: a development phase, an evaluation for content validity, a scoring application, an evaluation for interrater reliability, and a refinement phase. Faculty from our department, students, and faculty from other departments have been involved in the process. The project is conducted under the guidance of a formative committee of Jackson State University writing faculty and an external mentor from the Mississippi Writing/Thinking Institute.

The instruments have been specifically developed for use in our freshman English courses, but we also look for ways in which we can validly apply or validly adapt them to other courses within our department. For example, we have found the instruments to be effective tools for training pre-service teachers to implement PAL, and we have begun to apply the instruments in our undergraduate and graduate teacher preparation courses. We have also successfully applied the Reader's Assessment for process instruction (Appendices A and B) to an undergraduate course in technical writing.

Our vision for the future of the Reader's Assessment Project is to expand beyond our own department by serving as consultants to other departments across the curriculum as they develop rubrics tailored to their own discipline-specific writing assignments. Our experience at Jackson State University indicates that peer assessment instruments such as those we have developed can provide clear criteria to students before they begin a writing assignment, guide them during the process of preparing the assignment, and assist them in the formative assessment of their own work and that of their peers. Such instruments can lighten the professor's burden of providing formative feedback, build additional quality

into the processes and products of writing, and make the task of reading and assessing the finished product much more pleasant.

Implementing PAL with CARE

As our experience—and a large body of research literature—indicate, PAL is an effective method of aligning writing standards, writing instruction, and writing assessment. PAL works. It works, however, only when the faculty and students make it work. We have found that the key to successful implementation is a strategy that we call CARE: Creating a Reassuring Environment. The challenge is to transform the class from a disconnected group of individuals—many of them freshman—into a learning community with the confidence to give and receive frank and respectful responses to each other's writing. From our own experience with the CARE strategy, we offer the following recommendations for implementing PAL with CARE.

Orient the students to Peer Assisted Learning. We explain the concept, method, and benefits of PAL early in the course so that we and our students are intentional in our application of PAL. On the first day of class, we also begin to form a learning community by having pairs of students interview each other and introduce each other to the class. This first assignment gives the students the opportunity to get to know each other, and it constitutes the first step in establishing an atmosphere of collegiality. If students are going learn with a PAL, they must first become colleagues. Throughout the course, we provide numerous opportunities for students to build trust in each other and confidence in themselves as they practice giving frank and respectful feedback in groups of two or three.

Train the students to use the Reader's Assessment instruments. We train the students to use the assessment instruments by taking them through the scoring instructions step by step. We make sure to define any unfamiliar terms via the scoring guide and to distinguish between terms that might be viewed as synonymous, such as *tips*, *feedback*, and *precautions* (Appendix B). Once they understand the standards, we let them practice by scoring a sample essay; then they discuss the rationale for their ratings in class.

Make each peer review count. We stress the importance of giving quality responses by making each peer review count as an in-class writing assignment. When students know that they will get credit for giving meaningful, honest feedback, they tend to give better feedback. We also require our students to read their draft essays aloud to the class as well as the feedback they received from their peer reviewer. During this process, other classmates may also respond, and we also have the opportunity to question, comment, and

confirm. This process also offers the added benefit of building confidence by accustoming students to doing presentations and answering questions. Through this process, we also emphasize the importance of good speaking and its relationship to reading, writing, and listening as key skills in teaching and learning.

Use PAL only for formative review. This step alone takes a lot of pressure off the students and removes a major source of resistance to peer review. When students see themselves as "graders," they may lack self-confidence in doing the peer review and in using the instruments and scoring guides; some students may also think that by scoring the essay as leniently as possible, they will get the same easy review in return. For these reasons, we explain, at the outset, that PAL peer assessment is not the same as grading an assignment. Instead, PAL peer assessment is providing guidance and feedback to improve an essay in progress as well as to highlight the strengths of the author's work. If students know that their essays will be revised after the peer review, they are more likely to give better feedback and desire the same in return. In fact, in a formative review situation, giving frank, respectful feedback is the best thing one student can do for another. We have found that frank, respectful feedback can result in better final products, better grades, and-- most importantly--better writers.

Stress the student writer's AUTHORity. Whether the student is receiving feedback from us, from a classmate, or from a tutor in the campus writing center, we stress the following theme: "Writing is a decision-making process. You are the author. You must decide what to do with the feedback that you receive." Knowing that they are responsible for their own writing decisions gives the students a sense of AUTHORity and builds their confidence. We also build confidence by recognizing and reinforcing the strengths of the essay while giving the student an honest, positive, improvement-oriented critique.

In conclusion, we realize that when many students first come to us, they lack confidence in themselves or in the writing they produce. That is why we build confidence and encourage achievement by applying PAL with CARE as we have described. In doing so, we strengthen the connections among writing standards, writing instruction, and writing assessment. As we engage our students in multiple opportunities to internalize the principles of effective writing, build their confidence, and enhance their educational experience, we find that PAL in indeed a very effective way to CARE for our students.

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Acknowledgements

APPENDIX A

READER'S ASSESSMENT: PROCESS INSTRUCTION* *Gamma* version
© 2007 by Stephen G. McLeod and Gavin C. Brown

Title of Essay: _____Writer: _____

Reader: _____ Date: _____

Indicate the degree to which each statement applies to the essay by circling the appropriate number. Some statements carry a higher maximum point value than others because of differences in relative importance.

*Please note the following limitation: This instrument is designed for assessing only process instruction essays (i.e., "how to" essays), where the reader is expected to perform the process.

TITLE

1. The title is effective**.** (Note: The title may include a subtitle.)

1	2	3	4	5
hardly applicable		applicable		highly applicable

Comments:
_____
_____
_____

INTRODUCTION

2. The writer provides me with a motive for learning the process.

6	10
No	Yes

Comments:
_____
_____
_____

3. The thesis is a sharply focused assertion about the process (e.g., its importance, its ease or difficulty, its benefits, its outcome).

11	12	13	14	15
hardly applicable		applicable		highly applicable

Comments:
_____
_____
_____

BODY

4. The writer explains the steps of the process in chronological order.

6   10
No   Yes

Comments:
_____
_____
_____

5. The writer explains the steps in sufficient detail and with sufficient clarity so that I can perform the process.

11   12   13   14   15
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

6. The writer provides me with precautions, tips, feedback, and troubleshooting instructions at appropriate points.

6   7   8   9   10
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

7. The paragraph divisions are appropriate.

1   2   3   4   5
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

8. By using transitions of time or other transitions as appropriate, the writer guides me smoothly through the process.

1   2   3   4   5
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

CONCLUSION

9. The writer effectively culminates the essay.

6	7	8	9	10
hardly applicable		applicable		highly applicable

Comments:

_____
_____
_____

TOTAL IMPACT

10. The writer has presented the process in a "reader friendly" way.

6	7	8	9	10
hardly applicable		applicable		highly applicable

Comments:

_____
_____
_____

11. The technical aspects of the writing (i.e., sentence structure, grammar, punctuation, diction, usage, spelling, and mechanics) support the writer's credibility.

6	7	8	9	10
hardly applicable		applicable		highly applicable

Comments:

_____
_____
_____

APPENDIX B

READER'S ASSESSMENT: PROCESS INSTRUCTION ESSAY SCORING GUIDE*
Gamma version
© 2007 by Stephen G. McLeod and Gavin C. Brown

Title of Essay: _____Writer: _____

Reader: _____ Date: _____

*Please note the following limitation: This instrument is designed for assessing only process instruction essays (i.e., "how to" essays), where the reader is expected to perform the process.

Indicate the degree to which each statement applies to the essay by circling the appropriate number. Some statements carry a higher maximum point value than others because of differences in relative importance.

TITLE

1. The title is effective. (Note: The title may include a subtitle.)

1	2	3	4	5
hardly applicable		applicable		highly applicable

Comments:
_____
_____
_____

Award a score of 5 if the title (a) captures your attention with an arresting phrase, a vivid figure of speech, or a question, (b) specifies the process to be explained, (c) aligns with a process instruction strategy, (d) is free of technical errors, and (e) follows the instructor's format specifications.

Award a score of 4 if the title does four of the above.

Award a score of 3 if the title does three of the above.

Award a score of 2 if the title does two of the above.

Award a score of 1 if the title does only one of the above.

Award a score of 0 if the title is missing, and so note in the comments section.

INTRODUCTION

2. The writer provides me with a motive for learning the process.

6	10
No	Yes

Comments:
_____
_____
_____

Award a score of 10 if the writer supplies one or more cogent reasons for learning the process.

Award a score of 6 if the writer provides no cogent reasons for learning the process.

3. The thesis is a sharply focused assertion about the process (e.g., its importance, its ease or difficulty, its benefits, its outcome).

6	7	8	9	10
hardly applicable		applicable		highly applicable

Comments:

_____
_____
_____

Award a score of 10 if the thesis (a) is explicitly stated, (b) is readily identifiable, (c) is free of technical errors (d) identifies the process, (e) makes an assertion about the process (e.g., its importance, its ease or difficulty, its benefits, its outcome).

Award a score of 9 if the thesis meets only four of the above criteria.

Award a score of 8 if the thesis meets only three of the above criteria.

Award a score of 7 if the thesis meets only two of the above criteria.

Award a score of 6 if the thesis does only one of the above criteria.

Award a score of 0 if the thesis is missing or merely implied, and so note in the comments section.

BODY

4. The writer explains the steps of the process in chronological order.

6	10
No	Yes

Comments:

_____
_____
_____

Award a score of 10 if the writer presents all the steps in chronological order.

Award a score of 6 if any step is not in chronological order or if the writer leaves you unsure of the order of any of the steps.

5. The writer explains the steps in sufficient detail and with sufficient clarity so that I can perform the process.

11	12	13	14	15
hardly applicable		applicable		highly applicable

Comments:

_____
_____
_____

Award a score of 15 only if (a) you are confident that you can perform the process by following the writer's instructions, AND (b) the writer has included all the necessary details about the materials required, (c) the writer has

included all the necessary details about the procedures involved, (d) the writer has defined any unfamiliar terms, and (e) the writer has not burdened or bored you with excessive detail.

Award a score of 14 only if you are confident that you can perform the process by following the writer's instructions BUT the writer falls short only in burdening or boring you with excessive detail.

Award a score of 13 only if you are confident that you can perform the process by following the writer's instructions BUT the writer falls short only in failing to define one of more unfamiliar terms.

Award a score of 12 if only two of the standards have been met (see *a* through *e* above)
Award a score of 11 if only one of the standards have been met (see *a* through *e* above).

6. The writer provides me with precautions, tips, feedback, and troubleshooting instructions at appropriate points. *

6   7   8   9   10
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

Award a score of 10 if the writer provides (a) precautions, (b) tips, (c) feedback, and (d) troubleshooting instructions and (e) places each type of guidance at the appropriate spot in the essay.

Award a score of 9 if the writer does four of the above.

Award a score 8 if the writer does three of the above.

Award a score of 7 if the writer does two of the above.

Award a score of 6 if the writer does one of the above.

Award a score of 0 if the writer does none of the above, and so note in the comments section.

*Note: Look for each type of guidance mentioned. The writer is expected to provide each type of guidance and to place each type of guidance at the appropriate spot in the essay. Definitions for the various types of guidance are given below, with guidelines for their placement.

A *precaution* is guidance designed to prevent either injury or the failure of an action and must be given before the action to which it refers.

A *tip* is guidance designed to facilitate performance and can be given before or during the action to which it applies.

Feedback is guidance designed to let the reader know whether s/he has performed an action correctly and can be given after an action is explained.

Troubleshooting instructions tell the reader what to do if s/he encounters a problem during the process and may be given at the end of the applicable step or phase or at the end of the entire process, as appropriate.

7. The paragraph divisions are appropriate.

1   2   3   4   5
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

Award a score of 5 if (a) paragraph divisions separate the introduction from the body and (b) the body from the conclusion, (c) if the body itself is divided into paragraphs, (d) if all the paragraph divisions in the body are appropriate, and (e) if each paragraph division is clearly marked by indentation.

Award a score of 4 if only four of the standards above have been met.

Award a score of 3 if only three of the standards above have been met.

Award a score of 2 if only two of the standards above have been met.

Award a score of 1 if only one of the standards above have been met.

8. By using transitions of time or other transitions as appropriate, the writer guides me smoothly through the process.

1   2   3   4   5
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

Award a score of 5 if a transition is present wherever it is needed and if all the transitions present are used appropriately.

Award a score of 4 if no more than one necessary transition is missing and/or no more than one transition is used inappropriately.

Award a score of 3 if no more than two necessary transitions are missing and/or if no more than two transitions are used inappropriately.

Award a score of 2 if no more than three necessary transitions are missing and/or if no more than three transitions are used inappropriately.

Award a score of 1 if four or more necessary transitions are missing and/or if four or more transitions are used inappropriately.

CONCLUSION

9. The writer effectively culminates the essay.

6   7   8   9   10
hardly applicable   applicable   highly applicable

Comments:

_____
_____
_____

Award a score of 10 if the writer (a) completes the essay rather than merely stopping it, (b) reaffirms the thesis, (c) reaffirms the purpose or importance of the process, (d) builds effectively on what has gone before, and (e) encourages you—either explicitly or implicitly—to try the process.

Award a score of 9 if the writer does four of the above.

Award a score of 8 if the writer does three of the above.

Award a score of 7 if the writer does two of the above.

Award a score of 6 if the writer does one of the above.

Award a score of 0 if the conclusion is missing or if the writer does none of the above, and so note in the comments section.

TOTAL IMPACT

10. The writer has presented the process in a "reader friendly" way.

6   7   8   9   10
hardly applicable   applicable   highly applicable

Comments:

_____
_____
_____

Award a score of 10 if the writer (a) addresses you directly by using the second person and the imperative mood, (b) uses the active voice, (c) avoids the cookbook style—even for a culinary essay *(d) makes the process clear on first reading, and (e) takes a helpful, encouraging approach.

Award a score of 9 if the writer does four of the above.

Award a score of 8 if the writer does three of the above.

Award a score of 7 if the writer does two of the above.

Award a score of 6 if the writer does 1 of the above.

Award a score of 0 if the writer does none of the above, and so note in the comments section.

* Note: The "cookbook style" refers to the abbreviated instructions often found in cookbook recipes whereby the writer omits words such as articles (*a*, *an*, *the*) and objects of verbs: for example, "Place in mixing bowl and stir until well blended." Place *what* in *a* mixing bowl? Stir *what* until it is well blended? Avoid the cookbook style.

11. The technical aspects of the writing (i.e., sentence structure, grammar, punctuation, diction, usage, spelling, and mechanics) support the writer's credibility.

6   7   8   9   10
hardly applicable   applicable   highly applicable

Comments:
_____
_____
_____

Award a score of 10 if there are no errors in technique.

Award a score of 9 if there is only one error in technique.

Award a score of 8 if there are only two errors in technique.

Award a score of 7 if there are only three errors in technique.

Award a score of 6 if there are four or more errors in technique.

Metaphorical Mirror: Reflecting on Our Personal Pursuits to Discover and Challenge Our Teaching Practice Assumptions

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The goal of this paper is to examine how our personal pursuits—hobbies, activities, interests, and sports—can serve as a metaphor to reflect who we are in our teaching practice. This paper explores the notion that our favorite personal pursuits serve as metaphorical mirrors to reveal deeper assumptions we hold about the skills, values, and actions we encourage, recognize, and reward in our classrooms. The paper has four principle objectives: first, to understand the importance of identifying the skills, values, and actions that form our basic assumptions of knowing in our personal pursuits and teaching practices; second, to appreciate the importance of reflection on experience as an epistemology for self-knowledge and for developing in our teaching practices; third, to understand the power of metaphors to enhance our ability to see previously unavailable and therefore unexamined assumptions; and fourth, to examine and challenge for validity, through dialogue, our assumptions to improve our teaching practices. In addition, in this article we offer a metaphorical mirror exercise designed to help facilitate application of personal pursuits through reflection and dialogue to one's teaching practice.

The authors recently collaborated on designing and delivering a workshop for an annual teaching and learning conference that focused on using participants' personal pursuits as metaphorical mirrors to reflect assumptions about their teaching practices. The positive feedback received from participants about the power of this exercise to promote deep reflection confirmed the authors' personal experiences. Many participants were appreciative for both the opportunity to reflect and the facilitated method of reflection that prompted new insights. For participants in the session, the connections were immediately evident between the assumptions of skills, values, and actions that form the basis for knowing in their personal pursuits and how these same assumptions appear in their classrooms. For example, one participant remarked, "Until now, I hadn't made the connection between my love of reading and the unusually long reading list on my syllabus," while another stated, "the impact of my training as a marathon runner certainly shows up in a big way in my expectations for students' efforts in my class."

However, with accumulated experience much of our teaching practice may become routine and go largely unexamined, so too, may our reflective practice. In other words, we may ironically use routinized reflective actions to reflect on our routinized teaching actions and assumptions producing similar, if not the same, results. Our hope is that this article serves as a catalyst to reflect differently and more deeply, and to break the pattern of reflecting by introducing metaphors to see our assumptions in a new way. We believe reflecting on one's assumptions is a critical component of developing a reflective teaching practice.

Our article is divided as follows: first we examine the importance of self-knowledge as a crucial element in understanding, changing and developing one's teaching practice, and we suggest reflection as an epistemology for generating that knowledge; next, we develop the concept of using metaphors combined with dialogue to socially construct seeing things anew; then, we provide the metaphorical mirror exercise for assisting one in illuminating assumptions in our personal pursuits that reveal themselves in our teaching practices; and lastly, we end with our personal reflections and conclusions.

Developing Self-knowledge Through Reflection

Knowledge of self is crucial in better understanding the underlying assumptions we hold about the cultural, psychological, emotional, and political complexities that shape our classroom cultures (Brookfield, 1995). Parker Palmer (1998) writes,

> As I teach, I project the condition of my soul onto my students, my subject, and our way of being together. Teaching holds a mirror to the soul. If I am willing to look in that mirror and not run from what I see, I have a chance to gain self-knowledge—and knowing myself is as crucial to good teaching as knowing my students and my subject. In fact, knowing my students and my subject depends heavily on self-knowledge. (p. 2)

Further to that point, Cranton (2006) suggests reflective questions that facilitate educators inquiring into the content, process, and premise of their teaching

promotes self-reflection and self-knowledge. Cranton and Carussetta (2004) posits that reflection plays an important role in building greater self-awareness that leads to greater authenticity.

Reflective questions can be instrumental in increasing self-knowledge by enabling individuals to recognize their beliefs and by developing the capacity to confront the underlying assumptions that supports those beliefs. Reflection becomes a process for developing better self-awareness by offering a way to challenge what one knows and how one knows something. In this way, reflection can lead to insights about the subject being taught—what is it, why is it important, what impact does it have on students' learning—and insights into the person teaching the subject—what are they feeling and thinking, what does the subject mean to them—in ways that increase self-knowledge. While self-knowledge through reflection is crucial, it is often an overlooked aspect of our teaching practice development, particularly in higher education.

In an article about developing students' reflective practice, Pavlovich, Collins, and Jones (2009) write,

> conventionally, teaching has focused on what Palmer (1998) describes as questions of "what" (the nature and boundaries of the problem), "how" (the methods and techniques for finding solutions), and occasionally "why" (the underlying purpose of the nature of the topic of investigation). Rarely is there an engagement with the "who" with our own self-awareness, and the relationships we have with others. (pp. 37-38)

In more deeply examining the "who," the focus shifts inward to questions concerning who am I with this material, who am I in relationship with students, and who am I in this teaching experience? These deeper questions help delineate one's beliefs and the assumptions that support those beliefs. In this way, reflection is an epistemology for self-knowledge; and, an epistemology for personal and professional development.

There is a long history of research on the importance of reflection, particularly in the education literature, as a key component for learning, change and professional development (Argyris & Schön, 1974; Boud, Keogh, & Walker, 1985; Brookfield, 1995; Cranton, 2002; Dewey, 1922, 1933, 1938; Johns, 1994; Lewin, 1951; Marzano, 2007; Mezirow, 1990; Reeves, 2006; Schön, 1983, 1987; Vygotsky, 1962). Advocates suggest reflecting on one's lived experience is necessary to facilitate behavioral and cognitive change. Many studies recognize that reflection on experience, where reflection has a critical function of challenging routine assumptions,

values, and actions in one's practice, leads to personal and professional growth (Oermann, 1999; Platzer, Blake, & Ashford, 2000a, 2000b; Platzer & Snelling, 1997). Essentially, reflection enables learners to analyze their learning in ways that question take-it-for-granted assumptions and arrive at new knowledge based on considering different alternative actions (Argyris & Schön, 1974; Oermann, 1999; Schön, 1987).

Through a regular cycle of reflective inquiry—surfacing and challenging assumptions—teachers seeking improvement seek transformative change; change in their "way of being" as a teacher, not just in their "way of doing." Becoming a better teacher is about reflecting on and questioning deeply held assumptions in an experiential cycle of inquiry, developing new strategies, testing in action, and learning. It is through reflection and resultant self-knowledge that one can leverage greater awareness of others and course content in the journey toward becoming a better teacher.

Double loop learning (Argyris, 1993, 1996; Argyris & Schön, 1974; Schon, 1987) involves reframing how one is doing something, which is constructing new realities to produce different outcomes. If one can change what they are doing, they have the ability to avoid making the same mistake and possibly generate different and unexpected outcomes that produce new learning. This change sets the stage for further experimentation with reflection on action creating a double-loop learning cycle. Reflective practice suggests individuals have the capacity to grow throughout life using active engagement in experiences and reflection on those experiences to bring forth new experiences opening the possibility for a cycle of continued learning (Vaill, 1996).

As teachers, we spend an enormous amount of time and energy learning about our subject and our students, yet perhaps less time knowing ourselves. Without understanding self, we run the risk of thinking good intentions and subject knowledge trump the unintentional consequences of take-it-for-granted assumptions we unwittingly bring into the classroom. We run the risk of naively creating an illusory classroom culture that may appear fine on the surface but is largely unquestioned and untested. The issue, illuminating and questioning underlying personal assumptions that support our beliefs, begs the question that is at the heart of this article, "How do individuals discover and challenge tacit taken-for-granted assumptions in their teaching practice?"

Metaphors to See Anew

We suggest one way is to use personal pursuits as a metaphorical mirror to reflect deeper assumptions

embedded in our teaching practice thereby providing opportunity for critical analysis. In a way, we suggest going in through the back door rather than the front door in seeking to discover hidden parts of our selves, gain new perspectives, and seek new understandings. Metaphors are a way to see our self anew.

Metaphors have a long and rich history in literature, narratives, songs, and everyday conversations to evoke comparisons between different images that assist in meaning-making. Framing our understanding of an experience as a metaphor is to provide a phrase, word, or story that does not literally apply but serves as a suggestion for comparing the experience to another concept. A metaphor is not simply a comparison of different things with similarities it is combining unrelated concepts to form a new understanding of an experience. Thus, a metaphor makes an assertion that the experience "is like" the comparative concept and by default "not like" other concepts.

MacCormac (1985) explains in the process of comparing two normally unrelated concepts the brain is capable of sorting out what is similar and dissimilar creating new understandings. Andrew Ortony (1975) writes metaphors are necessary because they help us make a connection between something known to something new and, thereby, restructure what we know and gain a new perspective on it. Walters (1996) writes about metaphor in literature and concludes, "the reason people use metaphors in speech is that we use metaphors in thought. We think in metaphors" (p. 125).

Morgan (1986) posits an epistemological perspective that advocates the use of metaphors as a way of thinking and understanding facets of our experiences by comparing it with concepts of another experience. While Morgan's work is mainly utilized for understanding organizations, it obviously has relevance in understanding the individuals who make up organizations.

Many of our tacit and taken-for-granted assumptions, about teaching or other life experiences, are based on metaphors. A teacher who is orderly and efficient might metaphorically describe their classroom as "a well oiled machine." This metaphor would be a partial insight into the assumptions that influence what the teacher values in the classroom. Using a different metaphor might suggest new values and new actions for the teacher to emphasize. In this way, different metaphors help change one's perspective by reframing the situation. The relevance of using metaphors is in helping us understand complex phenomena, understanding that either confirm or disconfirm our assumptions. If our assumptions are confirmed, we should "stay the course"; if disconfirmed, there is incentive to change those assumptions, which ultimately suggests new assumptions and new teaching actions. Think what it would mean if we tested our

teaching practice assumptions for validity—students will love this topic as much as I do, students will read all the articles prior to class, this class is relevant to students, I am more knowledge on this topic than the students—and adjusted our teaching accordingly.

Rather than trying to directly unpack assumptions we make about the skills, values, and actions in our teaching practice, we suggest looking at personal pursuits as metaphors that facilitate mirror reflections of those assumptions in our practices: reflections that enable new insights and new learning through dialogue with others.

Constructing Knowledge through Dialogue

Constructivism is rooted in the pragmatist philosophies of Dewey (1933), James (2000), and Mead (1964) who proposed individuals construct their learning through active experience, discovery, and critical reflection. Dewey's (1933) instrumentalism, a variety of pragmatist philosophy, maintained that the truth and overall value of an idea are determined by its usefulness in actively solving human problems. Reflection is the means for analyzing and actively responding to problems. Dewey (1933) defined reflective thinking as "active, persistent and careful consideration of any belief or supposed form of knowledge" (p. 9). Likewise, James (2000) asserted that individuals should construct meaning from their experience by testing concepts with the question, "What sensible difference to anybody will its truth make?" (p. xvii).

Social constructivist theorists (Berger & Luckmann, 1967; Gergen, 1985; Gergen & Thatchenkery, 1996a, 1996b; Vygotsky, 1962, 1986; Weick, 1995), who suggested individuals "construct" meaning from their experiences, rather than the experiences creating meaning, support reflective practice. Essentially social constructivists posit that individuals make sense of their experience through meaning making models comprised of underlying assumptions and values, and that new learning requires individuals to challenge and even change assumptions to create new meaning making models. Social constructivists draw on Vygotsky's (1962) emphasis on the social elements and the collaborative construction of knowledge through dialogue. In this way, dialogue provides an interactive data collecting, testing, and organizing system for meaning making.

The tradition of dialogue can be found in most cultures. While formats may differ slightly, the intent for social engagement in collective inquiry—characterized by openness and trust in seeking to understand multiple perspectives toward formulating concurrence—is remarkably similar. Dialogue has the collective power to connect by collaboratively bringing

body, mind, and spirit to explore learning in the space between individuals. It is in the relationship of people through conversation, that meaning is made in dialogue. The epistemological nature of dialogue is rooted in the Greek word dia-logos, signifying that meaning is in the words between people, not in people themselves (Buber, 1970). Through dialogue, people experience collaborative inquiry that incorporates multiple perspectives for discovering new meanings that are synergistically more than they might discover on their own (Bohm, 1996; Isaacs, 1999; Senge, 1990; Stanfield, 1997).

Vygotsky (1962) claims external dialogue serves as an antecedent to the development of inner dialogue, which monitors individual mental processes for planning, implementing, and evaluating behavior (Belenky, Clinchy, Goldberger, & Tarule, 1997). In the absence of external dialogue, individuals may fail to develop the ability for meaning-making. By making reflection explicit during our metaphorical mirror exercise, participants have an opportunity to cycle through an internal-external-internal dialogue, which confirms or disconfirms assumptions in the meaning-making of their teaching practice. In this way, internal reflection is a function of and influenced by external dialogue. Dialogue co-creates an external meaning-making system, where conversation becomes data for framing and reframing internal individual meaning-making (Yankelovich, 1999).

Vygotsky (1962) identified the zone of proximal development, which refers to learning a task that is just beyond the ability of the learner to achieve working independently, yet reachable with the assistance of others. We believe, for many individuals, reflection is such a task. He advocated scaffolding: a technique that provides the changing level of support necessary for learning tasks too difficult to master alone. We suggest that the metaphorical mirror exercise combined with dialogue acts as scaffolding to help participants surface and challenge assumptions.

Metaphorical Mirror Exercise

The metaphorical mirror exercise consists of providing participants with guided reflection: open-ended questions probing their personal pursuits and teaching practice, allowing time for reflection and brief journal writing, then sharing answers in the form of a narrative with others in dialogue. The questions and journal writing provide structure and focus for internalized reflection. The narrative provides insights into previously obscure or hidden assumptions. And, the dialogue allows participants to engage in externalized reflection and to receive feedback to clarify and test their perceptions and assumptions (Flick, 1998).

There is ample research on the positive effects of both internalized non-verbal reflection and external articulated reflection in promoting self-awareness, learning specific job competencies, critical thinking, learning to learn, and change. Further to the point, Murphy (2004) suggests using both internal and external reflection provides choice in participation for introverts and extroverts, and for participants with different learning styles.

We instruct participants as follows: please reflect on and write responses, in whatever form feels appropriate, to the following open-ended questions. Feel free to be creative and add your own questions or categories.

- What is your favorite personal pursuit (e.g., hobby, activity, interest, or sport)?
- What attracted you to this pursuit?
- How did you learn the skills of this pursuit?
- How does it make you feel to participate in this pursuit?
- What assumptions do you hold about the skills, values, and actions associated with this pursuit?
- How are assumptions in your personal pursuit "like" assumptions in your classroom? In other words, what assumptions do you hold about that pursuit are also obvious in the assumptions you hold about skills, values, and actions you encourage, recognize, and reward in the classroom?
- What assumptions should you challenge, confirm, disconfirm, or change in your classroom? How would you test these assumptions?

In dialogue, typically in small groups (e.g., triads), we encourage participants to convert answers to their questions to a narrative using the questions only as a guide to inform their story. We suggest to participants that dialogue affords the opportunity for feedback and helps with identification, clarification, and validation of assumptions. We ask story-tellers to be creative, interesting, and engaging. In addition, we ask listeners to utilize active listening skills, probing for clarity, exploring meanings, and providing support. All participants take turns as story-teller and listener. After rotating through all the stories, we ask participants to discuss the common themes, assumptions, and insights that emerged.

Instructor's Guide

We use the following design to organize and facilitate learning with the metaphorical mirror

exercise. First, clearly articulate the purposes for the session (see below), ideally a week or so in advance, so participants have clear expectations and sufficient time to begin considering a personal pursuit and underlying skills, values, and actions. Discuss confidentiality, vulnerability, openness, and defensiveness with participants. Consider role-modeling each component of the mirror image exercise before asking participants to engage. Next, groups should be given ample time to thoroughly tell their stories and discuss all issues they deem appropriate. Finally, after the small group dialogue, the instructor should debrief the entire session, using the following simple yet effective questions, which are abbreviated and modified from the Institute of Cultural Affairs (Spencer, 1989) guide for facilitation:

- What did you observe and hear in your session that was meaningful?
- What did you feel during the session, either when you were presenting or when others were presenting?
- What insights have you gained about yourself or others through this exercise?
- How has this experience changed the way you think about your teaching practice?
- How will you use this new information in your teaching practice?

Session Purpose

- To identify a personal pursuit (e.g., hobby, activity, interest, or sport) in which you are active.
- To explore assumptions you hold about the skills, values, and actions associated with this personal pursuit.
- To explore how this personal pursuit serves as a metaphorical mirror to reflect assumptions you hold about skills, values, and actions you encourage, recognize, and reward in your teaching practice.
- To examine more deeply the validity of holding these teaching practice assumptions.
- To investigate how these insights inform your self-awareness and teaching practice.

Variations

- Change the questions to reflect the particular workshop or professions represented
- Assign the questions as homework
- Modify the questions to use with students as a way to examine their learning

- Have participants design their own questions

Reflections and Conclusions

Upon reflecting on developing, designing, and preparing the metaphorical mirror exercise and in conducting the workshop at the conference we learned much about our own assumptions and teaching practices. We learned that two of the authors' personal pursuits—woodworking and skiing—while uniquely different in the many assumptions about skills, values, and actions that transfer into our teaching practices, also had certain commonalities. While our woodworker values preparation, patience, following design, and precision in a controlled indoor environment, our skier values excitement, risk-taking, and adaptability in an open and changeable outdoor environment. Interestingly, we both teach the same topic in the same experiential style. As you might imagine, our classrooms are very different because we value, recognize, and reward different student actions based on our different assumptions. However, the commonalities— deliberate practice, constant seeking of advice from mentors, extensive reading of instructional manuals, and use of state-of-the-art equipment—manifests in similar expectations for students' preparation through reading assignments, skills practice utilizing role-plays, and self-development through journal writing assignments. We noticed participants in our workshop had similar experiences.

Our participants at the conference workshop had a wide-range of personal pursuits spanning family, reading, marathon running, religious faith, volunteerism, computer games, golf, theater, movies, and gardening. Their stories and dialogue shared in triads, and their general comments in the workshop suggested they were able to surface and begin to test previously hidden assumptions. Many remarked they gained new insights and new learning, while a few signaled their intention to incorporate more reflection into their teaching. One participant noted a confirmation of her assumptions: "My passion and main personal interest is my family. I can see how treating students as an extension of my family goes a long way toward building the kind of trusting relationships that foster a safe learning environment where students feel comfortable to take risks." Another participant questioned the boundaries his assumptions build in the classroom: "I wonder if my need for correctness and precision directs students to the text book answer, and in so doing inhibits their ability to find new creative solutions." Collectively participants reported their most significant insights were variations of the same themes, namely: how they saw their classrooms anew through the power of metaphor; and, how the subsequent dialogue with each other generated

more questions about their teaching practice—why do I do it that way, what works and doesn't work in terms of students' learning based on my assumptions, what should I change, how should I change, and what have I learned about my own teaching by asking others about their teaching?

It is our hope that by encouraging participants to use the metaphorical mirror to explore how their personal pursuits provide insights into previously hidden assumptions in their teaching practice they will develop better self-awareness and ultimately become better teachers. We believe it is through careful exploration of take-it-for-granted assumptions and a willingness to change those assumptions that produce ineffective actions that individuals learn, change, and develop new actions that are more effective.

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What's Not in the Syllabus: Faculty Transformation, Role Modeling and Role Conflict in Immersion Service-Learning Courses

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Immersion service-learning courses provide increased opportunities for faculty and students to experience the transformational effects of service-learning. This paper focuses on the experiences of faculty and the responses of students who took part in several immersion service-learning courses taught between 2005 and 2007 during the Winter term at Elon University in North Carolina. Four major themes were identified as being significant in these immersion service-learning courses: 1) sharing living space impacts the student-faculty relationship, 2) immersion faculty leaders are placed in multiple roles with multiple opportunities for role modeling, 3) immersion faculty experience their own transformative learning, which often further complicates their roles as leaders, and 4) immersion faculty leaders often experience role conflict in maintaining leadership roles and assessing student work in immersion courses. We conclude that while the role conflicts must be negotiated faculty modeling service behavior may have stronger lessons for students and their future civic engagement than other on-campus service learning courses.

Immersion service-learning describes courses where students and faculty participate together in a service project for an extended period of time, working together, living together and learning together. This experience generally takes place in a location apart from the usual teaching site, such as another country, state, or community. Immersion in a community over a period of time provides a depth of experience that one might not otherwise have in more traditional service-learning courses where the student works a number of hours at the site and then goes home or back to the classroom. Most of the service-learning experiences represented in the literature describe these more traditional courses. This research suggests positive effects on students' personal and social development, moral development, cultural understanding, leadership, and communication skills (Eyler, Giles, Stenson, & Gray, 2001; Moely, McFarland, Miron, Mercer, & Ilustre, 2002). Immersion service learning provides opportunities for more critical thinking and questioning as the student lives with the experience day and night. Moreover, it carries with it unique roles, responsibilities, and challenges for the faculty leader.

Little attention has been given to the experience of faculty teaching service learning courses (Bulot & Johnson, 2006; Gelmon, Holland, Driscoll, Spring, & Kerrigan, 2001). Yet, the impact of service-learning on faculty and their teaching is an integral factor in the outcome of student engaged learning. Faculty who choose to teach immersion service-learning courses commit to extensive time and effort in order to provide transformative learning experiences and diverse challenges for their students. The satisfaction the faculty leaders gain from observing the transformation that takes place in the students when they are engaged in community work is an important motivating factor for using service-learning in their courses (Abes,

Jackson, & Jones, 2002; Holland, 1999). The unanticipated questions and ideas that arise while serving in the community have been cited as having the potential to transform the roles of faculty and students (Baldwin, Buchanan, & Rudisll, 2007; Berry, 1990; Gelmon et al., 2001; Kiely, 2004; Kraft, 2002). During immersion service-learning, the intensity of the time faculty and students spend together in service to others creates more opportunities for enhanced transformation and satisfaction, while presenting its own set of challenges.

Immersion service learning experiences put faculty leaders into a variety of new roles, many of which are quite different from that of a usual classroom teaching experience. Typical classroom teacher roles in service learning courses include mentor, placement coordinator, community liaison, discussion and reflection facilitator, troubleshooter, evaluator, and advisor. In the immersion service learning experience, the roles multiply to include those listed above, along with the added roles of co-worker, learning partner, substitute parent, and a human being with emotions, flaws, and imperfections.

As faculty, we are accustomed to modeling for our students how to approach and analyze situations, how to reflect on what we read and what we experience, and how to synthesize information. In immersion experiences, the faculty leader is not only leading the course, but also dealing with his or her personal responses to those experiences. This paper focuses on immersion faculty leaders who were exposed to many potentially transformative moments, such as working alongside families in Mississippi who had lost everything in a flood, handing out food and supplies to homeless families in Washington DC, visiting the site of a massacre of innocent minorities in Guatemala, or meeting a family surviving on food and trash from the

Guatemala City Dump. It is impossible not to be personally affected by these realities, regardless of one's role as a leader. Modeling one's own transformative learning and personal growth can be an important contribution to the students' enhanced learning. Yet, this also presents some complications for the faculty as they try to balance their personal needs against the many responsibilities of leading the course.

Methodology

This research began as a discussion between the two authors when we returned from our own immersion service-learning experiences. We found that we shared many of the same benefits and struggles from our immersion experiences; together, we wondered if our reactions to the immersion experiences were unique, or if they were typical responses to immersion service learning courses. To more closely examine the impact of immersion service-learning on the faculty leaders and students, the authors of this paper interviewed faculty leaders and students who had participated in immersion service learning courses taught during the winter term at Elon University between 2005 and 2007. Elon University is a mid-sized, private university located in North Carolina. Service-learning and civic engagement activities at Elon are highly supported academic and co-curricular programs that take place in a variety of settings. This study focused on experiences that took place through study abroad and domestic travel outside of the local university community.

Because our research was exploratory, we chose to conduct informal interviews with the faculty leaders using a semi-standardized interview guide based on our own observations but allowed interviewees to relate their experiences and expand on those that seemed most important to them. We conducted focus groups with the students using a similar semi-standardized interview guide that was adapted to the student's experiences. The focus groups were led by impartial facilitators unrelated to the courses being examined. Most of the faculty leaders in this study, including the authors, had taught these courses multiple times, thus giving their answers depth of experience. The open-ended questions were developed to examine how the faculty leaders handled their experiences living and working alongside students for extended periods of time, how they managed their relationships with their students, and, given the extended time they spent together, the unique experiences or challenges faculty leaders might have had in maintaining leadership roles and assessing student work. We asked the students to respond to questions about their learning experiences, the types of assignments and assessment in their course, and their relationships with their faculty leaders.

Using grounded theory as a basis for analysis, the interviews were recorded, transcribed, and read for emergent themes and concepts (Berg, 2007). Arising from the data were four major themes that were significant in these immersion service-learning courses: (a) sharing living space impacts the student-faculty relationship, (b) immersion faculty leaders are placed in multiple roles with multiple opportunities for role modeling, (c) immersion faculty experience their own transformative learning, which often further complicates their roles as leaders, and (d) immersion faculty leaders often experience role conflict in maintaining leadership roles and assessing student work in immersion courses.

Sharing Living Space and the Student-Faculty Relationship

"Maybe it's seeing them in their p.j.'s that really does it." This quote from a student demonstrates the first theme that arose from the interviews: sharing living space impacted the student-faculty relationship. Living together for this period of time gave students and faculty opportunities to see each other live out the routines of daily life, including the common range of emotions that come with the frustrations and joys of everyday life. Both the students and the leaders of all the courses described the faculty-student relationships as crucial to the success of the course experiences. Students began to see instructors as human beings, something they may not consider in the classroom. All of the course leaders experienced an increased ability for communication and understanding between themselves and students. One faculty leader explained the special connection he had with these students: "… you develop trust, they know you genuinely care about their well-being. Now, they come tell me about their lives—unlike [my] having to beg other students to come to office hours."

Sharing living space with those other than family is something college students may be more immediately comfortable with than faculty. For example, where bath and eating facilities were shared, one faculty leader got up earlier than the students each day to shower privately and make a solo trip to the coffee shop to find some personal "down" time. Halfway through the course, a student asked if she could go along to the coffee shop. Before long, there were several students on that morning outing. While the personal down time for the faculty leader was lost, the value of the leisure time spent with students contributed to the relationship building.

Spending so much time together allowed the students to identify the humanness in their faculty leaders and interpret emotions that sometimes led to feelings of vulnerability for the leaders. For example, one student told us that "[the faculty leader] was transparent, she missed her family." Here, in a situation when the faculty leader is typically giving support to students who are homesick and missing their loved ones, the students saw their leader dealing with the same kinds of emotions. "I (the faculty leader) tried to not let it show that I was missing my family so much; but at the same time, I wanted my students to know that it was all right to be here, do the work and feel good about it, all while missing your loved ones and wanting to go home."

Living and working together also allowed students to see more flaws in the faculty leaders. The irony in this is that while the students seemed to appreciate and even request that their faculty leaders be "real" in their interactions with them, they were quick to criticize when faculty leaders were tired or irritable and might behave in ways the students would consider out of character. As one faculty leader put it after being criticized for making an off-color comment around her students, "The real me may sometimes seem inconsistent with the me I present in class; it's like we're not allowed to be human." Another faculty leader said the students were able to see her "goofy and silly" sides, and the "ugly" side, typically shown if they woke her too early. The faculty leader noted the value of these interactions as integral to the cohesion of the group. "We would get frustrated with each other and take care of each other. I never connected with students [before] the way I connected with those students."

Some faculty leaders sought out time for themselves to reflect, recharge, or to meet with other faculty leaders and process some of the challenges of leading the course. One faculty leader said, "Sometimes I didn't handle myself well because I was so tired and emotionally drained." In this course, faculty leaders said they walked off by themselves to process the events together rather than with students. Leaders from the Guatemala course also noted the importance of time together away from the students to debrief after specific events, plan future outings and process activities, discuss student personal issues, and to just have time to vent. "We would try to go out - just the three of us - and have a glass of wine in the evenings. We never invited the students to go along, and they seemed to understand the boundary that was there."

Despite the challenges that were presented by living together, the majority of the faculty and students valued the experience of living together as they reflected on their immersion experiences. These relationships, while often strained, intense, and short-lived, seemed to have a large influence on one's description of the course.

Multiple Faculty Roles and Role Modeling

Regardless of how intense the immersion experience is, or how close the student-faculty relationships are, the course leaders have a responsibility to facilitate the learning process and maintain a level of stability and assurance for students. The partnerships they developed with the students created complications for leadership. The students we interviewed also confirmed this conflict. Several faculty leaders reported that they sometimes felt like they had to take on a parental role. One said she lost her temper, yelled at the students, and felt the stress any parent would feel in trying to keep the students safe at the worksite. Several faculty leaders also reported growing tired of having to serve as the disciplinarian. One of the faculty leaders believed he had prepared his students to be independent and work hard but was surprised and somewhat irritated when they didn't always listen. He found himself repeating more often than he wished, "When I say go—you go, don't argue." Because of the cultural differences in Guatemala, students were told repeatedly to dress more conservatively than they were accustomed to dressing, especially when they planned to go out at night. "I felt like the students' mom, telling them they couldn't leave the hotel unless they were dressed appropriately," one course leader shared. As faculty leaders began to see students as partners in the experience, they often expected the students would also act more like responsible adults. Unfortunately, the students didn't always respond accordingly.

Taking students outside the local campus area can bring unexpected challenges and safety concerns. Even though students and faculty leaders built a partnership, students expected faculty leaders to provide stability and assurance. Safety was a major concern for all faculty leaders in these immersion courses. For example, when the D.C. group became lost, on foot, in a dangerous part of town, the faculty leader had to demonstrate calm and reassurance as they re-read maps and asked strangers for directions.

A pivotal part of the Guatemala course is a visit to the Guatemala City Dump, where families survive on food and recycled goods from the dump. During the 2006 tour of the dump, the group's bus driver was robbed at gunpoint. As one of the course leaders recalled,

We chose not to tell the students immediately what had happened, because we didn't want to alarm them. Later, when we returned safely to our hotel, we decided they had a right to know. I had a hard time with this, because my main concern was

keeping the students safe, but I also didn't want to be overprotective of them. I knew the news of the robbery would scare many of them, but I also didn't want any of them to have a false sense of security. The truth was, we were in a dangerous place.

These examples serve as reminders of who the leaders are, confirming the students' expectations that they will be protected and cared for by their leaders while they're away from home.

Another important role is to try to keep students focused on a task. One faculty leader described this leadership responsibility as being "in charge of the syllabus and plan for the day." He continued, "[you] help people prepare for what they will see and experience. In setting the context for each visit you reassert your faculty role." Sometimes facilitating learning means that faculty leaders must interrupt moments of light-hearted fun to refocus the students. "I make them face out of the bus, get outside their comfort zone and protective group. Interact with the environment, instead of being just observers. I'm not just the pal or buddy when I have to insist on capturing a moment for learning." There are frequent reminders that these experiences are far outside what most of the students have ever known.

In spite of needing to refocus students, the course structure can often be less hierarchical and more of a shared experience. A student described her experience as working "with someone who you think of as your superior and they come down to our level. We are all on the same page experiencing things at the same time." Especially in the service activities, course leaders reported acting as team members rather than leaders. One course leader explained the group's work at a Habitat for Humanity site in Guatemala:

> We relied on each other and allowed each other's strengths to emerge. The leadership was shared, depending on the task at hand. Sometimes the students were leaders depending on their skills, and sometimes I took the lead. I worked just as hard as they did, and the students seemed to appreciate that at the end of the day.

Mutual respect may be the guide toward finding the balance between asserting the needed leadership role and allowing students to develop self discipline and become active participants in their learning. One student noted, "they would step up and guide us when they needed to." Students also described the difficulty in finding that balance: "In very adult situations she would treat us like adults and then back up and treat us like we were much younger and that built a wall sometimes. By the end we could speak to each other on

an appropriate level." Students expressed the importance they gave to being treated with respect and recognized as adults, but also knowing that the faculty leaders were, in fact, in charge of the experience.

Faculty Transformative Learning

"Everybody cried at some point. It's the human factor." Regardless of how much experience and preparation the faculty leaders had, they still experienced emotions, personal change, and growth alongside students. Connecting to the humanness in others resulted in emotional responses that were spontaneous and more freely expressed than they might otherwise be in the classroom. Some of the faculty leaders reported feeling vulnerable because of these reactions, but students responded positively, especially to the idea that the students and faculty leaders were learning and growing together.

Students described their faculty leaders' experiences: "I think my course leaders were personally affected in the same ways that we students were. Going into a situation like that, your eyes are opened and you experience things you have never seen before." "[The faculty leader] had done this before but she experienced it differently this time, with us. During reflections and poetry writing we posed questions back to her too—she obviously came out of it differently." One faculty leader recalled that nightly sharing was deeply spiritual. "We were open about indicating when our own consciences had been challenged, deepened, and broadened."

A faculty leader of the course in post-Katrina Mississippi reported her own personal transformation. "The experiences woke me up." She explained that she knew there was poverty and racism in the United States, but this experience made it come alive. Additionally, sharing this experience with students led to more thoughtful discussions so that the whole group shared the transformation. Another faculty leader in the same course, believing he was well informed about conditions at the site, was surprised by how the experience affected him. He explained that he left with profound questions of his own that still "boggle his mind." In Mississippi, "the Rolls Royce guy lines up with everyone else to get food." It was impossible, he said, not to see "the power of the human spirit and the sameness of all human need." He didn't try to hide his reactions: "We were real in front of the students; you can't help it."

Similarly, another faculty leader reported how difficult it was to ignore the social reality in Washington, D.C. "Students see the contradictions to our nation's ideals first hand. They can't help but ask questions about how their society is structured." This same faculty leader described how she cried at the sight

of so many homeless people in yet another soup kitchen.   That evening during reflection time, the faculty leader shared her feelings of frustration at the magnitude of the problem to students who now had a deeper understanding of the issues of homelessness. The students responded to her feelings and discussed being partners in the effort for change. Transformation, in this experience took place together, as learning partners.

Students spoke about their leaders' reactions and seemed to benefit from the learning that their leaders modeled during immersion service-learning.   In addition, the students reported seeing that the course leaders, even through their frustration and fatigue, didn't quit, but remained committed to helping and serving others. Students said they believed that their faculty leaders benefited from seeing them learn and grow too. They saw themselves as partners in learning instead of passive recipients of knowledge.

Faculty Role Conflict in Student Assessment

Maintaining balance between this partnership and authority in the daily routine created challenges, but equally difficult were the challenges that the relationships and the service experience posed for assessment of student achievement. It was sometimes difficult for faculty leaders to separate what they saw and heard from students during the service portion of the course from the quality of the academic assignments completed.

 Students also had difficulty separating their personal experience from their academic work and reacted with great disappointment when they received lower grades than they expected.   "I had such a good experience, how did I get a B or a B+?"   Still, some students seemed to recognize the dilemma. "I feel everyone should have done well because everyone participated. If we had a student who didn't try, I don't know how they would have been graded." One student asked, "All of us gained a lot from the experiences—should I have gotten an A from the change in me?"

Some students also recognized that their writing ability affected their grade. "If your experience was so great, how can they grade you on your lack of articulation of the experience?" Upset at getting a lower grade, another student complained, "just because I'm not good at writing, I can't put it down on paper."   "All of us felt like we had done a lot of service and could reflect on it critically in our papers….but, it took a couple of papers for most of us to get a handle on how to write about the experiences."

The ability to reflect critically and to write about it is an advanced skill. This ability varied among individual students and also by class rank.   One

faculty leader said, "It's true that folks really engaged and thinking seriously about it can come up with very different outcomes—it's not as if there can be a uniform result. [The grade] does fall a lot on the capacity of a student to write well. I don't know how to avoid that."   Most faculty believed that the difference in the quality of thinking for students showed up more frequently during the group's evening reflection rather than on written on paper. One faculty leader explained his approach to grading:

> If what you write is—'this morning for breakfast we had this and that', its not reflection, its notes on your menu. But if you were to say something about having coffee and link it to the visit to the coffee plantation, and the discovery that the farmer gets 3% of what the coffee is finally sold for in Starbucks in America and see their food intake in relation to the economic system the coffee farm is a part of, in other words, reflect in a deep way how it fits into the economic system, then you are thinking critically. Writing must include engagement, analysis, and passion for what they've experienced.

Embedded in his point is the recognition that it is the experience in service-learning, along with the academic content and ability to link them critically, that leads to transformative learning for students. Consequently, the experience cannot be disregarded in assessing students.

The students expected to learn from experience and some students were frustrated by the amount and types of academic work associated with the course. Students felt more comfortable, in their role as partners, to ask course leaders to eliminate academic requirements by appealing to the newly formed familiarity or their obvious dedication to the service work. One student explained that she "didn't expect rigorous academic learning—I don't think it's really about that. Education before hand is key, but learning from experience is really more about the experience. Learning from experience is way more powerful than learning from books." A student from another course said, "We expected to learn a lot from being immersed in a culture. Social interactions with people there and with peers led to the most learning."

The faculty interviewed took different approaches to addressing the rigor and fairness of grading in their courses. One faculty leader's approach was to start by recognizing that each of his students would have a different and unique experience and focus on what each individual was getting out of the class. No one in his class complained about grades and all the students received high grades. This faculty leader admitted that although students were assigned academic

writing, much of the assessment came from watching them work.

While there are some very useful grading rubrics and reflection models designed to assess student learning in service learning (Ash & Clayton, 2004; Kiser, 2007), it is difficult to separate a student's personal growth and intensity of experience from the academic learning that takes place. Adding the personal relationship that develops during immersion service-learning compounds the problem. Two faculty leaders from the Guatemala course questioned whether they may have exercised a grade bias in favor of those students with whom they worked more closely. When they met to assign final grades to their students, "it was clear that we were advocating for those students with whom we had spent the most time. The quality of those relationships definitely impacted our assessment of their growth and learning."

Coming Home: The Faculty-Student Relationship and Future Civic Engagement

In spite of the role conflicts that lead to vulnerability and challenge, the relationships discussed in this study seem to have several benefits for both the students and faculty. A notable benefit was the development of an enhanced mentoring relationship between the student and faculty, which not only contributed to the transformative learning during immersion, but also continued back at the home institution.

Students noticed the difference in the relationships. "It was a very different relationship before and after. We went from being professors and [students] talking *at* each other to people talking *to* each other." One student reflected, "Since you experience such life changing events together, you have a stronger bond and connection. I would say that I feel closer to a leader from the trip than any other professor on campus." Several students discussed the plans they had to work with their faculty leaders in the future.

Faculty modeling service behavior may have stronger lessons for students and their future civic engagement than other on-campus service learning courses. In particular, students reported believing that they could make a difference and had already begun to integrate service into their lives. Upon their return to campus, many continued their work in the local area or began new service projects. Students from one of the Guatemala groups continued their relationships with some of the nongovernmental organizations they had worked with during immersion. They held a screening of the documentary film *Recycled Life* (about the Guatemala City Dump) on campus and continued to raise funds for the organization Safe Passage, long after the event was over. Students from the Mississippi

courses have kept in touch with families they worked with and have continued to raise money and collect needed items. Several of the students have returned to the area during breaks. Students from one of the Washington D.C. courses developed and implemented a homelessness awareness campaign on campus inviting homeless people to talk to students about their lives. One student participated in the Oxfam Change summer training workshop and continues to lead the campus in social justice efforts. These are only a few examples of students' continued action on campus and demonstrate not only their expectation that they will continue to serve, but their follow-through on that expectation.

Conclusion

While the evidence of student transformative learning is anecdotal, the effect on students is undeniable to the faculty leaders of immersion service-learning courses. Students reported that they experienced learning differently because they worked alongside faculty. And, faculty reported *seeing* the effects, something that does not happen as easily when students go into the field alone. In the immersion service-learning courses described here, students reported that their learning was not confined to the academic content of the courses, but also influenced by the experiential and relational aspects of immersion. This may not be a surprise to those who use service-learning in their courses, but it may point to the inadequacies of our assessment of student learning.

Assessments in most of these courses were focused on the quality of students' writing and their ability to make meaningful connections between their experiences and the course material. We had not considered a method for assessing their personal and relational learning and how our multiple roles as course leaders might have influenced this learning. The students tried to tell us how much they had learned and changed, and we saw these changes as well; yet our traditional methods of assessment did not adequately reflect this change. Although the goals and objectives of the courses may not have been, and perhaps should not be to "change" the student, separating the emotional and relational experience from the academic learning may be a false dichotomy. For students who may not have mastered the ability to articulate learning through their writing, the emotional experience could also be an expression of learning. The faculty leader who said he "watched" the students' work in the field and incorporated his observations into their grade, may have been more on target with assessment than the faculty leaders who tried to separate the academic learning from the emotional and relational experience. The confusion students felt about their grades could, perhaps, have been avoided if students were given

assignments that allowed them to work through the interpretation of their emotions and if the assessment process of their learning was made more transparent to them.   This clearly indicates a need for including alternative learning goals and methods of assessment in addition to the typical learning goals related to specific course content.

The report of increased transformational effects of immersion service-learning and the subsequent relationships and service activities lend support to our assertion that this is an important pedagogical method for engendering a dedication to life-long civic engagement. When the context of the service takes place outside the students' typical range of experience, students often experience conflicting beliefs and behaviors that lead to greater problem-solving and critical thinking opportunities (Berry, 1990; Kiely, 2004; Kraft, 2002).   Our experiences suggest students also benefit from seeing the humanness of their faculty leaders through both their experience of living together and their reactions to the service they are doing together and that these seem to contribute to transformative learning process. In spite of the challenges inherent in living together, faculty and students reported positive experiences. Each course has continued to be a popular choice for students and a coveted leadership position for faculty with new immersion service-learning courses being added each year.

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