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Faculty development in higher education: Long-term impact of a summer teaching and learning workshop

Diane Persellin[1] and Terry Goodrick[2]

Abstract: Past participants of the Associated Colleges of the South Summer Teaching and Learning Workshop were surveyed to determine long-term impact of this type of professional development experience. Results indicate a large majority of participants across rank and academic discipline continued to view the workshop as effective and valued feedback from the perspective of the learner. Females were more likely than males to report more awareness and thoughtfulness about their teaching since having attended the workshop and to report having tried new strategies and taken more risks in their teaching. This study supports the importance of an interdisciplinary forum for faculty development of teaching.

Keywords: faculty development, teaching and learning workshop, ideo-microteaching

I. Introduction.

Historically both new Ph.D.'s and mid-to-late career faculty have relied upon subject-matter knowledge to be sufficient for effective teaching. In the words of McGee and Caplow (1965), "any Ph.D. can teach." Professionally trained educators, however, dispute this statement. To empower learning is challenging and complex. Lee Shulman (1987), former president of the Carnegie Foundation for the Advancement of Teaching, argues that *subject matter knowledge* is only one of seven types of knowledge that expert teachers use. College educators also need to be grounded in what he terms as *pedagogical knowledge* (how to manage classrooms and present material) and *pedagogical content knowledge* (how to connect subject matter with teaching strategies that are most effective in communicating content. Lawler, Chen, and Venso (2007) state that we must employ a variety of teaching skills and strategies in today's classes and laboratories. Additionally, in *What the Best College Teachers Do,* Bain (2004) found in his fifteen-year study that the strongest, most effective college educators were learners who were "constantly trying to improve their own efforts to foster students' development" (p. 20).

Professors may have a fine grasp of content knowledge, but many may not have the skills and understandings required for effective teaching nor for strengthening their pedagogical skills. Even for those who do, the demands of research and campus and professional leadership leave little time for continued development of new teaching techniques and approaches. Also, many do not have a forum to discuss pedagogical issues, especially outside their disciplines. Although they may feel that their teaching was once a priority, their scholarship often gets more time, attention, reward, and acclaim (Baldwin, DeZure, Shaw, and Moretto, 2008).

Faculty development programs and teaching centers are one response to this deficit in professional development. At one time such programs and centers were found primarily in large research universities, but liberal arts colleges, small comprehensive universities, and community

[1] Department of Music, Trinity University, One Trinity Place, San Antonio, TX, 78212, diane.persellin@trinity.edu
[2] Department of Psychology, Birmingham Southern College, 900 Arkadelphia Road, Birmingham, AL, 35254, tgoodric@bsc.edu

colleges are starting to establish them (Hewson, Copeland, and Fishleder, 2001; Maxwell and Kazlauskas, 1992; Mooney and Reder, 2008). Increasingly, small colleges are participating in the Professional and Organization Development (POD) Network for faculty development programs and centers for teaching and learning (Reder, 2007). Offerings on each campus vary, but often include programs on technology, peer coaching, assessment strategies, and new teaching techniques.

For faculty members at institutions without on-campus teaching centers, summer workshops at other institutions or through consortia provide a means to address the need for faculty development of teaching. For instance, McGill University offers a summer workshop that focuses on course design and employs video-microteaching (Saroyan and Amundsen, 2004). Though now discontinued, the Great Lakes Colleges Association (GLCA) offered a similar program for 28 years (Frederick, 2008; Nowik, 1983), which also featured video-microteaching. Developed originally by Allen and Ryan (1969) as a means for training teachers at all levels, video-microteaching is based on psychological theories of behaviorism; it allows teachers in training to practice and give one another immediate feedback (Bell, 2007). Since its development in the late 1960s, microteaching has proved successful in settings including medical schools (Ananthakrishnan, 1993; Dennick, 1998; Higgins and Nicholl, 2003), instruction of graduate assistants (Ross and Dunphy, 2007), and universities such as Harvard (2009), MIT (2009), and Vanderbilt (2009).

Do microteaching workshops impact teaching, particularly in the long term? The purpose of our study was to determine the long-term impact of a microteaching workshop, the Associated Colleges of the South (ACS) Summer Teaching and Learning Workshop (ACS, 2009). Evaluations at the end of each ACS Teaching and Learning Workshop have been positive. Numerous comments from participants suggest that the workshop has given them a greater understanding of their teaching strengths and weaknesses, new insight into the effects of specific behaviors in the classroom, ideas for new teaching strategies, and newfound confidence in their teaching.

By surveying as many of the past participants as possible we hoped to find out if the workshop—and its underlying approach to receiving feedback on teaching—continued to be viewed as a valuable professional development experience. Additional research questions included the following: Did participants think that they had been more likely to take risks with their teaching or try new teaching strategies since the workshop? Did they continue to reflect on their teaching or consult workshop materials? And finally, did gender, rank at the time of the workshop, or academic division make a difference in long-term perceptions of the workshop?

II. The Associated Colleges of the South (ACS) Summer Teaching and Learning Workshop and Video-microteaching.

Associated Colleges of the South (ACS) is a consortium of sixteen liberal arts colleges and universities in 12 states across the south. The consortium builds programs that would not be possible on individual colleges and thereby allows ideas and resources to be shared among its member institutions. In 1992, the ACS created the Summer Teaching and Learning Workshop, its flagship and longest-running program. Since its inception, this workshop has provided 370 faculty members from the consortium a means to hone teaching skills through feedback from small microteaching groups. It has also offered large-group plenary sessions on topics such as collaborative learning, the syllabus as a teaching tool, learning modalities, and diversity of

teaching styles. In addition to providing a forum for the discussion of broad pedagogical issues, these various large-group sessions also have allowed participants to give one another ideas about teaching problems faced by professors regardless of discipline.

Microteaching groups at the ACS workshop are composed of 5 or 6 professors from different colleges and disciplines plus two staff facilitators. Staff facilitators are former participants who are invited to return for training and to lead sessions. Each participant is videotaped teaching a seven-minute segment of a class to the group. After the tape is viewed by the entire group, the teacher is invited to comment or ask questions before soliciting feedback from the other participants. To ensure that feedback is from the perspective of colleagues as *learners* and not colleagues as critics, the staff uses the "Guidelines for Useful Feedback" (see appendix A) developed originally by Peter Frederick, who served for many years on the GLCA teaching workshop staff and trained the original ACS staff. These guidelines prompt participants to focus on how the professor's specific behaviors—what she or he does—affect comprehension. They also uncover the diversity of ways learners may be processing information in any one moment.

III. Method.

A. Population.

Attempts were made to secure e-mail addresses of all 370 former participants by contacting each institution, faculty colleagues in the participant's former department, and through an internet search for individuals no longer at an ACS institution. We were able to locate e-mail addresses for 331 of 370 faculty members who attended the workshop from 1992 – 2007. Every effort was made to maximize our response rate by resending the survey four times. Fifteen former participants had chosen to "opt out" of all Survey Monkey questionnaires. We had a 62% response rate to our electronic questionnaire, yielding a sample of 206 former participants.

B. Survey Design and Analysis.

Our survey consisted 12 Likert-scale items (6 = strongly agree to 1 = strongly disagree). These items were designed to determine current perceptions of the workshop, changes in behaviors and attitudes since the workshop, and any subsequent use of workshop materials. The respondents were invited to comment on each of the items and were asked to indicate gender, discipline, approximate number of years since attending the workshop, and both current rank and rank at the time of the workshop.

ACS schools tend to focus on a liberal arts curriculum. However, their offerings are also unique and not easily categorized. In this study, we divided respondents into five broad academic divisions most typically found in ACS member institutions: Natural Sciences, Social Sciences, Math and Computer Sciences, Humanities, Arts, and the applied fields of Education, Business, and Accounting. Descriptive statistics were compiled for each of the Likert-scale items. Possible effects of gender were analyzed using t-tests, and those of rank or academic division were analyzed using One-Way ANOVAs. Effect sizes were determined with d and ω^2.

IV. Results.

Of the respondents, 51.4% were female and 48.6% were male. At the time of the workshop 7.8% were full professors, 13.1% were associate professors, 74.3% were assistant professors and 4.9% were instructors, adjuncts, or visiting professors. Percentages in academic divisions were as follows: Social Sciences, 22.3%; Natural Sciences, 25.4%; Math and Computer Sciences, 7.8%; Humanities, 30%; Arts, 8.3%; applied fields of Education, Business, and Accounting, 6.3%. Over 35 academic disciplines were represented in the sample. The mean number of years since attending the workshop was 6.34 years. The responses to each of the Likert-scale items are summarized in Table 1.

Table 1. Responses to survey on impact of teaching workshop.

	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
I have tried a new teaching strategy, technique, or approach that I learned or saw at the workshop.	38.8%	32.5%	19.4%	1%	6.3%	1.9%
Since the workshop, I have become more aware and thoughtful about my teaching.	41.5%	38%	13.2%	2.4%	2.9%	2.0%
Since the workshop, I have more confidence in my teaching.	34.3%	34.8%	19.4%	3%	7%	1.5%
Since the workshop, I have taken more risks with my teaching.	25.4%	37.6%	24.4%	4.4%	6.8%	1.5%
Since the workshop, I have been more likely to talk about teaching with others.	24.9%	33.7%	25.4%	7.3%	6.8%	2%
I have recommended that my colleagues attend the workshop.	55.6%	26.3%	7.8%	2.9%	4.4%	2.9%
At the workshop, receiving feedback focused on behaviors and the student perspective, rather than evaluation, was helpful.	56.4%	27.5%	7.4%	4.9%	2.5%	1.5%
I have read my facilitators' notes that I received at the workshop.	31.0%	42.1%	12.7%	3.6%	5.6%	5.1%
I have viewed the videotape of my teaching that I received at the workshop.	18.1%	26.6%	8.5%	6.0%	24.1%	16.6%
Since the workshop, I have looked at or used handouts from the large group sessions.	11.5%	21.5%	21.0%	9.5%	25.0%	11.5%
I have kept in contact with people I met at the workshop.	7.9%	7.9%	19.8%	13.4%	38.6%	12.4%
Overall, the workshop was an effective professional developmental experience for me.	48.8%	33.2%	10.2%	1.0%	4.4%	2.4%

A. Trying New Techniques and Taking Risks in Teaching.

Ninety-one percent of the respondents agreed at some level with the statement, "I have tried a new teaching strategy, technique, or approach that I learned or saw at the ACS workshop," (M = 4.91, SD = 1.22). Eighty-seven percent of the respondents agreed that they had taken more risks in their teaching (M = 4.66, SD = 1.19).

B. Confidence and Awareness.

Eighty-nine percent of the respondents stated that they have more confidence in their teaching since attending this workshop (M = 4.82, SD = 1.22). Ninety-three percent of the respondents had some level of agreement with the statement, "Since the workshop, I have become more aware and thoughtful about my teaching" (M = 5.07, SD = 1.11).

C. Subsequent use of workshop materials and contact with former participants.

While 86% of the respondents agreed that they reviewed facilitator notes on the feedback from their microteaching sessions (M = 4.74, SD = 1.36), only 53% indicated that they had viewed the videotape of their teaching used during those sessions (M = 3.59, SD = 1.83). Fifty-four percent agreed they had looked at or used handouts from the large group sessions since the workshop (M = 3.50, SD = 1.60). While 84% agreed at some level that they had been more likely to talk about teaching with others since attending the workshop (M = 4.57, SD = 1.24), only 35% agreed that they had kept in contact with former participants (M = 2.96, SD = 1.46).

D. Microteaching Feedback and Overall Impact.

Ninety-one percent of the participants found feedback helpful that focused on behavior and student perspectives rather than evaluation or criticism of their teaching (M =5.26, SD =1.11). In fact 84% of the participants marked "strongly agree" or "agree" to this question (See figure 2).

Ninety-two percent of the participants agreed at some level that the workshop was an effective professional development experience overall (M = 5.14, SD = 1.18). Eighty-nine percent of the participants agreed at some level that they had recommended that their colleagues attend (M = 5.17, SD = 1.26). Eighty-two percent responded "strongly agree" or "agree" to both of these questions.

E. Effects of Rank, Academic Division, and Gender on Survey Responses.

Rank at the time of participation in the workshop had no significant effect on responses to any of the Likert-scale items ($p > 0.05$), with the exception of "Since the workshop, I have looked at or used the handouts from the large group sessions," ($p < 0.01$). (See Tables 2a and 2b) The overall effect of rank on this item (ω^2) is considered small, accounting for only four percent of the variance in the responses to this question. Post hoc Games-Howell tests indicated that the associate professors were more likely than the assistant or full professors to have used the handouts ($p < 0.01$). The mean for associate professors was over half a standard deviation above the mean for the assistant professors (d = 0.59) and was nearly a full standard deviation above that of full professors (d =*0. 96)*. These are considered medium and large effects respectively.

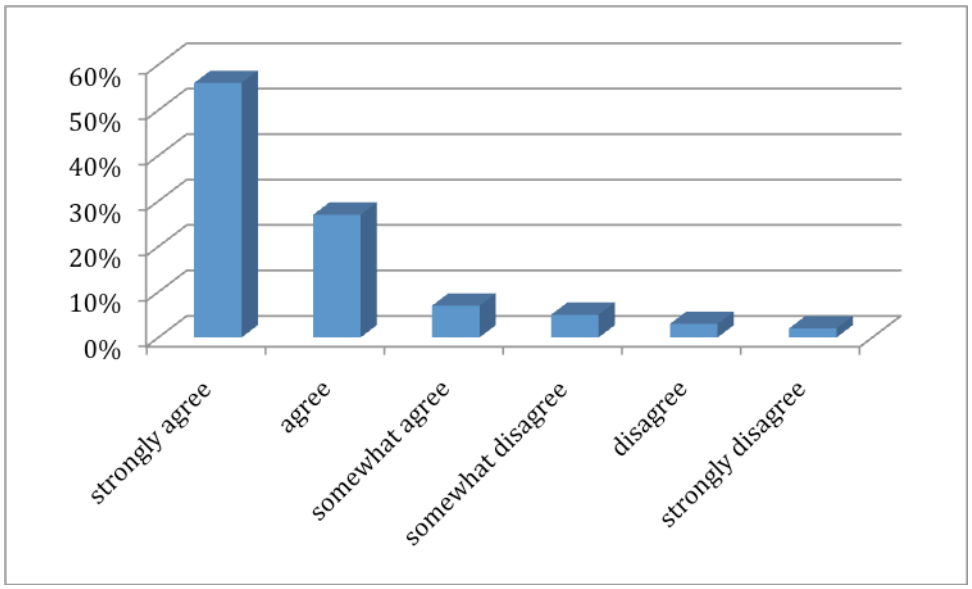

Figure 2. Responses to the question, "At the workshop, receiving feedback that focused on behaviors and the student perspective, rather than evaluation or criticism of their teaching, was helpful."

Table 2a. Means and standard deviations comparing rank at time of participation.
"Since the workshop I have looked at or used the handouts for the large group sessions."

Rank	*n*	*M*	*SD*
Adjunct, Visiting, Instructor	10	4.00	1.56
Assistant	147	3.38	1.60
Associate	27	4.33	1.59
Full	16	2.94	1.18

Table 2b. One-Way Analysis of Variance summary table comparing rank at time of participation on the item "Since the workshop I have looked at or used the handouts from the large group sessions."

Source	*df*	F	*p*	ω^2
"Looked at or Used the Handouts"				
Between Groups	3	3.84	0.01	0.04
Within Groups	196			
Total	199			

Note: This effect remains significant using the Welsh Statistic for heterogeneous variances.

Academic divisions had no significant effects on any of the Likert-scale items with the exception of "I have recommended that my colleagues attend the workshop." $p < 0.01$. (See Tables 3a and 3b). The overall effect (ω^2) of academic division on responses to this question is considered small, accounting for only five percent of the variance. Follow-up analysis using the Games-Howell test indicated that participants in Education, Business and Accounting were more likely to have recommended the workshop to their colleagues than were participants in the Humanities. The mean for participants in Education, Business and Accounting was nearly three quarters of a standard deviation higher than that of participants in the Humanities ($d = 0.72$). This

is considered a medium effect.

Table 3a. Means and standard deviations comparing academic division.

Academic Division	*n*	*M*	*SD*
Social Sciences	45	5.36	1.09
Natural Sciences	52	5.38	1.16
Math and Computer Sciences	16	4.81	1.22
Humanities	62	4.74	1.55
Arts	17	5.47	0.72
Education, Business and Accounting	13	5.77	0.60

Table 3b. One-Way Analysis of Variance summary table comparing academic division on the item "I have recommended that my colleagues attend the workshop."

Source	*df*	F	*p*	ω^2
"Recommended that my colleagues attend"				
Between Groups	5	3.11	0.01	0.05
Within Groups	199			
Total	204			

Note: This effect remains significant using the Welsh Statistic for heterogeneous variances.

Gender had a statistically significant effect on responses to three of the questions. Table 4 shows the mean for females was higher than that of males on the item, "I have tried a new teaching strategy or technique," (p = 0.044, d = -0.29); for the item, "Since the workshop I have become more aware and thoughtful about my teaching," (p = 0.025, d = -0.32); and for the item, "Since the workshop I have taken more risks with my teaching," (p = 0.035, d = -0.30). The effect sizes for these gender differences are considered medium.

Table 4. Comparison of male and female participants.

Item	*n*	*M(SD)*	*t*	*p*	*d*
"New Strategy or Technique"					
Males	100	4.73 (1.30)	-2.04	0.043	-0.29
Females	106	5.08 (1.13)			
"Aware and Thoughtful"					
Males	100	4.89 (1.23)	-2.28	0.024	-0.32
Females	105	5.24 (0.95)			
"Taken More Risks in Teaching"					
Males	100	4.48 (1.19)	-2.12	0.035	-0.30
Females	105	4.83 (1.16)			

V. Discussion.

Our survey results suggest that the workshop continues to be perceived as a positive professional development experience by former participants and that the enthusiastic response we receive immediately after the workshop may remain many years later. As one male environmental

studies associate professor commented, "This was my most valuable professional development experience in the area of teaching. The spirit of this workshop has stayed with me to this day (10 years later!)." A variety of factors probably contributed to the long-term impact of the workshop, but some were related likely to the structure of the microteaching groups.

Since each microteaching group is composed of faculty from different disciplines, participants are more likely see and experience a wider variety of teaching techniques and approaches than those typically used in their discipline. Such diversity allows teachers to receive feedback from participants without expertise in their discipline. As such, the feedback is from the perspective of *learners*, not disciplinary colleagues who already have mastery of the field. One participant commented that it had been a long time since he had had the opportunity to sit in on lectures in which he "had no background." He noted, "It was fascinating to see how I listened and processed the information." He went on to say, "by having to articulate my own thought processes, I gained insight into my students' perspective." Another participant noted that "A person from a very different discipline provided the most useful feedback."

Because individual microteaching groups are composed of participants from different institutions, it seems highly unlikely they would ever be in a formal evaluative position of one another. Additionally, participants are kept in the same microteaching group over the course of the five-day workshop. It is possible this practice allows a sense of camaraderie and trust to develop within the group. After the workshop, participants were given the videotapes that were recorded and viewed during the microteaching sessions, as well as handwritten notes made by the facilitators. No permanent record of teaching at the workshop is kept.

Taken together, these structural characteristics, as well as the type of feedback participants receive, likely contribute to a non-evaluative and nonthreatening environment. As a female communications participant commented, "The workshop is superbly and expertly conducted, providing a *safe* place in which professors can explore both their strengths and weaknesses as a teacher" (italics added). Similarly a male chemistry professor commented, "For those looking to take a hard, honest look at their classroom performance/interactions, the feedback and support from colleagues (often quite experienced) was very helpful." These comments reinforce the idea that the way in which the microteaching groups are formed without duplication of discipline or institution contributes to the positive experience of the participants.

Receiving and giving feedback from the perspective of the learner as opposed to that of the evaluator may develop in participants an ability to examine their teaching from a third-party perspective. For instance, a participant commented, "I felt pretty aware and thoughtful about it (*my teaching*) before the workshop, but I learned new ways to observe my teaching." She went on to say, "The feedback from my group gave me some new objective information—taught me to observe some of the things I was doing more automatically/unconsciously and to use those more to my advantage." Other participants commented they had always given their teaching a lot of thought, but that the workshop had broadened the types of things they think about in their teaching.

In their comments, several respondents wrote that they had recommended the workshop to their junior colleagues, and indeed, the majority of former participants were junior faculty members when they attended the workshop. Our analysis, however, suggests the workshop is valued equally by faculty members at all points in their careers. A full professor noted that after 27 years of college teaching he had begun to lose confidence in his ability to engage the interest of his students. He wrote that the workshop had helped him "to rediscover my natural teaching skills and to complement those by developing new skills, especially in terms of more varied classroom activities and new kinds of writing assignments." Participants across rank commented

on the importance of getting new ideas from seeing others teach.

In terms of looking at or using the plenary handouts since attending the workshop, it is interesting to note that associate professors were most likely to have done so. One might predict the less experienced assistant professors would be more likely to consult them again, but perhaps a certain amount of experience and skill may be necessary before professors feel comfortable adding new approaches and techniques to their teaching repertoires. A number of comments from junior faculty members suggest the workshop may have had other benefits for them, such as confirming career choice, building confidence, or developing their teaching philosophies.

Our analysis suggests that faculty from all academic divisions perceived the workshop as having been beneficial to them. Participants in the applied areas of Education and Business/Accounting were most likely to recommend the workshop to others, but only significantly more so than participants in the Humanities, who were the least likely to recommend the workshop to others. It is not surprising that participants from Education would view the workshop favorably. As for Business or Accounting, it is possible that professors in that area do not have as many interdisciplinary forums for the discussion of their teaching, so they are especially responsive to that aspect of the workshop. In describing the benefits of working with professors from different disciplines, a participant commented that the ACS workshop had been "the only workshop, seminar, or conference I have ever attended that was not Business Administration oriented." Also, in some areas of the Humanities, such as Foreign Languages, professors may tend to recommend more discipline-specific venues for development of teaching. A few participants (from various disciplines) noted that their institutions already did a good job recommending the workshop to faculty.

Although gender did not affect perceptions of overall effectiveness of the workshop, we found it interesting that females were more likely than males to report having tried new strategies and having taken risks in their teaching since attending the workshop. Our female sample also reported more awareness and thoughtfulness about their teaching than males. This general tendency may prompt their being more open to changes or experimentation independent of the workshop experience itself. The effect sizes found in gender research tend to be small (Hyde, 2005); the ones we found are in line with or larger than many. Our data suggest gender differences in the professional development of teaching may be a fruitful area for future research.

A very small percentage of participants did not perceive the workshop as having been particularly valuable. Comments from these participants suggest that taking nearly a week of time away from summer research was problematic. One participant found the experience to be intimidating. Some think that feedback from other professors, even as learners, is too different from feedback one might get from actual students. A few participants commented that they would have preferred more time discussing techniques outside the small microteaching groups.

The majority of participants indicate interest in attending the workshop to their academic deans and ask to be sent to it. As such, we cannot rule out the possibility that the workshop selects for participants who are open to and responsive to this type of faculty development experience or who may have continued to develop their teaching by other means. On the other hand, some participants, particularly those who may have been asked to attend by their deans, may not have been as responsive. Not being aware of why they were nominated to attend, these participants may have entered the workshop with different expectations. We were not able to examine these potential effects.

Despite these limitations, many participants commented on how the workshop was "restorative" when they had anticipated otherwise. Several commented on the pleasure they

experienced in this venue, which appeared to have been unique for them. A participant wrote, "It was just really fun to talk about teaching with people who really cared about it as much as I do, since I am not really surrounded by people like that in my current position." In commenting about the way in which the workshop had built his confidence, a participant who was in his second year of teaching at the time he attended wrote, "Just being around people who viewed teaching and learning in such open and creative ways has completely changed the way I see myself as a teacher." These comments speak to an aspect of the workshop that is difficult to quantify but may contribute greatly to its success. In reflecting on his work over many years with the GLCA summer workshop, Peter Frederick (2008) stated his belief that faculty respond favorably to the workshop experience because they are relieved to learn other professors share the same problems they do. As an opportunity to focus on pedagogy within a supportive, interdisciplinary venue, the workshop may provide a means for faculty to overcome what Shulman (1987) has called "pedagogical solitude"—a phenomenon in which faculty feel isolated and uncomfortable about seeking help with their teaching. Reder (2007) suggests that teaching needs to be conceived as a collaborative practice that is done within a community open to discussion, discovery, refinement, and improvement. It is our belief that the ACS Summer Teaching and Learning Workshop has provided such a community.

VI. Conclusion.

The ACS Teaching and Learning Workshop has brought together faculty members from different institutions across different disciplines, and at different points in their careers to 1) receive feedback on teaching in a non-evaluative setting, 2) give feedback on the teaching of others from a perspective of learning, 3) have the chance to observe teaching strategies and approaches from different disciplines, 4) share teaching problems and concerns, and 5) discuss broad pedagogical issues. The results of our survey suggest that the workshop has had a lasting impact on the professional development of its participants and has provided a valuable forum for faculty development of teaching. A large majority of participants, particularly female respondents, reported more awareness and thoughtfulness about their teaching, having tried new strategies, and having taken more risks in their teaching since having attended the workshop. A large majority of participants also continued to perceive the underlying approach to microteaching—receiving feedback from the perspective of the learner—as valuable. Other institutions and consortia may consider using workshops such as this as useful models for developing similar programs in order to support faculty development of teaching. Additionally, this study may encourage academic institutions to explore implementing various components of this workshop on their campuses, such as the guidelines for peer feedback, as well as establishing interdisciplinary forums for discussing teaching and learning.

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We would like to acknowledge Tricia Witte, Assistant Professor of Psychology from Birmingham Southern College, for her assistance with our statistical analysis.

Appendix

Appendix 1. Guidelines for Useful Feedback in Microteaching.

1. During a teaching segment when you are a participating as a student, you should not role-play as a "typical" student. Just be yourself.

2. After the segment, the "teacher" will have the first opportunity to comment before listening to others.

3. Feedback from others is most helpful when it is descriptive and specific, expressing one's *subjective experience as a learner* during the segment. Do not make evaluative, judgmental comments, best avoided by starting sentences with "I" rather than "you." Examples of helpful comments:

   "I had trouble understanding the concept before you drew the diagram on the board."
   "I became nervous when you said you'd be asking us each to answer in French."
   "I understood the principle when you restated it that third time."
   "I felt encouraged when you said you knew a lot of us were anxious about math courses."
   "I saw the point clearly when you presented the picture of the forest canopy."
   "I felt relieved when you understood what I was trying to say."

4. Helpful feedback focuses on behavior and your own experience rather than on the person. "You're a real intellectual," or "You have a dominating personality," are not helpful. "I don't understand all that lingo," or "I felt intimidated," or I felt like I couldn't interrupt" might be. The teacher can then decide what to do with the feedback.

5. Feedback should be checked with others to determine the extent of agreement about a particular experience or observation. Is this one person's impression, or is it widely shared? Remember: different students experience their learning in different ways, depending on cultural, social, and other individual characteristics.

6. Because each microteaching session raises shared issues of concerns to be explored, not problems to be solved, please do not offer advice or solutions ("this is what I do") unless specifically invited to do so. (No fair asking, "Would you like to know what I do in that situation?" since it's difficult for the other person to say "no.")

7. Finally, remember that pointing out what worked for you as a learner is as helpful and constructive as commenting on moments that were confusing. Your goal in providing feedback is to inform the teacher of your experience so that he or she can decide which behaviors to modify or maintain.

8. When you are the person receiving feedback, it is best not to feel compelled to respond to each point, but rather to listen quietly and try to understand what others' experiences were as you taught, asking only for clarification. The group facilitator will keep notes of comments made and give them to you and will make sure you do not get overloaded with too much feedback.

   Adapted from the work of Peter Frederick

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Inclusive Teaching Circles: Mechanisms for creating welcoming classrooms

Sharon Moore[1], Sherri L. Wallace[2], Gina Schack[3], M. Shelley Thomas[4], Linda Lewis[5], Linda Wilson[6], Shawnise Miller[7], and Joan D'Antoni[8]

Abstract: This essay examines the Inclusive Teaching Circle (ITC) as a mechanism for faculty development in creating instructional tools that embrace an inclusive pedagogy reflecting diversity, cultural competence and social justice. We describe one group's year-long participation in an ITC at a large, metropolitan research university in the south. Next, we share several members' strategies for promoting more inclusive and equitable learning for students in our classrooms. Finally, we consider the implications of ITCs for its group participants and the professorate at large.

Keywords: study circles, faculty development, diversity, inclusiveness, social justice education

Teaching is almost always a process done in isolation from planning, preparing to classroom deliverance. Often, it offers little time for self-reflection on how to improve. The purpose of this reflective essay is to highlight the effectiveness of faculty study circles as a mechanism for faculty development and to encourage experimentation for those seeking alternative techniques for classroom instruction. We share our personal experiences from participation in a faculty study circle – Inclusive Teaching Circle (ITC) – as well as several classroom activities developed and/or enhanced by members as a result of such participation.

The traditional stand-and-deliver style of teaching has changed little over the decades, while most student populations have become increasingly more diverse in terms of racial/ethnic, cultural, gender, ability, and social-economic backgrounds with different, unique learning styles. The activities we propose address classroom diversity as well as integrate more inclusive techniques into the content/skills being taught, thereby contributing to a richer teaching-learning process.

I. Theoretical Framework.

As America becomes more culturally, socially and economically diverse, faculty study circles have emerged across university campuses over the last decades to serve the needs of faculty and staff who want to examine their pedagogical approaches and interrogate their values, assumptions and biases as these relate to issues of privilege, power and difference in a

[1] Raymond A. Kent School of Social Work, University of Louisville, Louisville, KY 40292, Corresponding Author's Email: semoor02@louisville.edu.
[2] Department of Political Science, College of Arts and Sciences, University of Louisville.
[3] Department of Teaching and Learning, College of Education and Human Development, University of Louisville.
[4] Department of Teaching and Learning, College of Education and Human Development, University of Louisville.
[5] Department of Periodontics, Endodontics and Dental Hygiene, School of Dentistry, University of Louisville.
[6] Dean's Office, College of Arts and Sciences, University of Louisville.
[7] Raymond A. Kent School of Social Work, University of Louisville.
[8] Department of English, College of Arts and Sciences, University of Louisville.

multicultural society. In general, faculty study circles are structured to help instructors critically examine and recognize the learning gaps among and between students by exploring techniques that create/incorporate greater equity and social justice in teaching and pedagogy.

In 2006, the College of Arts and Sciences Office of Diversity and Outreach at the University of Louisville invited faculty and staff to participate in a variation of faculty study circles, dubbed Inclusive Teaching Circles (ITCs). ITCs originated from a program developed by Bonilla (2005) and adapted to our university in 2005 by the Coordinator of Diversity Programs in the College of Arts and Sciences. The ITCs were created to foster and broaden faculty and staff professional development to further actualize the university's mission, which "strives to foster and sustain an environment of inclusiveness that empowers . . . all to achieve our highest potential without fear of prejudice or bias . . . building an exemplary educational community that offers a nurturing and challenging intellectual climate, a respect for the spectrum of human diversity, and a genuine understanding of the many differences – including- race, ethnicity, gender, age, socio-economic status, national origin, sexual orientation, disability and religion – that enrich a vibrant metropolitan research university" (University Mission Statement, 2007). The university serves approximately 22,000 undergraduate and graduate/professional students with a student body that is 46% male and 53% female, with roughly sixteen percent students of color (University Statistics, 2007).

More specifically, the ITCs at our university have three primary objectives: 1) to support ongoing faculty development regarding inclusive teaching methods; 2) to cultivate a safe space for open discussions of successes and challenges in pedagogical practices; and 3) to develop a community among faculty and staff of knowledgeable multicultural educators who can serve as role-models and resources for other faculty and staff (Owen, 2006). Overall, the ITCs are structured as small, consistent groups of faculty and staff who meet monthly throughout the academic year over lunch to discuss readings on inclusive education, to share ideas and teaching strategies, and provide mutual support for the often difficult work of educating. The ITCs provide a friendly space to openly address difficult themes and further develop cultural competencies that enhance cultural proficiency for faculty and their students.

II. Methodology.

A. Participants.

This reflective essay describes the experience of one of the three ITC cohorts that met over the 2006-2007 school year. The ITCs were offered on three different days at slightly different mid-day times in order to make them accessible to more participants. Thus, group membership was defined by self-selection of meeting time/day. Each ITC was led by a faculty member who worked with the ITC coordinator.

Records indicate that eighteen people participated in our particular ITC at least once during the year, with the eight authors attending more consistently. Participants included faculty, staff, and graduate students, all in varying stages of their careers. The faculty included full-time assistant, associate and full professors and adjunct/part-time instructors from the Colleges of Arts and Sciences, and Education and Human Development; and Schools of Dentistry and Social Work. The staff members held full-time administrative/professional positions. Each taught undergraduate, graduate, and professional students in courses across various fields/disciplines including teacher preparation, dental hygiene, social work, political science, to freshman writing.

The regular group participants were all female. The racial balance of the eight core participants was roughly divided between African Americans and Anglo Americans. All said their primary reason for participating in the ITC was to better serve the needs of their students through critical self-reflection of their teaching in the classroom. All participants recognized that in the classroom, "we struggle alongside our students with our own social identities, biases, fears, and prejudices . . . [Yet, we] need to be willing to examine and deal honestly with our values, assumptions, and emotional reactions to oppression issues" (Bell, Washington, Weinstein and Love 1997, 299) as it relates to the classroom pedagogy. Self-knowledge and self-awareness are desirable qualities in any instructor and crucial for teaching issues of diversity and social justice education (Bell, Washington, Weinstein and Love 1997, 299).

B. Instruments.

There were two sets of instruments used for faculty development in this work: (1.) readings for faculty self-examination and group discussion, and (2.) activities for classroom application.

Group Readings. At each meeting, the group discussed a mutually selected text, *Privilege, Power, and Difference* (Johnson, 2001) and additional materials (interactive exercises, videos, journal articles, etc.) that were distributed previously by the facilitator, trained and assigned by the Coordinator of Diversity Programs. Each participant volunteered for leading the discussion of assigned readings. These materials were used to prompt participants to share related personal experiences and ask difficult questions, of others and themselves, regarding teaching styles, delivery and methods. The goal of the group discussion is to explore the implications of the readings for the teaching-learning process.

Class Activities. In the second semester of the program, several participants shared classroom activities they had used that can be adapted and applied by others to facilitate student discussion around issues of diversity and/or social justice. Although measuring student outcomes it is beyond the scope of this work, the goal of these active learning exercises is to transform students from passive to active learners by deepening students' understanding of diversity through the interrogation of context/subject matter, and by challenging the prevailing assumptions to help them learn the thinking processes of their respective discipline. Some of these activities are highlighted and evaluated in this essay to demonstrate how participation in the ITCs facilitated faculty development through the incorporation of more inclusiveness in the classroom.

C. Evaluation Procedures.

Activities, exercises, and simulations can give students insights beyond those gained from their usual roles of listening and discussing (The University of Wisconsin – Whitewater, School of Graduate Studies and Continuing Education, 2005-2006). ITC Participants were asked to present activities, techniques and strategies developed or used for exploration and examination by the group. Our purpose here is to describe the activities developed/used, and then share the implications for teaching in the classroom.

The selected six activities, mutually-chosen to emphasize diversity, inclusiveness and/or social justice issues, range from first-day-of-class to more intense exercises that may foster a range of emotions and responses from students. These activities have been used in both undergraduate and graduate courses with students representing several different majors. The first three activities are "ice-breakers" exercises. These are fairly low-risk, should be used early in the

course, and help students become familiar and comfortable with discussing social justice issues. The fourth and fifth activities involve greater risk, as they are designed to help students become more aware of and sensitive to their personal biases regarding people of diverse backgrounds. The last activity is designed to increase students' awareness of more subtle, less overt expressions of bias in everyday situations that can unintentionally marginalize people who are viewed as "different" or "outside the norm" of the majority culture.

III. Findings.

Below we describe each activity selected by the group for evaluation and discussion among the participants, highlighting common themes and assertions related to teaching diversity, cultural competency and social justice issues in the classroom.

Activity 1: Using Icebreakers to Increase Awareness of Diversity. This exercise entitled, "Who Among You…?", is used on the first day of class as both an icebreaker and a vehicle through which students can make personal introductions and begin the process of bonding (Parsons, 1995; Brill and Levine, 2005). Although seemingly simplistic in nature, this activity has been repeatedly used in various courses by one author because it has proven to be an effective way to foster dialog. The objectives of the activity are to create an environment where students learn immediately about the diversity that exists among them and come to better appreciate the racial/ethnic and cultural backgrounds and experiences of both themselves and their classmates.

Students are given a list of questions (see Appendix 1) and asked to find people in the class who meet each of the characteristics listed. They do this by moving around the room and talking with a variety of class members. The class is given approximately twenty minutes to complete the activity.

After the information has been gathered, the class comes back together. The people who best fit each characteristic are asked to briefly comment on their experience(s) in that particular area. After all characteristics have been addressed, students who did not speak earlier are asked to tell the class one thing that makes them unique. As a result of this activity, students find that there is much more diversity among them than they previously thought existed. They are more aware of their commonalities and differences, which can then be used as avenues for growth and exploration throughout the remainder of the course.

Activity 2: Using Icebreakers to Explore Knowledge of Diversity. "Cultural Pursuit" is a similar but more culturally-focused activity that explores students' knowledge of diversity with respect to particular persons and lifestyles in American society. Here, the instructor gives each student a chart (see Appendix 2) consisting of 25 squares, each describing some knowledge or an experience related to a cultural group. First, students initial the squares that describe themselves, and then they walk around the classroom seeking classmates who fit the remaining descriptions. When a classmate identifies with one of the descriptions, s/he initials the square, and then briefly shares the knowledge or describes the experience to classmate, and move on to continue searching for others who fit the descriptions in the remaining boxes. Although descriptions and responses can be adapted to suit the students and the instructional environment, the included chart explores a broad range of identities, including race/ethnicity, class, gender, sexual identity, and physical abilities.

This activity generally results in two outcomes. It can reveal students' knowledge gaps about various cultures, as well as their assumptions about which peers may know the answers to

such descriptions. The experience and ensuing discussion also increases cultural awareness around diversity issues and promotes students' sensitivity to how their own cultural influences (i.e. power or privilege) and personal biases can perpetuate discrimination intentionally and unintentionally in everyday situations.

Activity 3: Using Class Snacks to Increase Sensitivity to Diversity. Establishing a sense of community, in terms of inclusiveness and of belonging to the group, is a key component of one author's classes. Because she prefers having students work in groups throughout the semester, she created a socially-engaging activity that would be used early in the course to build community among students and foster an overall sense that the classroom is an inclusive and safe place.

In the first week of the semester, the instructor asks students to consider what sort of snacks they would like the instructor to bring to class to share. This simple task requires students to get to know each other because they have to think about who is in the class in order to plan foods they all can eat. This activity has both practical and hypothetical components. The first task is to decide what sort of food should be brought (i.e. breakfast, lunch, dessert, snacks, etc.). Then, with this practical choice made, the class breaks into groups to brainstorm a list of food issues they must consider before making the final food selection(s). Here, students are prompted to consider food allergies (e.g. nuts, strawberries, shellfish, etc.) as well as dietary considerations related to health (e.g. sugar, salt, fat, carbohydrates) and other food choice restrictions with which most students are familiar. For example, vegetarians and vegans can raise the issue of foods that use animals or animal products. Students who follow certain religions can share their prohibition against eating particular meats or products and/or how such meats and products need to have been processed or prepared. If students fail to bring up elements that impact the kinds of food people can eat, the instructor usually prompts students to consider the missing elements, which can inspire a teachable moment. Finally, the students look at the calendar to consider whether a given class day is a day of observance for a religious holiday with food implications.

This activity requires students to acknowledge that not everyone shares their perspective about something as ordinary as food, and to consider others whose identity and needs might not be immediately obvious. In addition, students are encouraged to reflect about how it feels to be served something one cannot eat for personal or religious reasons as well as how it feels to be excluded. The practical outcome of this activity is class snacks that are planned and shared by the group in a way that builds community and acknowledges the importance of all class members.

Activity 4: Using Popular Culture to Teach Diversity and Cultural Competency. Increasingly, students in the health field are being encouraged to examine and explore their personal biases and assumptions about patients of different backgrounds. Given the broad range of social justice issues that these students will encounter in the profession, one instructor felt the need to create an activity that had students actively explore the concepts of diversity and cultural competence in relation to their fields. This led to an activity[9] requiring students to view the award-winning film, *Crash*, an R-rated cinema directed by Paul Haggis (Lions Gate Entertainment Films, 2004). The film showcases many instances of characters acting out and responding to both positive and negative stereotypes, which are simplified conceptions, beliefs or predictions (based on limited information) that members of a group will behave in certain ways (Ebert, 2005). The daily activities and events that intersect the characters' lives throughout the

[9] Similar films can be used or adapted to suit the educational level of the students. Suggestions include: *The Eye of the Storm* (1970) targeted at pre-schoolers, and *The Angry Eye with Jane Elliott* (2004) targeted at college students.

film highlight stereotypes and differences related to race/ethnicity, gender, social class, and sexual orientation. Characters encounter contradictions among their own personal biases, beliefs, and perceptions, and their lives are altered as a result.

While viewing the movie, students are asked to note at least five different intersections among characters including the negative and positive communications that occur during such encounters. In addition, they are asked to list any stereotypes they see or hear. Afterward, students write a paragraph about one of the five intersections described and any of the stereotypes listed, discussing how communication among the characters allowed them to transform the encounter from a negative to a positive one.

With an understanding of how stereotypes are actualized in daily interactions, students can use their growing awareness and sensitivity to create more open and positive interactions in their professional and personal lives. The goal of this activity is for students to recognize that there are no universal definitions, but that meanings of difference are social and political constructions that mean different things at different times to different people. Watching the film and reflecting about it will increase students' empathy for people who don't share backgrounds or social experiences similar to their own (Ebert, 2005).

Activity 5: Using Occupations to Explore the Effects of Stereotypes. Because students come to college from diverse backgrounds, with varying levels of skill and preparation for discussing controversial and contentious topics, this active-learning exercise helps students quickly relate to and understand how difference can affect one's everyday life in very common situations. Getting students to actually experience the subtleties of positive and negative stereotypes is a challenge for any educator. The overall objective of this activity is to reveal how certain occupations create certain impressions or images in our minds, which can foster discriminatory attitudes.

In an exercise focusing on occupations (adapted from lessons on stereotypes from *Teaching Tolerance*, 1994), the instructor asks for four student volunteers. Each is given a different occupation, with the four varying in their socio-economic level (e.g., hair dresser, plumber, priest, and professor). As their respective occupation is named, each volunteer is asked to identify their first impression of the physical image that comes to mind. In addition, they are asked to describe the person's level of education, annual income, and their overall quality of life (e.g., type of neighborhood in which they live, vehicles, material possessions, number of children, etc.). After the four student volunteers have completed their descriptions, the rest of the students in the class are asked to share their impressions/images. Do they agree or disagree? Why or why not? This will help to facilitate an open and honest dialogue about stereotyping.

As all students discuss their perceptions, the instructor then asks them to talk about where they get their impressions/images. Possibilities include personal experiences, newspapers or news broadcasts, and entertainment (television, movies, etc.). Also, students are asked to consider (or research) the accuracy of their impressions. For example, plumbers are often described as low income (working class) with low levels of education, but that does not always match reality.

Other areas for discussion include the kinds of stereotypes used to categorize people, such as their race/ethnicity, sex and gender, sexual orientation, and social class (Rosenblum and Travis 2006), and whether stereotypes are good or bad, and why. During the dialogue, the instructor can emphasize how stereotyping can become a negative for those who are stigmatized or seen as bad, unworthy, or polluted because of the category to which they belong. As Rosenblum and Travis (2006) observed, "[j]udgments of worth based on membership in certain

categories have a self-fulfilling potential. Those who are judged as superior by virtue of their membership in some acceptable category are given opportunity to prove themselves; those who are judged less worthy by virtue of their membership in a stigmatized category have difficulty establishing their merit no matter what they do" (p. 28). The goal is to show students that what we think about a person without full knowledge of them and their potential can actually devalue them, depending on whether we associate them with social categories, statuses, and occupations viewed positively or negatively.

Activity 6: Using Commercial Items to Illuminate Majority-Centered Assumptions. Students preparing to become certified teachers in early childhood through high school classrooms need plenty of opportunities to learn about inclusiveness in education and the classroom. Because many teacher candidates at our university are typically white, middle-class, heterosexual, and Christian, it is critical that they be able to create a classroom community that respects, includes, and supports all learners, particularly those who may differ from one or more elements of the dominant culture. To do that, teacher candidates need to examine their own (or lack thereof) cultural awareness with respect to people who differ from them. Candidates rarely make errors of commission – saying or doing things that are overtly offensive – but they often offend by acts of omission – saying or doing things that assume everyone sees the world the same way they do – and thereby excluding or marginalizing people who are viewed as different from them. The following activity, named "Flesh-Colored Band-Aids[10]," was developed and designed by one author to help candidates discover and examine some of these assumptions in a non-defensive way. The activity was named in recognition of the author's early insight into unconscious racism or white privilege as observed, unfortunately, among teacher candidates in the classrooms and/or lesson plans (see Appendix 3). While designed for teacher candidates, it can be used more widely, as all students are likely familiar with the classroom context of the items listed.

The activity usually takes place toward the middle of the course, after students have had time to become comfortable with each other. Students are given the activity to complete individually. Then they choose a partner and compare and discuss their responses. The instructor then places student pairs into groups of four, increasing the level of diversity among them. Students are again asked to compare answers and discuss any differences or what they find interesting among the responses. Students are brought back to the larger group to share questions, insights, comments, and implications. All students then write closing reflections about the experience and what they learned.

In practice, students are usually able to explain to each other why some would find the items offensive, and they seem more receptive to hearing this from their peers than from the instructor. Occasionally, some will ask why X is such a big deal and why "people don't just get over it." Framing the same statement from a non-dominant culture's perspective (e.g. #14, Koran reading opening the school's graduation ceremony) and/or pointing out who is left out (#3, poor people) usually clarifies the issue. This activity has been used effectively to lay the groundwork for another ITC participant's course on that focuses on "culturally responsive teaching" (Gay, 2000), whereby course assignments are structured to demand that students recognize themselves as cultural beings and examine how their own cultures intersect with the diverse cultures of others in order to understand how this affects teaching and learning (Gay and Kirkland, 2003).

[10] Flesh-colored band-aids are a commercial product that, for decades, was available only in one "universal" color that reflected the majority culture and skin tone.

IV. Implications for Participants and Professoriate.

A. Implications for Participants.

In highlighting the themes among the activities used by participants to engage students in the classroom, the purpose is to consider how participation in the ITC has impacted participants as university-level instructors. As mentioned previously, the ITC has pushed each participant to philosophically and pedagogically examine issues present in our social and academic spaces as these issues relate to the multiple disciplines in which we work. Further, we acknowledged that instructors and students share responsibility for the reflection and action necessary to further the mission of the university. Thus, our involvement in the ITC fostered critical cultural consciousness as we considered the complexities of teaching in, for, and about a multicultural society (Gay and Kirkland, 2003). In essence, we learned that we must practice what we teach. By actively participating and challenging ourselves to self-examination and reflection fostered by the interdisciplinary, diverse ITC, we learned new tools and receive new resources to push our thinking, challenge our assumptions, and renew our sense of what is possible in the classroom.

One benefit of the ITC is the opportunity to openly examine past "missteps" or "sites of discomfort" in the classroom and share them with others in a safe environment – the same kind of safe environment that our classrooms should be for all of our students. At first, sharing a moment of failure with colleagues can seem risky. Internally, we pondered "What will they think of me if they know that I did not know what to do?" However, as the group became more cohesive through discussing and sharing of common readings and our problems and experiences, we began to feel more freedom to address issues and concerns without guilt or fear.

In *Teaching to Transgress*, bell hooks (1994) states "[t]o educate for freedom, then, we have to challenge and change the way everyone thinks about pedagogical process" (p. 144). Another benefit of ITCs is that they provide an engaging and supportive forum for that challenge and change. The participants challenge themselves and each other to rethink classroom practices about how to teach, what to teach, and who is taught. By changing the way instructors think, speak, act, and teach, the class itself can become a location of change.

Lastly, ITCs promote small-group facilitated dialogue as a way to learn new knowledge and explore other perspectives and experiences. ITCs work because they bring different kinds of people together around shared concerns and create a space that enables constructive, safe, respectful conversation. In this vein, ITCs promote respect for out-of-classroom learning as a valued educational strategy that supports faculty/staff and student development. Participants in ITCs can share examples of "teachable moments" with each other at appropriate times. More importantly, ITC participants learn to develop trust for each other as well as a shared understanding of social justice education issues.

B. Implications for Research.

In addition to teaching, research is another area impacted by the ITC. Researchers use a variety of research methods and envision research in different ways. Through the ITC, we were able to explore a variety of qualitative methods framed by critical theories (Denzin and Lincoln, 1998) and how these might inform research in our different disciplines. Discussing with colleagues social justice questions about our work as university-level educators prompted

consideration of research questions related to diversity and social justice. Because the ITC provided a forum to hear others' perspectives, our conversations shape the lenses through which we analyzed data and located implications within our respective disciplines.

In sharing work with colleagues in the ITC, we strove for clarity to communicate across the modes of discourse of our different disciplines. This was certainly true when describing something as contested and vague as social justice education. Rather than being a buzzword that we claim to look for in others, social justice education is something we continuously define and strive to enact. One facet of social justice education is an inquiry stance toward teaching that challenges assumptions about who is teaching what to whom and why (Cochran-Smith and Lytle 2001). The ITC at our university provided a nurturing space to achieve this end. More than just a notion to ponder, social justice education is a perspective, which moves to action. For most participants in the ITC, that action is advocacy through both research and teaching, and the ITC was instrumental to growth in both areas.

V. Conclusion.

Participation in faculty development initiatives invigorates our teaching. Prior to involvement in the ITC, we may have wondered if and how others approached the challenges and opportunities teaching in an institution of higher education affords faculty in similar and dissimilar disciplines. Indeed, reflection on our unique teaching experiences took on new meaning because, within the ITC, we reflected on our pedagogies, content, and goals with a mutual purpose, considering why we chose to address multicultural topics or use a diversity lens to examine problems in our disciplines. We became members of an intentional group of educators committed to our own, each other's, and all students' learning and engagement within inclusive classrooms.

Participants in our ITC used diverse materials for our monthly meetings and conversations about teaching strategies. Together, we examined social justice and inclusiveness issues from many points of view, considered many possible methodological approaches, exchanged strategies for creating inclusive classrooms, and ultimately, developed ideas for action and change over the course of our year-long participation. The ITCs, when used as a vehicle for faculty development, demonstrates a commitment to becoming a multicultural learning community, which enhances the academic and social integration of our students as well as our overall retention and attrition rates. These faculty development seminars allow participants to embrace new knowledge/techniques in a collaborative manner, share and learn from mishaps, and promote diversity competencies.

As America's classrooms become more culturally diverse, the need for inclusive environments where instructors and students partner, creating and sustaining an environment where everyone feels safe, respected, and encouraged to share his or her views is imperative. Collaborative learning fosters and builds an inclusive learning environment by utilizing myriad learning strategies, skills and personal attributes we all need to live and work in a diverse world. Furthermore, sharing our experiences in the ITC in the classroom models collaboration for students, lends credibility to statements like "we are all in this together," and demonstrates respect for the critical roles seemingly disassociated fields can play in creating a more just, inclusive society.

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Appendices

Appendix 1. "Who among you…?" Activity.

Who among you…

1. has frequently invited a person of a different racial background to their home for dinner?
2. speaks more than one language? If so, how many and which languages?
3. has the oldest living parent? What is the parent's age?
4. has traveled to the most foreign countries?
5. has the most siblings?
6. has lived in the most states within the United States?
7. has eaten something while it was alive?
8. has been married the longest?
9. has the most children?
10. fulfilled a lifelong dream this year?

Adapted from: The University of Wisconsin – Whitewater, School of Graduate Studies and Continuing Education, 2005-2006.

Appendix 2. "Cultural Pursuit" Activity.

Find Someone Who…	Has had her or his name mispronounced.	Knows what "Nisei" means.	Is from a mixed-heritage background.	Is bilingual/ multilingual.	Has been misunderstood by a person from a different culture.
	Has a parent or grandparent who was not born in the United States.	Has had to overcome physical barriers in life.	Has experienced being stereotyped.	Knows what Rosa Parks did.	Has an "abuela."
	Can name the West Coast equivalent of Ellis Island.	Knows what an upside-down pink triangle symbolizes.	Listens to "ethnic" music.	Has traced his or her family lineage or heritage.	Knows who Harvey Milk was.
	Knows how many federally recognized Native American tribes are in the United States.	Knows what "Juneteenth" means.	Knows the significance of eagle feathers.	Knows why the Irish immigrated to the United States in the 1840s.	Knows the color of a parking zone for physically-challenged or disabled people.
	Can name the lawyer(s) who argued for the petitioner in *Brown v. Board of Education.*	Knows the meaning of "goy."	Knows what "comparable worth" means.	Has seen a step show.	Knows what a "lumpia" is.

Adapted from: Pacific Educational Group, "Expressing Our Differences," 1994; National CASA/GAL Association, "Exploring Cultural Heritage," 2001.

Appendix 3. "Flesh-Colored Band-Aids" Activity.

Flesh-Colored Band-Aids

Assume you are visiting the classroom of another teacher whom you don't know well. Indicate how you would feel when that teacher says one of the comments in quotation marks or when you see the things described below. If you rated it anything other than "1" please note why.

1	2	3	4	5
Seemed normal; Is there a problem?	**Confused; I don't understand**	**Surprised but not offended**	**Left out; invisible**	**Offended**

_____ 1) "So, Alice, when you grow up, do you want to have a career or raise a family?"
_____ 2) "While this tribe's ritual may seem unusual to you, it's as common to them as your grandmother baking Christmas cookies is to us."

_____ 3) "This lesson on advertising and persuasion is really important because in a few years you'll be buying your first car, and there is a lot of advertising about cars that you'll need to sort through to decide which one you want."

_____ 4) Classroom bulletin board in the spring with pictures associated with Easter (colored eggs, baskets, bunnies, etc.)

_____ 5) In the school cafeteria the week before Easter, you find hamburgers and spaghetti with meat sauce as the two entrée choices.

_____ 6) Class assignment to create a family tree, at least three generations back.
_____ 7) "Feel free to use your home computer to research your project on the internet, write it, and illustrate it. There's lots of good clip art on the web these days."

_____ 8) "You speak English really well!" (to a child of Asian descent)
_____ 9) "You can't possibly appreciate that book at your age. I think you should find something more age-appropriate."

_____ 10) Notice that this year's school PTA meetings are scheduled for 9:00 a.m. the last Thursday of each month.

_____ 11) Poster publicizing a combined band, orchestra, and chorus Christmas concert.
_____ 12) "So I'll order three pizzas, one with pepperoni and onion, one with sausage and mushrooms, and one with everything, okay?"

_____ 13) "Famous Americans" bulletin board with pictures and information about George Washington, Alexander Graham Bell, Thomas Jefferson, Bill Gates, Larry Bird, Norman Rockwell, Lewis and Clark, and General Custer.

_____ 14) Bible reading opening the school's graduation ceremony
_____ 15) (to a child of Asian descent) "It's so hard to pronounce your name. "How about if we just call you 'Tom'?"

_____ 16) Your example:_____
_____

Created by Gina D. Schack, Ph.D. (2001). Department of Teaching and Learning, College of Education & Human Development, University of Louisville, Louisville, KY 40292.

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Focusing on how students study

Regan A. R. Gurung[1], Janet Weidert[2], and Amanda Jeske[3]

Abstract: What is the best advice to give students regarding how to study? We provide preliminary results on the utility of a 35-item Study Behaviors Checklist that is adaptable for any course. We assessed 125 introductory psychology students' use of different study techniques and correlated their responses with their exam scores. Attendance, study guide use, using practice exams, and using class material to explain problems were positively correlated with exam scores. Some often recommended techniques (e.g., highlighting material) were negatively correlated with exam scores. We present study guidelines for students and key areas for future research on this topic.

Keywords: study techniques, strategies, student success, study skills.

"Read your textbook and assignments before coming to class. Take good notes. Test yourself often".--- These are some of the many study techniques recommended to students by instructors and even some textbooks to do well in a course and there are also a number of student study guides (e.g., Fry, 2004; Tamblin and Ward, 2006). A large body of research has attempted to identify the techniques that are optimal (e.g., Gurung, 2005; Hattie, Biggs, and Purdie, 1996; Kobayashi, 2006; Metcalfe, 2009; Robbins, Lauver, Le, Davis, and Langley, 2004; Wingate, 2006; Worrell et al., 2010; see Gurung and Schwartz, 2009 and Hattie, 2009 for extensive reviews and summaries). Unfortunately, given the breath of past research and the ambiguity of findings (i.e., what is found to work in one study often does not seem to work in another), it is difficult for instructors to find the best empirically supported advice to give students regarding how to study. In this article we provide instructors with preliminary results using a short measure of study behavior that is adaptable for any course. Our primary research question was, "What study behaviors are associated with higher grades on exams?"

Measures of study behaviors, also called study skills, strategies, or techniques can serve as diagnostic tools to help instructors identify students in need of additional help, as well as providing students with a better awareness of their strengths and weaknesses and, correspondingly, ways to optimize their learning. Study behaviors can be broadly defined as behaviors serving to acquire, organize, synthesize, evaluate, remember, and use information (Crede, and Kuncel, 2008; Gettinger and Seibert, 2002). Such behaviors include time management; goal setting; selecting what to study, how, and where; taking good notes; reading; and self-testing. Researchers have divided the many specific study behaviors into main four categories: repetition-based (e.g., flashcards), cognitive-based (e.g., studying with a friend), procedural (e.g., time management), and metacognitive (e.g., taking quizzes to test self-knowledge; for more details see Gettinger and Seibert, 2002; Tamblin and Ward, 2006). Metacognitive techniques were shown to be some of the strongest predictors of exam scores

[1] Department of Human Development and Psychology, 2420 Nicolet Drive, MAC C309, University of Wisconsin, Green Bay, Green Bay, WI 54311, gurungr@uwgb.edu
[2] Department of Industrial/Organizational Psychology, Colorado State University, Fort Collins, CO 80523-1876
[3] Department of Counseling Psychology, University of Minnesota-Twin Cities, Minneapolis, MN 55455

(Hattie, 2009). This study builds on this literature and assesses techniques from each of these categories.

Given the obvious link between studying and learning (as established by high exam scores and course grades), a large 'self-help' market caters to students looking for tips. The style and empirical basis of the available material varies greatly. Many of the guides include discussions of topics such multiple intelligences, learning styles, and time management, while providing step-by-step strategies on how to read better, take good notes, and remember and test better. Whereas some guides include some empirical evidence to support recommendations (e.g., Pauk and Owens, 2007; Tamblin and Ward, 2006), most do not. For example, Newport (2007) features tips based on interviews with students who achieved high grades in college and list anecdotes of what the high scoring students did (e.g., minimize the time spent on assignments while still learning exactly what is needed, p. 83). Many guides are targeted at the high school or first year college student (Fry, 2004) and many of the prescriptions are not necessarily derived from or aligned with the empirical literature on study techniques reviewed above.

In contrast to non-empirical 'self-help' style student guides to studying, a wealth of empirical research suggests that good study behaviors predict academic success (Crede, and Kuncel, 2008; Hattie, 2009; Prevatt, Petscher, Proctor, Hurst, and Adams, 2006). But what exactly are 'good study behaviors'? Early attempts to assess 'good' study behaviors go back to Wrenn's (1933) Study-Habits Inventory, the Student Skills Inventory (Locke, 1940), and the Survey of Study Habits and Attitudes (Brown and Holtzman, 1955). More recently, researchers have commonly used the Learning and Study Strategies Inventory (LASSI, Weinstein and Palmer, 2002) or created their own scales (Carrell and Menzel, 1997; Gurung, 2005). Unfortunately, many of these scales are long, extremely general, and furthermore do not afford clear prescriptions on how to advise students to study although they do provide links between studying and exam scores. Similarly, while clearly establishing the link between study behaviors and performance, large meta-analytical studies (Crede and Kuncel, 2008; Hattie, 2009) do not provide specific prescriptions of how exactly students should study.

We build on previous work to provide a more fine-tuned view of what students do to study by assessing different behaviors in a shorter format than existing scales. Furthermore, we directly tie study behaviors to exam scores to test the utility of many commonly suggested study tips such as looking over notes immediately after a lecture. Consistent with recent research, we hypothesized that metacognitive behaviors (e.g., self-testing) would predict higher exam scores.

I. Method.

A. Participants.

One hundred and twenty students (41% women and 19% men; 40% did not report sex) from a midsized Midwestern university in one section of an introductory psychology class participated in this study (participation was voluntary, class enrollment = 126). The mean age was 19.60 (*SD* = 2.80). The majority of the students were freshmen (46%); the rest were sophomores (16%), juniors (7%), and seniors (6%) or did not report their year in school (25%). The mean ACT score was 22.16 (range: 17 to 30) and mean cumulative GPA was 2.83 (range 0.98 to 4.00). We obtained student permission to access university records for ACT and GPA data.

B. Materials.

We created a 35-item Study Behavior Checklist (SBC, see Table 1) based on previous research (Gurung, 2005; Weinstein and Palmer, 2002) and student interviews. The items assessed students' *organizational behaviors* (e.g., writing down when exams, assignments, and quizzes are due; setting up a study schedule), *application behaviors* (e.g., creating questions about the material), *elaboration behaviors* (e.g., paraphrasing the material, explaining it to another person), *metacognitive behaviors* (e.g., using practice exams to study), and *resource use behaviors* (e.g., asking a fellow classmate to explain the material) on a scale ranging from 1 (*Not at all like me*) to 5 (*Exactly like me*).

C. Procedure.

After completing the final class exam consisting of 60 multiple choice questions, participants picked one of two extra credit opportunities (for five bonus percentage points on the exam) in accordance with approved Institutional Review Board (IRB) protocol. Students were able to complete the 35-item study behavior checklist or read an article about student study behaviors and complete short answer questions about the article. We informed students that participation was voluntary, the information obtained would be strictly confidential, and responses to the questions would not adversely affect their class grades or exam scores.

II. Results.

The mean scores on each of the items of the SBC appear in Table 1. The scale showed high reliability (Cronbach's alpha = 0.89). Attending class, organizing notes, writing down relevant figure/table/chart numbers, and knowing when assignments were due were the most highly cited behaviors. Using the book Web site for practice quizzes and asking for additional study materials were the least cited behaviors. There were no significant differences between men and women in scale responses.

We correlated student responses to the SBC with scores on students' final exam. The more students attended class, $r(114) = 0.23$, $p < 0.05$; answered all questions on the study guide, $r(114) = 0.23$, $p < 0.05$; used practice exams to study, $r(114) = 0.24$, $p < 0.05$; and were able to explain problems using the material, $r(114) = 0.28$, $p < 0.01$; the higher were their exam scores. A number of behaviors were associated with lower scores. The more students reported looking over notes after class, $r(114) = -0.20$, $p < 0.05$; highlighting important information to review later, $r(114) = -0.21$, $p < 0.05$; asking friends/classmates to explain material they did not understand, $r(114) = -0.23$, $p < 0.01$; asking the TA or professor for additional study materials, $r(114) = -0.26$, $p < 0.05$; and reviewing the chapter after lecture, $r(114) = -0.26$, $p < 0.05$; the *lower* were their exam scores. Student report of study hours did not relate to exam scores.

Our hypothesis that the metacognitive items (20 and 21) would be the most powerful predictors of exam score was borne out by the positive correlations between these items and exam score. To further test whether these two items held together well and were unique from the other items, we computed a principal components factor analysis and used a varimax rotation. Ten factors (Eignevalues > 1.0) explained 67% of the variance. Looking at the rotated factor

matrix showed that the two explicitly metacognition items loaded highly on a single factor with weights of 0.70 and 0.75 respectively.

Table 1. Means and Standard Deviations for the Study Behavior Checklist items and Correlations with Exam Score.

Item	*M*	*SD*	*r*
1. I attended every class.	4.46	0.76	0.24*
2. My notes were organized well.	4.27	0.88	0.15
3. I wrote down in my notes figures/tables/charts/sections that were mentioned in lecture.	4.22	0.98	0.12
4. After class, I looked over my notes to check for and fill in missing information.	2.48	1.02	-0.21*
5. I read the difficult material slowly.	3.51	1.08	-0.07
6. I highlighted the most important information in each chapter to review later.	3.04	1.29	-0.23*
7. I took notes on what I was reading.	2.66	1.31	-0.15
8. I created and answered questions about the material while I was reading in my head.	2.35	1.14	-0.02
9. I created and answered questions about the material while I was reading in my notes.	2.57	1.19	0.00
10. I related what I was reading to lecture materials and discussion.	3.64	0.97	0.05
11. I reviewed the chapter after the lecture on that topic.	2.60	1.05	-0.27**
12. I read and evaluated the figures and tables in the book.	3.35	0.99	0.11
13. I evaluated the pictures/photos in the book.	3.17	0.90	0.00
14. I read and evaluated the Personal Application Sections in the book.	2.39	1.17	0.16
15. I knew when the exams, quizzes, assignments were due and noted them in my planner, calendar, PDA, etc.	4.14	1.15	-0.03
16. I actively modified my studying because this exam used a Multiple Choice format.	2.75	1.19	-0.18
17. I reviewed the material to decide how many hours I needed to study.	2.66	1.06	-0.08
18. I set up a study schedule that allowed me enough time to complete all that is due in my different classes.	2.97	1.19	-0.01
19. I crammed before this exam.	2.54	1.15	0.15
20. I answered every question on the study guide.	3.66	1.38	0.22*
21. I used practice exams to study.	3.84	1.36	0.24*
22. I briefly reviewed all the chapters covered before I studied.	3.43	1.11	-0.01
23. I divided material into smaller, manageable, and logical sections (e.g. I used an outline).	2.78	1.32	0.00
24. I varied my studying behaviors by switching between reading, rehearsing, solving problems, writing, etc.	2.84	1.31	0.04
25. I went to the book website for practice quizzes.	2.14	1.35	-0.11
26. I took the online quizzes without any notes.	3.41	1.32	0.07
27. When I got an answer wrong on a quiz, I went back to the related material to better study it.	3.47	1.20	0.06
28. I paraphrased what I was learning and explained it to someone else.	2.85	1.17	0.13
29. I generated my own examples about the material.	2.97	1.11	0.08
30. I was able to explain a problem or phenomenon using the material.	3.42	0.95	0.27**
31. I asked (by email, a phone call, visit, etc.) a classmate/ friend to explain material I did not understand.	2.95	1.34	-0.22*

32. I asked (by email, a phone call, visit, etc) the professor/TAs to explain material I did not understand.	2.40	1.26	-0.09
33. I explained confusing concepts to classmates.	2.76	1.26	-0.02
34. I was able to answer questions my classmates asked.	3.29	1.01	0.12
35. I asked the professor or TAs for additional study materials.	1.61	0.82	-0.26**

Note: * $p < 0.05$; ** $p < 0.01$

Is it possible that study behavior varies by student ability (i.e., GPA)? To test this idea we used a median split to divide the sample into students with high ability (cumulative GPAs > 2.90) and those with low ability (GPAs < 2.90). We then computed similar correlations to those discussed earlier comparing self-reported study behavior and exam score. There were differences in patterns of correlations between the two groups. For high ability students, only one SBC item was significantly (though still negatively) correlated with exam score. Students who highlighted important information to review later did worse on the exam $r(34) = -0.38$, $p < 0.05$. For low ability students, a number of SBC items were negatively correlated such as looking over notes after class to fill in missing information $r(28) = -0.48$, $p < 0.05$; reading difficult material slowly, $r(28) = -0.44$, $p < 0.05$; highlighting important information to review later, $r(28) = -.041$, $p < 0.05$; evaluating pictures in the book, $r(28) = -0.41$, $p < 0.05$; actively modifying studying, $r(28) = -0.47$, $p < 0.05$; reviewing material to decide on study hours needed, $r(28) = -0.41$, $p < 0.05$, setting up a study schedule, $r(28) = -0.38$, $p < 0.05$, and asking the professor or TAs for additional study materials, $r(28) = -0.35$, $p < 0.05$. As can be seen, the sample size for each subsequent analysis was much smaller due in large part to the fact that GPA information for 33 students was not available (students did not give permission for their records to be accessed).

III. Discussion.

These results present many challenges for pedagogical research attempting to identify optimal study skills. Whereas we found support for our hypothesis regarding the utility of metacognitive strategies such as self-testing, few behaviors significantly related with exam scores, and some often recommended strategies turned out to correlate negatively with exam scores.

The results of this study, although troubling, are consistent with the literature that suggests there are no strategies that work all of the time, for all students, in all classes (e.g., Gurung, 2003; Hadwin and Winne, 1996; Hattie et al., 1996). Additionally, given the results of this study are based on one sample and are self-report, it may be premature to over emphasize the magnitude and directions of the relationships. The key may be that the SBC identifies some of the most commonly suggested study behaviors based on a wide literature. It is possible that introductory psychology multiple choice exams require only basic study behaviors as seen in the demonstrated utility of behaviors such as self-reported use of the study guide and practice exams.

The higher negative correlations between self-report study behavior and exam scores for students with lower GPAs suggest that some behaviors such as highlighting important information served as “dangerous detours” to learning (Gurung, 2004, p. 164) involving more study time at the expense of other techniques and efficiency. The negatively correlated items could represent behaviors used by academically weaker students. Whereas the academically stronger students may not take time on behaviors such as going over chapters right after a lecture in lieu of doing so right before an exam, the weaker students may go over the chapters at both times.

The preliminary findings on the SBC provide important recommendations for both how instructors advise students and for future research on study techniques. Instructors need to be cognizant of how much of the advice they give to students is empirically proven to work in an actual classroom as compared to a controlled cognitive psychology laboratory study where many studies of learning are done. What may work well in the lab may not transfer well to a classroom (Daniel and Poole, 2009). Part of the problem may relate to what exactly students are doing. Studying with a friend was negatively correlated to exam scores in our study. Perhaps students need to be trained in the best way to study with a friend. Instructors can model how students should make up examples with the material and quiz each other. For some students 'studying with a friend' may mean sitting on a couch reading notes and chatting with the television on. Whereas you can control and monitor what a student is doing in a laboratory experiment on studying, a simple questionnaire measure may not accurately tap into what students do as they study in college. This notwithstanding, the SBC takes the first large step towards specifying study behaviors and may provide teachers with a useful format for guiding student learning. Asking students to complete the SBC (or even some items from the SBC) after the first exam in any class taught may provide instructors with a starting point to discussing study behaviors with students. Instructors can correlate the behaviors with exam scores and identify what behaviors are associated with better scores. Sharing the results with the students can help the students modify their study behavior. Taking some class time to discuss the variety of study techniques as outlined in the SBC, *and then detailing what exactly is involved in each method*, may also be critical to helping students do better. In class discussion can provide a key venue to expand on some suggestions, such as providing specifics on how 'studying with a friend' can be optimal. Students can also get a sense of what they are not doing and be alerted to possible problems in their existing ways of studying (Entwistle, 2009).

We hope the SBC can form the basis for additional explorations of what works best, for whom, and when. Whereas the items can remind students of the different ways they can study, serving as a helpful guide, scholars of teaching and learning need to fine tune prescriptions for studying going beyond global recommendations such as 'read the book' to ways to read to achieve the best outcomes. Instructors can advise students to study using the different methods listed in the SBC, but much more focused empirical research is needed to pinpoint which specific behaviors encompassed by each item are the most conducive to learning. Results such as those found in this study compel a closer look at the recommendations instructors make to their students, highlight some critical techniques, and also help set a research agenda for a focus on the best ways to help students learn.

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Attention drainage effect: How background music effects concentration in Taiwanese college students

Peter Tze – Ming Chou[1]

Abstract: The purpose of this study was to see whether different types of background music affect the performance of a reading comprehension task in Taiwanese college students. There are two major research questions in this study. First, this study tries to find out whether listening to music affect the learner's concentration when they are doing a task such as reading. The second research question is whether light classical music is more distracting or less distracting than hip hop music during a reading comprehension task. An experiment involving 133 participants from a medium-size college in southern Taiwan was conducted where the participants performed a reading comprehension task with either light classical music, hip hop music, or with no music in the background. The result of the study showed that music with a higher intensity is more distracting and has a greater effect on task performance and concentration. The result helped formulate the Attention Drainage Effect theory, which is based on Kahneman's (1973) capacity model of attention.

Keywords: effects of background music, reading, attention

I. Introduction.

Living in the 21st century, students today are immersed with more and more technology that allows them to have easier access to different types of media, especially for students in Taiwan. For example, a typical student may not only have television sets, CD players, and computers with Internet at home, they may also have cell phones and portable MP3 players or i-pods where they can listen to music (and sometimes watch videos) when they are away from home. Cool and Yarbrough (1994) found that elementary students and junior high students routinely perform their homework with television or radio playing. Other studies have found that teenagers in the United States are spending an increasing amount of time with different types of multimedia such as television, radio, MP3, video and computer games (Azzam, 2006; Ballard, 2003; Elias, 2005). Therefore, studies on the effects of background media on the learner's performance is an important area to study in some parts of the world because it is a common trend for many young adults to have various types of music or sounds in the background while they are concentrating on tasks such as homework.

There are several studies that looked at the effects of different types of background media on reading and other cognitive tasks such as homework (Armstrong, Boiarsky, and Mares, 1991; Cool and Yarbrough, 1994; Pool, Van der Voort, Beentjes, and Koolstra, 2000; and Pool, Koolstra, and Van der Voort, 2003). One of the models on which this study was based was Kahneman's (1973) capacity model of attention. The basic idea behind Kahneman's (1973) capacity model of attention is that the amount of attention that can be deployed at any one time is limited. In addition, the amount of attention that is required for performing multiple tasks

[1] Wenzao Ursuline College of Languages, 900 Mintsu 1st Road Kaohsiung 807, Taiwan R.O.C.

depends on the demand of each single activity performed in isolation. For example, an easy task demands little effort while a complex or difficult task requires more effort. Therefore, according to the capacity model of attention, one may fail to perform an activity because the supply of attention does not meet the demands. In other words, a task or activity fails because relevant information during the input process was not recognized since that person was unable to pay enough attention to process the information.

Kahneman's (1973) theoretical framework on the capacity model of attention provides a theoretical base on how music could potentially be distracting to a cognitive task such as reading. Unlike the studies found in the review of literature on the effects of background television on cognitive tasks, this study focuses on how different types of music may distract or impair the student's concentration during a reading comprehension task. The main goal of the study is to compare the variables of classical and hip hop music to determine which type of background music creates the most amount of interference and which type of background music creates the least amount of interference. From the goals of this research study, two research questions emerged: (1) Does listening to music effect the learner's concentration when they are doing a task such as reading; and (2) Is light classical music more distracting or less distracting than hip hop music during a reading comprehension task?

II. Review of Literature.

In the study on the effects of background music on concentration, there are several different areas of research that should be examined. First, it is important to look at the study of attention because part of how well a person can concentrate depends on the amount of attention that the person devotes to the task. Therefore, the literature in this area provides the theoretical framework for the study. Then, the study of attention leads to examining past studies that look at the effects of background media on different cognitive tasks such as homework and reading comprehension. This also gives some insights into why students perform better or worse with certain types of background media and how they are affected by it.

A. The Study of Attention.

The interests in the study of attention begin in the late 1950's and the theory that ultimately gained acceptance by researchers today is the limited capacity theory by Kahneman (1973). This theory, which is also known as the capacity model of attention, is used as the theatrical framework by many researchers. The capacity model of attention suggests that there is a limited amount of resources in a person's mental capacity for information processing or for the performance of cognitive tasks (Armstrong et al., 1991; Kahneman, 1973; Pool et al., 2000; Pool et al., 2003). There are two main concepts found in the limited capacity theory. First, the limited capacity theory suggests that attention can be allocated freely among different concurrent activities and attention is increased or decreased based on the arousal level of each activity. Therefore, this arousal energy plays a significant role in the process of attention because any variations in the performance are faithfully reflected in the variations of the arousal level. Second, the ability to perform several mental activities concurrently depends on the demand of each single activity performed in isolation. An easy task demands less effort than a complex or a difficult task, which requires more effort. Because different mental activity imposes different demands on the capacity of our attention, when the supply of attention does not meet the

demands, performance falters or fails. Therefore, the total amount of attention that can be deployed at any given time is limited.

The capacity model of attention was used to explain the findings in research about the effects of background television on cognitive performance, particularly by Armstrong et al. (1991), Pool et al. (2000), and Pool et al. (2003). These researchers made references to Kahneman's (1973) capacity model of attention as a way of explaining the results of their findings. The kinds of experiments that were conducted included the effects of background television on reading comprehension (Armstrong et al., 1991) and the effects of background television on homework performance (Pool et al., 2000; Pool et al., 2003).

Based on the limited capacity theory, there are two types of interference that can affect the participant's performance during the study. The first type of interference is called capacity interference. This type of interference occurs when the amount of attention cannot meet the demand of the two concurrent cognitive activities competing for the same information processing resources (Armstrong et al., 1991; Kahneman, 1973; Pool et al., 2000; Pool et al., 2003). The second type of interference is called structural interference. Structural interference occurs when there are two concurrent cognitive activities that require the same amount of processing resources. However, in order to complete each specific task, more processing resource is needed. Once the capacity of the processing resource is exceeded, then structural interference occurs (Armstrong et al.; Kahneman; Pool et al., 2000; Pool et al., 2003).

B. Studies on Media and Homework.

Several studies have found that many students today are immersed with media technology and this leads to the problem of how well students can study. In a paper presented at the National Media Education Conference, Ballard (2003) surveyed and interviewed students from two Midwestern states in the United Sates. The students gave their self report of media habits and academic performance. The participants in this study reported and perceived that media have a negative effect on academic performance because it is a source of major distraction when completing homework. Television was perceived as a major source of distraction because having a television in your room makes you want to watch it. According to Azzam (2006), it was found that 68% of the students have a television in their bedroom and the students are exposed to on average six and half to eight and half hours of media a day. Also, nearly one-third of the students reported that they talk on the phone, instant message, watch television, listen to the radio or music, or surf the internet for fun while they are doing homework (Azzam, 2006). This is similar to what Cook (1992) found where more than 70% of teens use the internet regularly and that working on a computer offers its share of distractions. The computers have an amplifying effect on the student's study habit because if the students do not care about what they are learning, they are much more likely to multitask. Parents who often check on their children may find them surfing the internet, listening to music and talking on the phone while trying to finish their schoolwork. The findings from these studies support the idea that many students do have the habit of doing homework while engaging in other types of media.

Although the above studies found the frequency of participants who combine doing homework with background media, there were also a number of studies that dealt with the effects of background media on the performance of cognitive tasks. Recent research in this area includes works by Armstrong et al. (1991), Cool and Yarbrough (1994) and Pool et al. (2000, 2003). According to the limited capacity theory, capacity interference can occur when the amount of

attention cannot meet the demand of the two concurrent cognitive activities that are competing for the information processing resources (Armstrong et al., 1991; Kahneman, 1973; Pool et al., 2000, 2003). "Combining homework and television, therefore, may lead to an overload of information that exceeds a person's attentional capacity or resources, with the result that only part of the information can be processed and homework performance decreases" (Pool et al., 2003, p. 362). In theory, this would also happen if the students combine reading with a background media.

There had been several studies in the past that showed how concentration can be affected when media distracters (such as radio and television) were playing in the background. Cool and Yarbrough (1994) found that television and radio did not facilitate nor did it impair the performance of either mathematical or reading assignments. In this study, the students completed fewer math problems when television was used as a distracter than with radio or in silence. One possibility for this result may be because the television programs and the commercials increase the student's arousal, taking some of the concentration away from the given task. The use of different television programs as a treatment was also used in several studies. For example, Armstrong et al. (1991) looked at the effects of different television program types such as TV drama versus TV advertisements while Pool et al. (2000, 2003) used new and old soap operas in their study. In these studies, the authors found that television programs affected the student's ability when performing certain tasks. If was found that when background television was present, the participants had a difficult time in recalling information from a difficult written text (Armstrong et al.,1991) and that television programs extended the time used to complete the assignments by exactly the same amount of minutes that the students spent looking at the screen (Pool et al., 2003).

The studies mentioned above have shown that with the advancement of technology, students in the United States and Europe are increasingly immersed in different kinds of multimedia (Azzam, 2006; Ballard, 2003; Beentjes and van der Voort, 1996; Elias, 2005). Along with this trend is the common practice of listening to music or watching television while doing homework or other cognitive task such as homework or reading. One of the main findings about the effects of background media is that the multimedia interfered with concentration, especially during cognitive tasks. These include the performance of more difficult homework assignments and memorization tasks (Armstrong et al. 1991; Cool and Yarbrough, 1994; Pool et al., 2000, 2003). The capacity model of attention by Kahneman (1973) was used to explain why lower performance was observed. The limited capacity theory suggests that people have a limited amount of information- processing capacity, or attention, and that different cognitive tasks compete for the same resources of information processing. Therefore, elements of the background media may draw attention away from cognitive task such as homework or memorization, making them a secondary task.

Unlike the studies mentioned above, this study focuses on the level of distraction in different types of music. Unlike television, which is both visual and audio, background music consists of only audio. This means that if the students are listening to music while they are doing homework, they will not be tempted to look elsewhere around the room and their eyes will be more focused on the task. This study used two different kinds of music to see if the types of music that the participants are hearing affect their concentration. Similar experiments have been done in the past by Hallam and Price (1998), who suggested that the use of music in classroom may be beneficial to the student's behavior and performance. It is believed that with the right kind of music, music can help make the students less stressed, more relaxed, happier and more

productive. In another study, Hallam, Price, and Katsarou (2002) found that playing music that was perceived as arousing, aggressive and unpleasant had a negative effect on the performance of various cognitive tasks and that it also led to a lower level of reported social behavior. In this case, music can disrupt concentration and becomes a form of non-verbal distraction. The findings from the studies on the effects of background television led to the formulation of the first research question on whether or not background music can affect the learner's concentration like background television. The findings from the studies by Hallam and Price (1998) and Hallam et al. (2002) lead to the formulation of the second research question on whether or not light classical music enhances the performance of a reading comprehension task while other types of music such as hip hop decreases the performance of a reading comprehension task.

III. Methodology.

A. Participants.

The sample of the study was comprised of 133 students from the 2-year technical college division from a medium sized college in Taiwan. Both male and female students participated in the study on the performance of reading comprehension with background music. The participants were all from the Department of English. Because the participants were students in the night school, their age varied from early 20's to mid 50's. The average age of all participants was 31.8 years old. The participants also had a wide range of different professional fields from secretaries to engineers. Many of them work during the daytime and attended school during the night.

B. Obtaining the Assessment Tool.

The assessment tool for the reading comprehension that was used in the study was the reading comprehension component from a TOEFL preparation manual called *30 Days to the TOEFL CB*. In the TOEFL preparation book, there are five practice sections for reading comprehension. In each practice section, there are five reading passages with ten questions for each reading passage. For this study, three reading passages with questions were selected as the assessment tool.

The themes of the reading passages were carefully selected to account for the prior or background knowledge of the participants. The first reading passage was about donating blood. This was selected because blood donation is something that is done in Taiwan, therefore, the participants would not feel unfamiliar with the topic. The second passage was about the Forbidden City, which is the former imperial palace in Beijing, China. Since the participants should have had Chinese history lessons, the participants would also not be unfamiliar with the topic. Finally the third passage was about George Eastman and the Kodak camera. Since Kodak film is common in Taiwan, the participants would be familiar with the product and relate to the reading passage. Past research in reading comprehension has shown that background knowledge aids reading comprehension (Hammadou, 1991, 2000; Lee, 1986; Nassaji, 2003). Since the participants would all be familiar with the topics in the reading, they would have an increased understanding of the selected reading passages. Therefore, this study could focus on assessing the participants' ability to concentrate with background music rather than on the participants' reading ability in the foreign language. The three selected reading passages were word processed into a document where it was printed and photocopied for use on the day of the experiment.

In addition to the assessment tool, this study also used two CDs. The CDs were used as the variable during the study. The first CD was called *Chill with Mozart*, a mix CD with various types and styles of music by Mozart with eleven tracks on the CD with a mixture of string and wind ensemble, vocal, and piano music. Tracks 3 and 5 were not used because since they were of a faster tempo. Classical music selections with faster tempo were not used in order to control the level of distraction from the same type of music. The second CD that was used in this study was a selection of songs from a CD album entitled *Hip Hop Best – The Collection*. This CD contained many of the most popular Hip Hop songs produced in 2006. The CD alternated randomly between male and female artists such as The Black Eyed Peas, The Pussycat Dolls, Nelly Furtado, 50 Cent, just to name a few. These songs mainly consisted of fast or up-beat rhythms and tempos. According to the limited capacity theory (Kahneman, 1973), having this music in the background could potentially affect the participant's concentration because when they are played at a noticeable volume, they take some of the attention away from the reading task.

C. Instrument Identification.

The main instrument used for this study were three reading passages with the thirty reading comprehension questions from a TOEFL preparation book called *30 Days to the TOEFL CBT*. The three reading passages along with its reading comprehension questions were first processed into a Microsoft Word document. Then, the reading passages and the reading comprehension questions were printed out and photocopied into the appropriate number of copies for use during the study. Because there were a total of eight pages for the reading passages and the reading comprehension questions, the documents were made into individual booklets so they could be distributed and collected more easily on the day of the experiment. The scoring of the reading comprehension test was based on the answers provided by the TOEFL preparation book. The answers were found at the end of each practice tests.

D. Procedures.

In this study, there were two experimental groups and a control group. The participants in the control group performed the reading comprehension task without any background music, while the participants in the first experimental group performed the reading comprehension task with classical music in the background and the second experimental group performed the reading comprehension task with hip hop music in the background. The participants were randomly assigned to either the control group or one of the two treatment groups through the use of a random number generator. Random assignment was used in order to make sure that all groups were equal since this study did not include a pre-test to determine the participant's level of English proficiency before the experiment. Three volunteer teachers were asked to help assist with conducting the experiment. All of them were briefed about the procedure of the experiment. For the experiment, the participants had 35 minutes to complete the three reading passages and 30 reading comprehension questions. During the task, music was played at a noticeable volume in the classroom for the 2 experimental groups, with classical music for one and hip hop music for the other. The participants were told by the volunteer teachers to try and ignore the music while they were doing the reading comprehension task. After the allowed time was up, all the booklets were collected by the researcher for scoring and analysis.

E. Analysis.

After the participants finished with the reading comprehension task, the booklets were collected and graded based on the number of correct and incorrect responses. Once the grading was completed, the score of each participant was transferred to a database for analysis in SPSS. The analysis used for this study was a one-way factorial ANOVA. The one-way factorial ANOVA design allows for comparisons of mean scores from multiple groups in a factorial design in order to decide whether the differences between means are due to chance or the effect of the our variable (background music). If a significant difference was found in the ANOVA, a Tukey's HSD (honestly significant difference) was used to determine which of the three groups differ from each other.

F. Assumptions.

A number of assumptions were made about this study. First, an assumption was made that the participants who were listening to Mozart's classical music while attending to the reading comprehension would perform better than the control group (which had no background music) or the group with hip hop music in the background. This was based on past research that showed an improvement in test performance when Mozart music was used (Cockerton et al., 1997; Rauscher et al., 1993). Also, classical music enables students to be calmer and more relaxed (Hallam et al., 2002; Haynes, 2003; Walter, 2003), which could help the students stay calm and perform better in a test situation. The second assumption was that the participants who were listening to hip hop music while attending to the reading comprehension would perform worse than the control group. This was based on past research by Hallam et al. (2002) who found that playing music that was perceived as arousing, aggressive and unpleasant can disrupt concentration and had a negative effect on performance of the cognitive task.

IV. Results of the Study.

The purpose of this study was to explore whether background music has a distracting effect during a reading comprehension task. There were a total of 133 participants in the study. A one-way factorial ANOVA was used to analyze the results for the research questions on whether different types of background music, especially light classical music and hip hop music, have an effect on concentration during a reading comprehension task. The mean score for the control group was 67.67 with a standard deviation of 14.293 while the mean score for the classical music group was 64.41 with a standard deviation of 14.019. However, the mean score for he hip hop music group was a bit lower at 58.32 and a standard deviation of 14.412.

In the one-way factorial ANOVA, the comparison of the mean score among the control group (M=67.67, SD=14.293), the classical music group (M=64.41, SD=14.019) and the hip hop music group (M=58.32, SD=14.412) yielded a statistical significance, $F(2,130) = 5.431$, $p<0.05$. This meant that there was a difference in the performance of the reading comprehension task due to the different types of music in the background (see Table 1). Because a significant difference was found in the one-way factorial ANOVA, a Post Hoc Test was performed.

Table 1. ANOVA Summary Table.

Source	SS (variance)	Df	Mean Square	*F*	Sig.
Group	1999.066	2	999.533	5.431	0.005
Error	23924.182	130	184.032		
Total	562149.000	133			

Using Tukey's HSD, a significant difference at the .05 alpha level was found between the control group and the experimental group with hip hop music. However, the reading comprehension score for the control group was not significantly different than the classical music group. In addition, the reading comprehension score for the classical music group was also not significantly different than the reading comprehension score hip hop music group (see Table 2).

Table 2. Post Hoc Summary.

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Control	Classical	3.26	2.876	0.496	-3.56	10.08
	Hip hop	9.35*	2.876	0.004	2.53	16.17
Classical	Control	-3.26	2.876	0.496	-10.08	3.56
	Hip hop	6.09	2.892	0.093	-0.77	12.95
Hip Hop	Control	-9.35*	2.876	0.004	-16.17	-2.53
	Classical	-6.09	2.892	0.093	-12.95	0.77

Based on observed means
* $p<0.05$

V. Discussion and Conclusion.

This study showed that the performance of a cognitive task such as reading can be affected by the type of music played in the background. In this study, hip hop music had a significant effect on the performance of the reading comprehension task when compared to the scores of the participants who performed the reading comprehension task with no music in the background. The classical music group in the experiment also performed slightly lower than the control group. This showed that the participant's concentration in both of the experimental groups were more or less affected by the music as described in the limited capacity theory (Kahneman, 1973).

According to the results of the study, the findings yielded some important information. It showed that playing music such as hip hop music in the background has a greater effect on the concentration during the reading comprehension task when compared to light classical music or with no music. However, it was surprising to find that the control group performed better than the classical music group. Perhaps it was because the melodies in the light classical music that the participants heard became a form of distraction. However, this was still in accordance with the original hypothesis and with the idea that music that is perceived as distracting will affect task performance and concentration.

In the past studies about the effect of background television on different cognitive tasks, the authors found that different types of television programs distract the participants (Armstrong

et al., 1991; Pool et al., 2000; Pool et al., 2003). One of the results was that the television programs extended the time used to complete the assignments by exactly the same amount of minutes that the students spent looking at the screen (Pool et al., 2003). However, one cannot really say that the extended time needed to complete the assignments was because of the limited capacity theory. In this situation, the participants had only shifted their attention from the assignment to the television. It is only when the participants are focusing on the assignment but also hearing sounds from the television at the same time does the limited capacity theory apply because the sounds the participants heard in the background evoke some arousal in the participants, which may draw some attention away from their cognitive task.

The limited capacity theory says that capacity interference occurs when the amount of attention cannot meet the demand of the two concurrent cognitive activities competing for the same information processing resources (Armstrong et al., 1991; Kahneman, 1973; Pool et al., 2000; Pool et al., 2003). But unlike the studies done by Armstrong et al. (1991), Cool and Yarbrough (1994) and Pool et al. (2000, 2003), this study did not involve the visual distraction of a television. In the current study, the students were not trying to do the reading comprehension task while listening or trying to understand the music that they were hearing in the background. Their focus was only on the reading comprehension task. Because the participants were told to ignore the background music during the reading comprehension task, the distraction effect occurs not because the participants were listening to the music, but because the attention was unconsciously being "drained" from the participants. This could be a new type of interference in the limited capacity theory called the attention drainage effect.

The attention drainage effect occurs when a distraction causes the attention capacity of a person to be unconsciously reduced or "drained" while they are performing a single cognitive task. The size of distraction depends on how arousing the distracting sound was. For example, in this study, the hip hop music that was played had fast tempos with heavy bass beats in the background. This would be something we would consider high intensity, which in turn "drained" a lot more of the attention from the participants in the study. This could be the reason why in this study, the mean score for the experimental group with hip hop music in the background (58.32) was significantly lower than mean score for the control group (67.67). On the other hand, the soft classical music that was used in the study was slower in tempo and did not have any attention grabbing beats in the background. However, the soft classical music may have contained melodies that grabbed the attention of the listener. However, because of its low intensity, this could explain why the mean score in the experimental group with classical music in the background (64.41) were only slightly lower than the mean score for the control group (67.67).

From the finding of this study, we can conclude that the best way for students to study is to study in a quiet room. The participants who scored the highest in the reading comprehension task were the control group who performed the reading task in silence. A quiet or silent room would be the best condition for learning because there are fewer distractions that would take the attention or focus away from the task at hand. This is important in today's society since our daily lives are immersed in technology. Sometimes having the television set or the stereo in the bedroom is a distraction itself because teenagers may be tempted to turn them on while they are trying to study. Once turned on, the attention drainage effect could occur even if the students choose not to pay any attention to them. Perhaps future studies about the attention drainage effect in other contexts can be explored. With this study, hopefully teachers and students are enlightened and will make better choices to enhance their learning condition. Although this study found that hip hop music was more distracting than light classical music, perhaps future studies

could also explore the distraction effects of music that contained the participant's native language because the participants would be able to fully understand the lyrics. Also, other types of background music could be explored in future studies such as country music or jazz.

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How student satisfaction factors affect perceived learning

Celia C. Lo[1]

Abstract: Data from students in two sections of a general education course offered at a research university in spring 2009 were used to explore whether student satisfaction factors are associated with perceived learning as rated by students. A list of 22 elements in the learning environment was explored. The 22 were used in creating 3 satisfaction factors related to the roles of student, instructor, and policy. The study showed all of these satisfaction factors to be associated with higher rates of perceived learning, measured via students' expectations of academic success. The findings' implications for practice are briefly discussed.

Keywords: student satisfaction, perceived learning, learning environment

I. Introduction.

In contemporary higher education, the role played by the classroom student has switched from that of passive receiver to that of active learner, under the *learning paradigm* that university professors everywhere are gradually adopting (Barr and Tagg, 1995). This new paradigm's constructivist approach is accompanied by the expectation that students take responsibility for their own learning by involving themselves in knowledge construction (Chermak and Weiss, 1999; Prince, 2004). While, under this paradigm, the university instructor has had to yield center stage to become him- or herself a learner in and out of the classroom, the instructor now becomes more important than ever in the learning process, because it falls to him or her to create the environment that fully realized student learning requires (Barr and Tagg, 1995). Instructors do matter, for their role as course designer; their creativity facilitates student learning (Barr and Tagg, 1995; Lo and Olin, 2009a, 2009b; Lo and Prohaska, 2009; Umbach and Wawrzynski, 2005).

To become effective, less-than-optimal learning environments should be redesigned to include a variety of learning activities and opportunities shown to foster achievement of the desired learning outcomes. Additionally, instructors should provide evidence of student learning by assessing students' understanding and their demonstration of desired results (Hersh, 2007). Student demographics have changed greatly in recent years, as have teaching and learning technologies; because the student population is increasingly diverse—and unevenly fascinated by these technologies—instructors seeking to obtain accurate learning outcomes may need to use a variety of assessment methods, in deference to the students' differential learning styles and thinking paths (Bauman, Bustillos, Bensimon, Brown II, and Bartee, 2005; Oblinger, 2003; Williams, Berger, and McClendon, 2005). Among their options are direct assessment methods evaluating how well students achieve desired outcomes and also indirect assessment methods, in particular surveys (written or interview) eliciting students' opinions throughout a course. Such data collected from students sheds light on their own perceptions of learning and of the

[1] Department of Criminal Justice, University of Alabama, Box 870320, Tuscaloosa, AL 35487-0320, clo@ua.edu

effectiveness of the learning environment created by the instructor, and they are also helpful for ongoing course improvement.

Previous studies show that students' academic success relies on certain features of learning environments, notably on small-group work and problem-solving exercises (Gokhale, 1995; Johnson, Johnson, and Smith, 2007; Jones, 2006; Nelson, 1994; Olivares, 2005; Schamber and Mahoney, 2006; Springer, Stanne, and Donovan, 1999). Only a few previous studies, however, explicitly explored the student's roles in transforming learning environments to enhance learning; such transformation is itself a learning process (Arbaugh and Duray, 2002; Mbarika, Sankar, and Raju, 2003; Winberg and Hedman, 2008). One role necessarily belonging to the student is to capitalize on challenges posed through instructional methods such as problem-solving exercises, in order to strengthen their critical thinking and creativity. In an environment that is truly student centered, students are continually confronted with stimulating instructional methods and related environmental features, generating student satisfaction that may be linked to successful academic outcomes (Ocker and Yaverbaum, 2001).

Student satisfaction is the subjective perceptions, on students' part, of how well a learning environment supports academic success. Strong student satisfaction implies that appropriately challenging instructional methods are serving to trigger students' thinking and learning. Important elements in student satisfaction are likely to concern the role of the instructor and of the students; these elements may be central to student learning. The present study explored some of these elements, in an effort to begin identifying the ones most helpful for ensuring students' academic success (Winberg and Hedman, 2008). The study hypothesized that several distinct student satisfaction indicators would be positively related to student learning. It employed a survey, administered in spring 2009, through which enrolled students rated how strongly they agreed with statements describing environmental features of a particular redesigned course at a large research university. The student satisfaction indicators were developed for the study by empirically grouping related environmental features of the course.

II. Methods.

A. Design and Sample.

A hybrid course blending face-to-face, in-class meetings with online delivery of course materials was the focus of the present study. The course was of completely new design. It was offered at a large research university in the southeastern United States in spring 2009. Titled "Analysis of Social Problems," it was accepted by the university as a social/behavioral course fulfilling a requirement of the general education curriculum. The redesign of the course was intended to involve students more deeply in critical thinking, theory application, and synthesis of information, better preparing them to become lifelong learners. In the redesigned course, students engaged in collaborative learning activities and class discussions while in the classroom once a week for 75 minutes. They also took exams and completed weekly homework assignments, each through online delivery via eLearning, the learning management system supported by Blackboard. Also via eLearning, students received grades each week for their online assignments, group participation, and class participation, a means of monitoring academic progress. The course had been structured to provide an environment that was student centered and promoted active and collaborative learning. (For a detailed description of the redesigned course see Lo, 2009 and Lo, Johnson, and Tenorio, 2009.)

Data for the present study came from a survey designed to measure students' satisfaction with a particular course and instructor, along with their expectations of academic success in that course. Originally, the university had used the particular survey instrument in evaluating the online courses that are gradually becoming popular on campus; the instrument was viewed as appropriate for evaluating a hybrid course as well. In the second week of March 2009, about half way into the semester, two graduate assistants helping with the redesigned hybrid course administered the survey to their students in class, while the researcher, who was also the course instructor, attended a professional conference off campus. Students were told the survey would be used to improve the course and that no identifying information should be placed on the questionnaire. This survey was one of several indirect assessments that generated data for possible use in improving the redesigned course; the instrument did not, therefore, cover demographic variables (for example, gender or race). The course had 114 registered students. Only 78 filled out the questionnaire, a low number probably attributable to low attendance during a week that immediately preceded the university's scheduled spring break; the researcher had not previously found large numbers of students opting out of surveys of this kind. Students were not penalized for skipping the survey.

B. Measures.

Students were asked to answer 22 questions about satisfaction with the course and instructor. They were asked to use a 5-point response scale with the following answers: 1 *strongly disagree*, 2 *disagree*, 3 *neither*, 4 *agree*, and 5 *strongly agree*. Each question highlighted some feature of the learning environment in the course. Table 1 presents the actual questions asked.

To make the resulting data manageable and to identify reasonable latent dimensions of student satisfaction, the researcher performed exploratory factor analysis for all 22 questions. Principal component analysis with varimax rotation produced results indicating an underlying structure of 3 factors capable of explaining 66% of the cumulative variance of all items. None of the factor loadings was lower than .5. Table 1 shows the results of the factor analysis.

The first of the 3 factors described students' levels of agreement that the instructor's performance improved student learning in the course. Students recognized the role the instructor played in encouraging students to engage course materials and in using appropriate instructional methods to direct and support the learning process. This factor comprised 8 distinct items, and the reliability of the factor was very high, the Cronbach's alpha equals to 0.93. The 8 items were summed to yield a measure for a variable labeled *satisfaction with instructor's directions and support.* Among the surveyed students, measures for this variable ranged from 8 to 40, with a mean of 35.5 and a standard deviation of 5.3. The measures indicate that respondents generally were happy with the instructor's directions and support.

The second factor captured the availability, in the course, of environments in which students could actively create their own academic success, as demonstrated by sufficient challenge of their understanding of course materials and their more general academic growth and development of scholarly competence. The second factor comprised a 9-item index with high internal consistency (alpha = 00.94) that was labeled *satisfaction with own commitment to learning.* Among the students, scores for the second factor ranged from 12 to 45, with a mean of 36.5 and a standard deviation of 7.5. These measures indicate high levels of satisfaction among the

Table 1. Factor Analysis Results.

		Pattern Matrix		
	h2	Factor I	Factor II	Factor III
Satisfaction with Instructor's Directions and Support (Cronbach's Alpha = 0.93)				
The instructor encouraged students to ask questions.	0.67	0.76		
The instructor provided assignments that required critical and creative thinking.	0.72	0.67		
The instructor treated me fairly.	0.73	0.76		
The instructor used appropriate technology to present material clearly.	0.72	0.78		
The instructor was accessible to students.	0.69	0.59		
The instructor used collaborative groups/teams.	0.63	0.63		
This course was well organized.	0.76	0.67		
The instructor was able to utilize the technology to provide a supportive environment to accomplish course objectives.	0.69	0.60		
Satisfaction with Own Commitment to Learning (Cronbach's Alpha=.94)				
The Instructor consistently informed students of their progress.	0.66		0.73	
The instructor challenged me to understand ideas and concepts.	0.75		0.70	
The instructor directed students to multiple academic resources.	0.76		0.77	
The instructor was an effective online communicator.	0.68		0.55	
The course challenged me intellectually.	0.75		0.71	
I have become more competent in this area because of this course.	0.70		0.75	
The instructor clearly communicated concepts.	0.74		0.52	
The instructor was supportive of academic needs.	0.61		0.58	
The instructor evidenced a personal interest in my success.	0.61		0.72	
Satisfaction with Course Policies (Cronbach's Alpha=.90)				
The instructor provided prompt feedback to keep students on track with course expectations.	0.75			0.65
The grading system and other course policies were communicated clearly.	0.80			0.85
The rationale for grading decisions was clearly articulated by the instructor.	0.83			0.82
The instructor was able to utilize the technology to encourage and promote student dialogs and queries regarding course materials and topics.	0.70			0.65
The instructor syllabus was accurate and useful.	0.71			0.60
Total Explained Variance: 65.94%		53.59	6.39	5.96

students with the degree to which the instructor had challenged them and helped them improve their learning.

The third factor concerned the course syllabus and its clarity, course grading and its reasonableness, performance feedback and its timeliness, and the use of technology and its appropriateness. The survey asked the students how satisfied they were with each of the foregoing. Their responses on the 5-item index yielded high scores for the study variable *satisfaction with course policies.* Students' scores ranged from 5 to 25, with a mean score of 21.3 and a standard deviation of 4. This factor, like the others, also demonstrated good reliability (alpha = 0.90).

Students' academic success was measured by asking them the grade they expected to receive for the redesigned hybrid course: 0 *F*, 1 *D*, 2 *C*, 3 *B* or 4 *A*. No respondent anticipated receiving a D or F, and only one expected to receive a C. Therefore, the *perceived academic success* variable was recoded as a dummy variable with 1 indicating *A* and 0 indicating *not A*.

III. Results.

The present study asked whether 3 student satisfaction factors could help explain students' perceived academic success in a redesigned hybrid course. Correlations among the 3 satisfaction factors showed them to be highly related to each other. The correlation coefficients ranged from 0.72, for *satisfaction with own commitment* and *satisfaction with course policies*; to 0.75, for *satisfaction with instructor* and *satisfaction with course policies*; to 0.82, for *satisfaction with instructor* and *satisfaction with own commitment*. In light of the factors' strong relationships, the researcher conducted separate directional *t*-tests to determine whether each factor was related to perceived academic success. The results confirmed the hypothesis; they indicated that students expecting an A grade were more likely than students expecting a B or C grade to express satisfaction with the instructor's directions, with their own commitment to learning, and with the various course policies. Specifically, mean differences found between the two groups of students were 2.26 ($t = 1.84$, $p < 0.05$) for reported satisfaction with instructor's direct directions and support; 3.75 ($t = 2.18$, $p < 0.05$) for students' own commitment to learning; and 2.61 ($t = 2.49$, $p < 0.01$) for the course policies.

IV. Discussion and Conclusion.

Under the contemporary learning paradigm in American higher education, university instructors are encouraged to innovate when it comes to the learning environment, introducing truly appropriate instruction methods able to facilitate the construction of knowledge by students (Barr and Tagg, 1995; Lo and Olin, 2009a). Students of differential backgrounds, beliefs, attitudes, and learning styles, however, may not all perceive that all the introduced features of the learning environment are crucial to, or even useful in, learning; they may variously show high and low levels of satisfaction with a course (Berg, Christina, Bergendahl, and Lundberg, 2003; Kasturiarachi, 2004; Limon, 2001). Where a low level of student satisfaction exists, there is often "unbalance" between the challenges imposed by the course and the student's possession of skills suitable to meet these challenges (Winberg and Hedman, 2008). Where a high level of student satisfaction exists, student learning may be enhanced. The present study was interested in identifying elements of the learning environment possibly linked to better student learning.

The study located 3 different satisfaction factors serving as predictors of perceived student learning. The first concerned instructor performance, the second the student's own commitment to learning, and the third the course policies. The study's results show that the student respondents expressed high levels of satisfaction with a learning environment that required instructor and students alike to assume responsibility for learning. The results support earlier findings showing that teacher performance contributes crucially to subjective perceptions of student learning (Jaarsma, de Grave, Muijtjens, Scherpbier, and van Beukelen, 2008; Munz and Munz, 1997). Clear and fair course policies communicated to students in effective ways also help further student learning (Nolen, 2003). But as the present results also attest, even though the instructor—as the designer of the course—is held responsible for whatever learning-environment

features characterize a given course, students' perceptions about those features and about the challenges they pose—whether it be to master course materials or to build one's general capacity for academic success—also influence how students perceive their own learning (Mbarika, et al., 2003).

This research examined students' perceptions concerning what instructional and other features actually work for them in a learning environment. Its linking of specific aspects of student satisfaction to perceived learning illustrated the important roles of student, instructor, and course. Because the data were collected from students in one course at one university, however, the results may not be generalizable to other students, whether enrolled in other courses at the same university or enrolled at other universities. Nevertheless, the empirical relationships found between the 3 measured student satisfaction constructs and perceived academic success augment the existing literature on the learning environment's importance for student learning. In addition, cautious consideration of the present results is needed due to the timing of data collection. At mid-semester, students may be in mid-process when it comes to formulating likes and dislikes among course features, and they may not have a particularly solid idea of what their final grade will be. Moreover, the small sample used in the present study precluded use of multivariate techniques of data analysis. Future studies should employ larger samples while continuing to seek out environmental features able to enhance student satisfaction, in light of the present finding that high levels of student satisfaction tend to be associated with better student learning.

In a student-centered environment, students' perceptions of what constitutes adequate intellectual challenge are situational; these perceptions must not be overlooked as instructors refine environments to facilitate learning. The present study's results clearly indicate a need to balance course designers' perceptions of students' skills and abilities with students' own perceptions of their skills and abilities. Balance will help university faculties facilitate all the learning possible among their students.

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Course assessment using multi-stage pre/post testing and the components of normalized change

David R. Dellwo[1]

Abstract: A multi-stage pre/post testing scheme is developed to gauge course effectiveness using gain and loss components of normalized change. The components, unlike normalized change itself, can be used to distinguish courses that promote acquisition as well as retention of information from courses that promote acquisition at the expense of retention or retention at the expense of acquisition. The technique is employed to study the effectiveness of a course in differential calculus taught using the studio method, a form of interactive engagement.
Keywords: course assessment, multi-stage, pre/post testing, normalized change, normalized gain, normalized loss, studio method, interactive engagement.

I. Introduction.

Assessment of learning is a recurrent and sometimes controversial theme in higher education. The literature is replete with conflicting advice on how best to conduct an assessment, see Hake (2004, 2006) and Suskie (2004a, 2004b). However, pre- and post-testing evaluation is often cited as a commonsense approach. Perhaps no one has expressed this point of view more graphically than Bond (2005), who wrote in a Carnegie Perspective:

> *If one wished to know what knowledge or skill Johnny has acquired over the course of a semester, it would seem a straightforward matter to assess what Johnny knew at the beginning of the semester and reassess him with the same or equivalent instrument at the end of the semester.*

Theoretical justification for the technique was provided by Willet (1989a, 1989b, 1994, 1997) and Rogosa (1995). In particular, they demonstrated that additional rounds of pre- and post-testing dramatically improve the method's reliability.

The multi-stage assessment scheme employed here partitions the course into several instructional periods. Each period is bracketed by pre-instruction and post-instruction tests, with the post-test for one period serving as the pre-test for the next period. This arrangement creates an opportunity to study the marginal (snapshot) effectiveness of individual instructional periods or alternatively to combine individual periods and study the cumulative (longitudinal) effectiveness of several combined instructional periods.

The two analyses provide information on different aspects of course effectiveness. A cumulative analysis is used to determine whether repeated exposure to course material over multi-periods of instruction increases the likelihood of students acquiring and retaining baseline knowledge. A marginal analysis is used to determine whether course design is flexible enough to

[1] Department of Mathematics and Science, United States Merchant Marine Academy, Steamboat Road, Kings Point, NY 11024, dellwod@usmma.edu

continually rebalance acquisition and retention efforts as student performance changes from one instructional period to the next.

The method used to quantify changes in performance is a definitive feature of any pre/post testing design. The following index is frequently used to measure the change in group performance from a pre-instruction to a post-instruction test.

$$g = \frac{\left\{\begin{matrix}average\ grade\ on\ the\\ post\text{-}instruction\ test\end{matrix}\right\} - \left\{\begin{matrix}average\ grade\ on\ the\\ pre\text{-}instruction\ test\end{matrix}\right\}}{100 - \left\{\begin{matrix}average\ grade\ on\ the\\ pre\text{-}instruction\ test\end{matrix}\right\}} \tag{1}$$

The ratio in (1), often referred to as normalized change, expresses the difference between average test scores as a fraction of the maximum possible difference between these scores.

Hovland et al. (1949) used (1) to quantify the effectiveness of instructional films. Hake (1998) used (1) to gauge the relative effectiveness of various instructional techniques employed in introductory physics courses. Cummings et al. (1999) used (1) to evaluate innovations in studio physics. Meltzer (2002) used (1) to explore the relationship between mathematics preparation and concept learning in physics. These important studies relied on the intuitive notion that when comparing two courses:

The course with the larger value of normalized change (g) is the more effective course. (2)

Unfortunately, as demonstrated here, this classic assessment rule can lead to counterintuitive conclusions.

This paper employs an alternate assessment rule obtained by decomposing normalized change (1) into component measures:

$$g = G - \gamma L \tag{3}$$

Here G is a normalized gain measuring the likelihood that a mistake on the group's pre-instruction test is corrected on the post-instruction test. Similarly, L is a normalized loss measuring likelihood that a correct response on the group's pre-instruction test is rendered incorrect on the post-instruction test. The non-negative parameter γ is a renormalization factor dependent on the population's pre-instruction performance. Consequently, (3) expresses normalized change (1) as the difference between two non-negative indices, normalized gain and renormalized loss. The decomposition (3) gives rise to an alternative assessment rule that avoids the counterintuitive conclusions associated with (2), and reads in part:

The course with the larger value of normalized gain (G) and smaller value of renormalized loss (γL) is the more effective course. (4)

The derivation of (3) is discussed in the next section. Section III discusses assessment standards and value-added measurement of effectiveness expressed in terms of the components of normalized change. Multi-stage assessment is discussed in section IV. The application is presented in section V. The concluding remarks in section VI discuss the implications of (3) for

past and future research.

II. Normalized Change and Its Components

Normalized change (1) for a group of N students taking a diagnostic test with M questions can be expressed in the following form:

$$g = \frac{\theta_{post} - \theta_{pre}}{1 - \theta_{pre}} \tag{5.a}$$

where

$$\theta_{pre} = \frac{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ correctly\ \ on\ the\ pre\text{-}instruction\ test\end{array}\right\}}{NM} \tag{5.b}$$

$$\theta_{post} = \frac{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ correctly\ \ on\ the\ post\text{-}instruction\ test\end{array}\right\}}{NM}. \tag{5.c}$$

The derivation of (3) is based on the following observation.

$$\left\{\begin{array}{l}Number\ of\ questions\\ students\ answer\ correctly\\ on\ the\ post\text{-}instruction\ test\end{array}\right\} - \left\{\begin{array}{l}Number\ of\ questions\\ students\ answer\ correctly\\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}$$

$$= \left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ correctly\ on\ the\ post\text{-}instruction\ test\\ and\ incorrectly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\} - \left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ incorrectly\ on\ the\ post\text{-}instruction\ test\\ and\ correctly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}$$

This observation together with definitions (5.b) and (5.c) imply

$$\theta_{post} - \theta_{pre} = G(1 - \theta_{pre}) - L\,\theta_{pre} \tag{6}$$

where

$$G = \frac{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\ correctly\ on\ the\ post\text{-}\\ instruction\ test\ and\ incorrectly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}}{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ incorrectly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}} \tag{7.a}$$

$$L = \frac{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\ incorrectly\ on\ the\ post\text{-}\\ instruction\ test\ and\ correctly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}}{\left\{\begin{array}{l}Number\ of\ questions\ students\ answer\\ correctly\ on\ the\ pre\text{-}instruction\ test\end{array}\right\}}. \tag{7.b}$$

The numerator in (7.a) is the number of questions on which students demonstrate a gain in knowledge and the denominator is the maximum possible gain. Consequently, the ratio G is a

normalized gain measuring the conditional probability (Ross, 2004) that a mistake on the group's pre-instruction test is corrected on the post-instruction test.

Similarly, the numerator in (7.b) is the number of questions on which students demonstrate a loss in knowledge and the denominator is the maximum possible loss. Consequently, the ratio L is a normalized loss measuring the conditional probability that a correct response on the group's pre-instruction test is rendered incorrect on the post-instruction test.

In summary, equation (6) expresses change in test score as a difference between the fraction of questions on which students demonstrate a gain in knowledge and the fraction on which they demonstrate a loss of knowledge. Finally, to obtain (3) define

$$\gamma = \frac{\theta_{pre}}{1 - \theta_{pre}} \tag{7.c}$$

and divide (6) by $(1-\theta_{pre})$. The scaling factor (7.c) is a non-negative parameter whose value is larger than 1 if $\theta_{pre} > ½$, equal to 1 if $\theta_{pre} = ½$, and smaller than 1 if $\theta_{pre} < ½$. The scale γ is referred to as the group's aspect ratio and specifies the odds that the group gives a correct answer on the pre-instruction test.

III. Value-Added Measurement of Course Effectiveness.

The following criteria are used in this study to assess the relative effectiveness of two courses (A and B).

i. *A is more effective than B if:*
$$\begin{cases} G_A > G_B \text{ and } \gamma_A L_A \le \gamma_B L_B \\ \text{or} \\ G_A \ge G_B \text{ and } \gamma_A L_A < \gamma_B L_B \end{cases} \tag{8.a}$$

ii. *A and B are equally effective if:* $G_A = G_B$ *and* $\gamma_A L_A = \gamma_B L_B$ (8.b)

iii. *A and B are not comparable if:*
$$\begin{cases} G_A > G_B \text{ and } \gamma_A L_A > \gamma_B L_B \\ \text{or} \\ G_A < G_B \text{ and } \gamma_A L_A < \gamma_B L_B \end{cases} \tag{8.c}$$

Notice, (8.a) restates (4) in algebraic form and defines a consistent ordering of courses in the sense that if A is more effective than B and B is more effective than C, then A is more effective than C. Also, (8.c) offers an assessment option not offered by (2): namely, some courses are not comparable.

If A is a more effective course than B in the sense of (8.a), then $G_A - G_B$ is a value-added measure of improved effectiveness due to larger gains, see (Suskie, 2004a). Also, $\gamma_B L_B - \gamma_A L_A$ is a value-added measure of improved effectiveness due to smaller renormalized losses experienced by students in the more effective course. Consequently,

$$g_A - g_B = (G_A - G_B) + (\gamma_B L_B - \gamma_A L_A) \tag{9}$$

is a value-added measure of the total improvement in effectiveness when (8.a) or equivalently (4)

applies and one course can claim the larger gains as well as the smaller renormalized losses.

On the other hand, (9) is not a measure of total improvement in effectiveness when (8.c) applies and neither course can claim both larger gains and smaller renormalized losses. In this case, one of G_A - G_B and $\gamma_B L_B$ - $\gamma_A L_A$ is positive while the other is negative; so (9) is the difference between two value-added measures:

$$g_A - g_B = (G_A - G_B) + (\gamma_B L_B - \gamma_A L_A) = \begin{cases} -(G_B - G_A) + (\gamma_B L_B - \gamma_A L_A) & \text{if } (G_A - G_B) < 0 \\ (G_A - G_B) - (\gamma_A L_A - \gamma_B L_B) & \text{if } (\gamma_B L_B - \gamma_A L_A) < 0 \end{cases} \quad (10)$$

That is, g_A - g_B is a difference between added effectiveness due to larger gains in one course and added effectiveness due to smaller renormalized losses in the other course.

Finally, in view of (10), the classic assessment rule (2) declares A more effective than B when either of the following applies.

- The added effectiveness due to smaller renormalized losses in A offsets the added effectiveness due to larger gains in B.
- The added effectiveness due to larger gains in A offsets the added effectiveness due to smaller renormalized losses in B.

Of course, neither of these alternatives can form the basis for a pedagogically sound strategy to improve learning.

IV. Multi-Stage Assessment.

Most pre/post assessment regimes employ a single instructional period bracketed by identical or nearly identical pre- and post-instruction tests. See (Hake, 1998), (Cummings et al., 1999), (Meltzer, 2002), (Libarkin et al., 2005), and (McConnell et al., 2006). Unfortunately, these single-stage methods, relying on two tests, cannot gather enough data to detect inevitable fluctuations in learning that result from imperfect acquisition and retention of course material. For example, a round of pre/post testing cannot detect a difference in performance between a student who never learns a key skill and a student who learns and then forgets that skill during the term. Similarly, a round of testing cannot distinguish between a student who retains pre-instruction knowledge throughout the term and a student who forgets and then relearns that knowledge during the term.

Multi-stage regimes track fluctuations in learning and refine the assessment process by combining several single-stage regimens. For example, the two-stage scheme diagramed in Figure 1 can detect a one-time loss and reacquisition of course material as well as a one-time acquisition and subsequent loss of material. It is important to note that the inter-period diagnostic test (T_1) serves as a post-instruction test for the first stage as well as a pre-instruction test for the second stage.

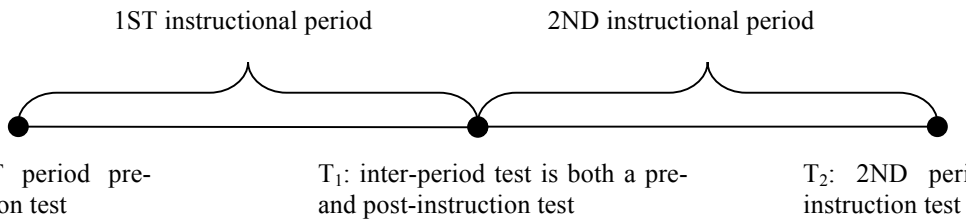

Figure 1. The first stage of a two-stage assessment scheme is bracketed by pre- and post-instruction tests T_0 and T_1. The second stage is bracketed by T_1 and T_2. The diagnostic tests are identical or nearly identical instruments designed to assess learning of key skills and concepts.

A. Marginal Analysis of Multi-Stage Schemes.

A marginal analysis uses the components of normalized change (3) to tabulate changes in performance relative to pre-instruction levels at each stage of a multi-stage scheme. This technique can be used to study variations in effectiveness from one instructional period to the next for a particular course. Or alternatively, the approach can be used to compare effectiveness of two courses during a particular instructional period.

Notice that for a marginal analysis the standard by which effectiveness is determined changes from period to period. For example, a marginal analysis of the two-stage scheme shown in Figure 1 might use gains and losses from T_0 to T_1 as well as from T_1 to T_2 to study variations in effectiveness for a single course. In this situation, improving effectiveness from the first to the second instructional period means the course was more effective in boosting learning relative to performance on T_1 than it was relative to performance on T_0.

As a second example, the marginal analysis of a two-stage scheme might be used to compare the effectiveness of two courses in promoting learning relative to T_0 as well as to T_1. In this situation, it may happen that one of the two courses is more effective in promoting learning relative to T_0 while the other is more effective in promoting learning relative to T_1.

B. Cumulative Analysis of Multi-Stage Schemes.

A cumulative analysis tabulates changes in performance over several successive stages of a multi-stage scheme by measuring gains and losses from the initial pre-instruction test to each of the subsequent post-instruction tests. In contrast to the marginal analysis, a cumulative analysis uses performance on T_0 as a fixed standard from which to gauge change over successive periods from T_0 to T_1, from T_0 to T_2, from T_0 to T_3, etc.

This technique can be used to compare a particular course's effectiveness during the single period from T_0 to T_1 with its effectiveness during the two periods from T_0 to T_2 in helping students rectify weaknesses revealed by their performance on the initial diagnostic test, T_0. Alternatively, the approach can be used to study the relative effectiveness of two courses in promoting learning over the first two, three, or more instructional periods following the initial diagnostic test.

V. Application.

The illustration presented here uses multi-stage pre/post testing to study the effectiveness of a course in differential calculus taught by the author to 125 plebes at the United States Merchant

Marine Academy over a seven-year period from the fall of 1999 to the fall of 2005. The course was taught using the studio method, a form of interactive engagement; see (Ecker, 1996a, 1996b), (Hake, 1998) and (Sokoloff et al., 1997). Methodology and other details are discussed first, in the next section, before presenting results.

A. Study Procedures.

This section discusses details of the teaching methods, the pre-instruction test, the pre- and post-instruction testing, as well as the student participants.

Teaching Method. Studio sections of the differential calculus course were taught using a modified form of the integrated lecture-laboratory-recitation design envisioned by Ecker (1996a, 1996b). In the classic studio setting, small groups of students work on in-class activities while receiving constant guidance and help from the instructor. There is essentially no lecture, and although there is homework, there is little use of out-of-class projects requiring written and/or oral reports.

The modified studio format used here incorporated instructor demonstrations of interactive Maple applications as well as out-of-class group projects. Instructor demonstrations exploited the computer algebra system's facility to perform "what if" scenarios in real time, giving students the opportunity to rapidly and efficiently test preconceptions and correct misconceptions. Often the demonstrations were used in conjunction with classic studio activities from the text *Studio Calculus* (Ecker, 1996b). On the premise that *teaching is the best way to learn*, the out-of-class group projects required studio students to construct interactive multimedia learning aids for use by other students.

Pre-Instruction Test. The pre-instruction (diagnostic) instrument included twenty-four multiple-choice questions concerning core concepts and skills associated with differential calculus. Specific topics include functions, limits, continuity, differentiation, as well as applications; see (Dellwo, 2000) for details. The diagnostic questions were typical of practice problems used to prepare for standardized exams. However, the questions were not vetted to the same degree as those developed for the Force Concept Inventory (Hestenes et al., 1992) or the more recent Calculus Concept Inventory (Epstein, 2007).

Pre- and Post-Instruction Testing. Each year, the pre-instruction test was administered on the first day of class. Post-instruction testing employed a regimen of quizzes intended to give each midshipman two post-instruction opportunities to answer the twenty-four diagnostic questions. Typically:

- The first post-instruction quiz was composed of diagnostic questions on topics covered in class during the first or second week of the term.
- The second post-instruction quiz was composed of questions repeated from the first post-instruction quiz and diagnostic questions on topics covered during the second or third week of the term.
- The third post-instruction quiz was composed of questions repeated from the first post-instruction quiz but not used on the second post-instruction quiz, questions repeated from the second post-instruction quiz, and diagnostic questions on topics covered in class during the third or fourth week of the term.

This process of combining and recombining questions from the pre-instruction test

continued until the end of the term and generally resulted in eight to ten quizzes of approximately seven questions each. Thus, none of the quizzes contained all the diagnostic questions given on the first day of class. Rather, each quiz contained a subset of diagnostic questions on topics discussed in class prior to giving that quiz. Consequently, the pre-instruction test (T_0) and the post-instruction tests (T_1, T_2) contained the same twenty-four diagnostic questions, but administered the questions in different ways. The pre-instruction test administered all the questions on the first day of class while the post-instruction tests administered the questions a few at a time on quizzes spread through out the term.

The pre-instruction test and the post-instruction quizzes were scored by assigning a numerical value of 1 to correct answers and a numerical value of 0 to incorrect answers. By term's end each student had accrued three scores for each of the twenty-four diagnostic questions. For a particular student answering a particular question these scores are:

- $S_0 = 1$ or 0 depending on whether the student answered the question correctly on the pre-instruction test.
- $S_1 = 1$ or 0 depending on whether the student answered the question correctly on the first post-instruction opportunity.
- $S_2 = 1$ or 0 depending on whether the student answered the question correctly on the second post-instruction opportunity.

There are NxM values of S_0 for a group of N students answering M questions. These values of S_0 determine the numerator in equation (5.b) and consequently the average grade on T_0. For example, the numerator for all studio sections under study was computed by summing the values of S_0 over all diagnostic questions and all studio students. Values of S_1 determine the numerator in (5.c) for the first post-instruction test and consequently the average grade on T_1. Similarly, values of S_2 determine the average grade on T_2.

The gain and loss components in equations (7.a) and (7.b) were computed in a similar fashion. For instance, the numerator in (7.a) for the studio gain from T_0 to T_2 was obtained by summing the values of $\max(S_2 - S_0, 0)$ over all diagnostic questions and all midshipmen in the studio sections.

Questions appearing on the calculus diagnostic test were never modified, but the optional choices were rearranged from time to time. Although this method has the disadvantage of using the same questions several times, it has the overriding advantage of eliminating any possibility that test questions revised for use on a later test could introduce ambiguities resulting in false gains and/or false losses. The technique eliminates the difficult, if not impossible, task of establishing equivalencies between seemingly similar questions.

Students. Midshipmen taking the studio course had some calculus in high school and demonstrated strong algebraic skills on a screening test given to all plebes. The course was taught in an electronic classroom that limited the number of students to twenty, but enrollment varied between fifteen and twenty students per year.

B. Effectiveness of Studio Calculus.

This section illustrates the use of a two-stage assessment scheme to study intra-term variations in effectiveness for a studio course in differential calculus. A marginal analysis is presented first, then a cumulative analysis.

Marginal Effectiveness. The results of a marginal analysis of gains and losses for the studio course are tabulated in Table 1. When reviewing the table, keep in mind that the inter-period test (T_1) is used as a pre- and a post-instruction test. Consequently, the aspect ratio changes from one period to the next. For example, the value 1.46 of the aspect ratio for the first instructional period is obtained from (7.c) using the average score on T_0. The value 3.09 for the second period is obtained from (7.c) using the average grade on T_1.

In addition, normalized gain and loss are conditioned on events that change from period to period. For example, in Table 1 the value 0.14 for the normalized loss from T_0 to T_1 means that 14% of diagnostic questions answered correctly on T_0 were answered incorrectly on T_1. The value 0.71 for normalized gain from T_1 to T_2 means that 71% of questions answered incorrectly on T_1 were answered correctly on T_2.

Table 1. Marginal analysis of gains and losses for the studio course. The initial pre-instruction test is designated by T_0, the first post-instruction test by T_1, and the second post-instruction test by T_2. Error estimates employ the standard deviant. The estimates for γ, γL, and g are based on conventional linearization techniques; see (Taylor, 1982) and the discussion in (Hake, 1998, p. 73).

Instructional Period	Aspect Ratio: γ	Normalized Loss: L	Renormalized Loss: γL	Normalized Gain: G	Normalized Change: g
T_0 to T_1	1.46±0.05	0.14±0.01	0.20±0.01	0.60±0.01	0.40±0.02
T_1 to T_2	3.09±0.13	0.07±0.01	0.22±0.02	0.71±0.02	0.49±0.03

Data in Table 1 indicates that renormalized loss was nearly constant from one instructional period to the next, with $\gamma L \approx 0.21$. Although nominal values of γL increased slightly, the increase is not large enough to be statistically significant. On the other hand, the difference in normalized gain is large enough to conclude that G increased from one period to the next.

In summary, for the studio course renormalized loss remained stable while normalized gain increased; and (8.a) leads to the conclusion that marginal effectiveness of the course improved from one period to the next. Moreover, according to (9), successive differences in nominal values of normalized change listed in Table 1 quantify the added effectiveness. The data indicates the studio course was 22.5% more effective in boosting learning relative to performance on T_1, when the odds of a correct answer were $\gamma_1 \approx 3$ and the average grade was 75%, than it was relative to performance on T_0, when the odds of a correct answer were $\gamma_0 \approx 1.5$ and the average grade was 60%.

Cumulative Effectiveness. Table 2 tabulates the results of a cumulative analysis of gains and losses for the studio course. When reviewing the table, keep in mind that for cumulative periods of instruction, change is measured relative to the initial diagnostic test, T_0. Consequently, the aspect ratio (7.c) has a fixed value.

Similarly, normalized gain and normalized loss are defined relative to performance on T_0. For example, the value 0.08 for the normalized loss from T_0 to T_2 means that 8% of diagnostic questions answered correctly on T_0 were answered incorrectly on T_2. The value 0.81 for the normalized gain from T_0 to T_2 means that 81% of diagnostic questions answered incorrectly on T_0 were answered correctly on T_2.

Table 2. Cumulative analysis of gains and losses for the studio course. The initial pre-instruction test is designated by T_0, the first post-instruction test by T_1, and the second post-instruction test by T_2. Error estimates employ the standard deviant. The estimates for γ, γL, and g are based on conventional linearization techniques; see (Taylor, 1982) and the discussion in (Hake, 1998, p. 73).

Instructional Period	Aspect Ratio: γ	Normalized Loss: L	Renormalized Loss: γL	Normalized Gain: G	Normalized Change: g
T_0 to T_1	1.46±0.05	0.14±0.01	0.20±0.01	0.60±0.01	0.40±0.01
T_0 to T_2	1.46±0.05	0.08±0.01	0.11±0.01	0.81±0.01	0.69±0.01

Inspection of Table 2 reveals that normalized gain was larger during the period from T_0 to T_2 than during the period from T_0 to T_1. Also renormalized loss was smaller from T_0 to T_2 than from T_0 to T_1. Consequently, the studio course was more effective in promoting learning relative to T_0 during the two instructional periods from T_0 to T_2 than during the single period from T_0 to T_1 by an amount equal to the difference in normalized change $\Delta g = 0.69\text{-}0.40 = 0.29$, see (9).

VI. Concluding Remarks: Was Hake Correct?

In 1998 Richard Hake published the results of a large survey of pre/post test data for introductory physics courses. He estimated the average normalized change for traditional (T) courses, those that made little use of interactive engagement (IE), at $g_T \approx 0.23$. He estimated the average normalized change for courses that made substantial use of IE methods at $g_{IE} \approx 0.48$. These findings are noteworthy because the estimate $g_{IE} \approx 0.48$ for interactive courses is almost two standard deviations above the estimate $g_T \approx 0.23$ for traditional courses. Hake (1998) concluded:

> *Classroom use of IE strategies can increase mechanics-course effectiveness well beyond that obtained in traditional practice.*

Hake's conclusion is certainly valid on the basis of (2), but is it valid on the basis of (8)? At present a complete answer cannot be given, since the average values of G and γL for traditional and interactive physics courses are not known. However, the decomposition (3) can be used to obtain a partial answer.

Since (3) is an identity, Hake's findings imply that assessment states for traditional courses must be distributed near the contour $g \approx 0.23$ in the (G, γL) plane. Furthermore, the mean assessment state for traditional courses must lie on this contour. Similarly, assessment states for interactive courses must be distributed near the contour $g \approx 0.48$ and the mean IE state must lie on that contour. See Figure 2.

If the mean IE state falls along the middle portion of the contour $g \approx 0.48$, shown in Figure 2, then (8) implies IE methods are more effective than traditional methods because on average they exhibit higher normalized gains and smaller renormalized losses. On the other hand, if the mean IE state falls along the upper or lower portions of the contour, as indicated in Figure 2, then (8) implies the two methods are not comparable because one method produces larger gains while the other produces smaller renormalized losses.

Thus, if (8), rather than (2), is used to gauge effectiveness, Hake's data implies that traditional physics courses cannot, on average, be more effective than interactive courses. That is, the traditional approach is either less effective than the interactive approach or the two methods are not comparable. Although this statement is not as strong as Hake's original statement, future efforts to determine the average values of G and γL for traditional and

interactive physics courses may make it possible to say more, even more than Hake originally envisioned:

> *Classroom use of IE strategies can promote both the acquisition and the retention of mechanics-course material well beyond that obtained in traditional practice.*

See Dellwo (2009) for additional commentary on the utility of Hake's gain.

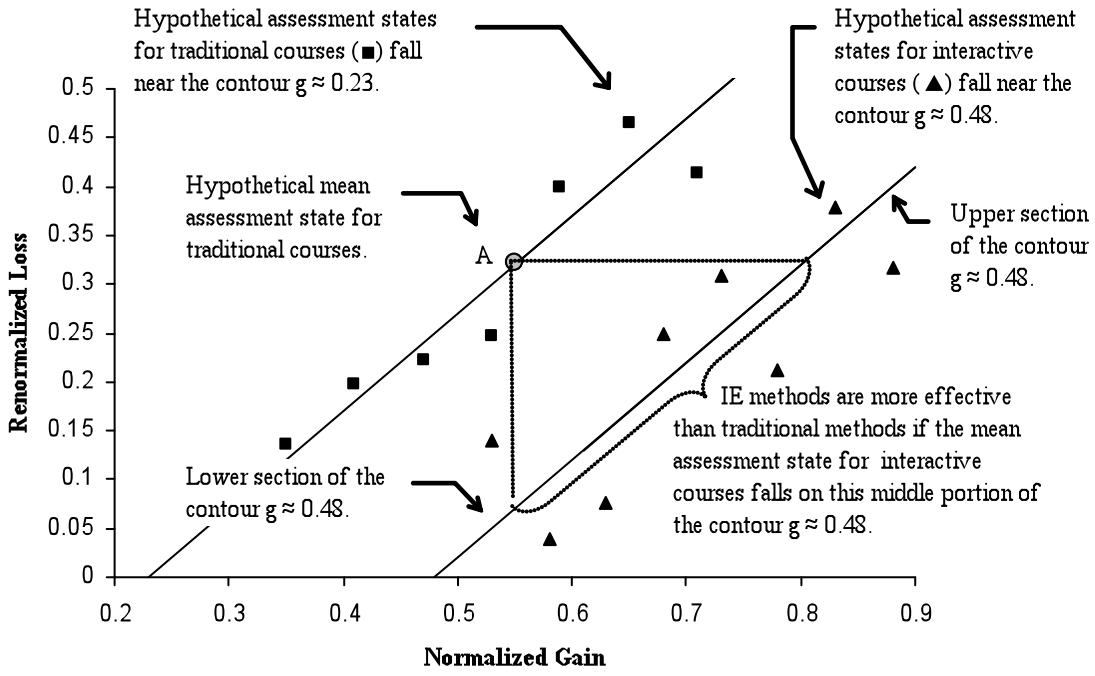

Figure 2. The contours of $g = G - \gamma L$ are parallel lines in the $(G, \gamma L)$ plane. The hypothetical mean traditional state A falls on the contour $g \approx 0.23$ while the mean IE state falls on $g \approx 0.48$.

Disclaimer

The opinions expressed are those of the author and not the U.S. Merchant Marine Academy or the U.S. Department of Transportation.

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When western epistemology and an indigenous worldview meet: Culturally responsive assessment in practice

Jioanna Carjuzaa[1] and William G. Ruff[2]

Abstract: There exists a natural tension between standards-based assessment and a multicultural perspective of assessment. The purpose of this paper was to examine issues of culturally-sensitive assessment, specifically within the context of preparing a female American Indian doctoral candidate in Educational Leadership. How does an instructor with a Western worldview fairly evaluate a research topic proposal written from an Indigenous paradigm? A case study design bounded by a single assignment and the instructor's reflections of that assignment provided the context for examination. When the instructor and the student operate from different worldviews, there is a mismatch in expectations. Criteria for evaluating a student's understanding from an alternative perspective need to be explored.

Keywords: multicultural assessment, Indigenous worldview, educational leadership, research proposals, Western epistemology.

Since the late 1980s, there has been a growing interest in how to design and implement culturally responsive pedagogy (Gay, 2000; Ladson-Billings, 1995; NWREL, 2006; Phuntsog, 1998; Wlodkowski, and Ginsberg, 1995). This movement came about in response to the growing diversity found in U.S. classrooms and the widening achievement gap that all too often leaves many minority students behind despite years of education reform. Zeichner (2003) described the mismatch between the teachers' and the students' backgrounds as problematic. "This cultural divide between teachers and their students is further complicated by the lack of sustained attention to preparing teachers to teach across lines of ethnicity/race, language, and social class in most teacher education programs," (Zeichner, 2003, p. 493). Students crave to have their cultural identities acknowledged and reflected in the school environment. Unfortunately, this cultural divide is just as apparent in higher education as it is in K-12 classrooms (Kirkness and Barnhardt, 1991). Efforts to bridge this divide have included modifying instructional strategies and diversifying representative curricula (Barnhardt and Kawagley, 2005; Cleary and Peacock, 1998; Fox, 2007; Kelting-Gibson, 2006); however, published literature discussing a multicultural perspective of instructional assessment is scant.

Wlodkowski and Ginsberg (1995) produced a comprehensive guide to integrating a culturally responsive pedagogical approach in higher education. In their book, they include chapters that help faculty understand the importance of respecting diversity; motivating learners; creating a safe, inclusive, and respectful learning environment; deriving teaching cross-discipline and cross-cultural principles; and promoting social justice and educational equity. Although there are measurement tools included in the appendices of the book, these assessment rubrics reflect the expectations of educators who are members of the dominant culture.

[1] Department of Education, Montana State University, Reid Hall 119, Bozeman, MT 59717, carjuzaa@montana.edu
[2] Department of Education, Montana State University, Reid Hall 113, Bozeman, MT 59717, wruff@montana.edu

There exists a natural tension between standards-based assessment and a multicultural perspective of assessment (McCarty, 2009). Scheurich and Young (1997) argued that assumptions buried deep into cultural routines create bias against those who hold any epistemology that diverges from the mainstream perspective. Whether the standards be those created by states for use in K-12 education as a result of the No Child Left Behind Act (2002) or the standards used to prepare professional educators (such as the Educational Leader Constituent Council Standards or the Association for Childhood Education International Standards), these standards reflect the dominant paradigm. In the words of Lightfoot (2008):

> Bringing diverse groups of people together when members of one group have wielded power over members of another group, without giving explicit attention to changing the imbalance of power and status, will not resolve conflict. …The fact of the matter is that the education they [historically oppressed minorities] receive from the oppressor only reinforces their oppression…. (p.39)

To achieve equity in education, deep-rooted cultural assumptions must be identified and acknowledged through "dialoguing with, not inculcating, students regarding their perspectives" (Sernak, 2008, p. 119). This means that educators at all levels must go beyond modifying instructional strategies to meet the needs of diverse learners and providing a representative view of multiple cultures. To achieve equity, educators must question the standards being used to evaluate student understanding by considering multiple paradigms in addition to the dominant worldview.

The purpose of this paper is to examine issues of culturally sensitive assessment, specifically within the context of preparing a female American Indian doctoral candidate. How does an instructor with a Western worldview fairly evaluate a research topic proposal written from an Indigenous paradigm? The significance of such a discussion is directly related to facilitating awareness of faculty about the need to question assumptions related to student assessment, especially in cases where the student and instructor may not share the same epistemology. When the instructor and the student embrace different worldviews, there is a mismatch in expectations. Criteria for evaluating a student's understanding from an alternative perspective needs to be explored.

I. The Context.

A case study design bounded by a single assignment and the instructor's reflections of that assignment provides the context for examination. Veronica was one of twelve students in a first year doctoral class on the topic of organizational and leadership theory. She identified herself as belonging to both the Crow and Northern Cheyenne tribes, and was one of two American Indians and one of three women in a class of 12 doctoral students. This was her second semester as a part-time doctoral student and full-time principal of a rural high school on the Northern Cheyenne Indian Reservation in Montana.

The culminating assignment for the course was for students to identify a potential dissertation topic appropriate for a doctorate in Educational Leadership and, using the content of the course, write a research topic proposal that would support the selected topic. When assigning this topic, the instructor imagined the product to be similar to a theoretical framework section of a dissertation literature review with the student introducing the topic and providing background information, discussing and elaborating an organizational theoretical or contemporary leadership framework which was heavily supported with reference citations and quotations, and finally a

discussion that overtly connected the theoretical framework to the potential dissertation topic. In fact, almost all students submitted a paper that matched the product imagined by the instructor. Veronica's paper stood out as a well written exception to this envisioned structure. Her paper contained the key aspects, such as a topic, a multicultural/feminist leadership framework supported with scholarship, and a connection between the topic and theoretical framework; yet, the structure and arrangement of ideas were not remotely similar to the products submitted by other students, nor what was envisioned by the instructor.

II. Veronica's Response to the Assignment.

Although a proposed dissertation topic was embedded in the discourse of her paper, Veronica had not explicitly laid out a dissertation topic in a succinct, explicit manner. Most of her classmates objectified their discussion and explicitly connected the topic to a theoretical framework citing the key academic sources as needed to support the connections. Veronica's paper described a personal journey that connected her relationship with her ancestors, her personal experiences, and her topic. The references were used more as a bridge seeking to transform a personal context to a multicultural understanding of that personal context. Nonetheless, she submitted a well crafted, powerful personal account of what transformational leadership meant for her, her relatives, and her ancestors. In explaining this journey, Veronica integrated issues of gender using role congruity theory pertaining to leadership, (Eagly and Karau, 2002) and issues of culture (House, Hanges, Javidan, Dorfman, and Gupta, 2004) into her account by weaving autobiographical meaning into existing literature and sharing what it means to be a female Crow transformational leader.

The instructor's objectives for the assignment were that students be able to: (1) demonstrate an understanding of the theories discussed throughout the course, (2) evaluate current issues and select a potential topic for dissertation study, (3) explicitly connect the topic to an appropriate theory or group of theories, and (4) justify the use of the theory for that topic using referenced sources.

Most students accomplished this standard by writing in a Socratic, direct, concise manner, which exemplifies the Western linear communication style. Veronica's paper, on the other hand, was written in an indirect, circular manner representative of an Eastern communication style which is more common among American Indians. According to Goin (1999) discourse patterns can be divided into the two aforementioned opposing styles, linear or circular communication. How doctoral candidates present a logical argument when writing a research topic proposal appears to be determined by their cultural values and socialization. In other words, their communication style transcends into their academic writing. Those students adhering to a Western communication style tend to get directly to the point whereas those students adhering to a circular communication style talk around and around the point, never directly mentioning it. The Western communication style, while appearing formal and direct, is idea and task focused. Circular communication patterns, in contrast, appear to be indirect, informal, and person and relationship focused. In the linear communication style, the point is stated explicitly, where as in the circular communication style the communicator lets the story make the point. Directness is thought to be equated with honesty and respect for others in the Western communication style and in the Eastern communication style, indirectness is equated with politeness and respect for others. In a Western communication style, priority is given to the

task and getting it done, whereas in the Eastern communication style priority is given to relationships.

Veronica adhered to the circular communication style in her research topic proposal. The four criteria the instructor required were all addressed in Veronica's paper, but presented in a qualitatively different way than they were presented in the other students' research topic proposals. Whereas other students wrote a formal linear narrative research topic proposal, Veronica's instructor categorized her paper as being a genre of qualitative research known as autobiographical ethnography. He commented, "Many scholars from historically oppressed groups have used this method of inquiry to convey their perspective and add to the body of literature."

Autoethnography, research in which the researcher is a full member in the research group or setting, has become a popular form of qualitative research (Anderson, 2006; Bateson, 1994; Ellis, 1997; Ellis and Bochner, 2000). Anderson (2006) traced the history of autoethnographic research and proposed five key features of analytic autoethnography. So, although Veronica provided a product that was decidedly atypical, her instructor interpreted her paper as having met the standards of scholarship based on criteria listed above. Yet, the difference between her paper and those of her classmates were numerous. The key sources of difference lay in issues of identity, relational framework, contextualization of the situation, and spirituality.

III. Cultural Identity.

Cultural identity is composed of a number of interrelated components including religion, gender, age, socioeconomic status, geographic location, ability, and language, in addition to ethnicity and race (Gollnick and Chinn, 2009). Norquay emphasized that "identity is multiple, shifting, and contradictory," (1990, p.291). Gollnick and Chinn offer this description of the importance of culture, "Culture provides the blueprint that determines the way an individual thinks, feels, and behaves in society. We are not born with culture, but rather learn it through enculturation and socialization. It is manifested through societal institutions, lived experiences, and the individual's fulfillment of psychological and basic needs," (2002, p.31). As is evident in Veronica's course project, one's cultural heritage and life experiences frame the cultural lens though which one experiences the world and infiltrates every aspect of one's life.

Relational Context as a Framework. In her research topic proposal, Veronica detailed what it took for an American Indian woman to be an effective leader in the Crow nation. She drew on her personal narrative throughout her writing. She opened with the following question, "Who are my mentors?" and provided a contextualized (place-based) background of her personal experiences and those of other female Crow leaders.

Veronica contextualized her understanding of the attributes of a transformational leader based on ancestral experience. She explained that her female ancestors, members of her family of origin, her nuclear family, and her extended family members all influenced her understanding of the concept of leadership. She explained how their experiences and cultural backgrounds have influenced who they are and the roles they have played,

> … My female ancestors, grandmothers, mom, aunt, and cousins are my mentors. Why? Because these are courageous women leaders who have warrior attributes of heart. They have been instructed, formed and developed through the Crow and Northern Cheyenne spiritual, cultural, and social values of their tribe. (Veronica, 2007, p.1)

Veronica emphasized the courageousness of these female leaders.

> One of these women, North Woman (medicine woman) along with Chief Dull Knife led the great nation of the Northern Cheyenne home from Oklahoma where they were held in bondage on a reservation which was not their homeland along the Tongue River in Montana. Next, was Head Woman (leader of Women), who owned and trained many grey and roan horses; she was a strong horsewoman and gentle wife. … I remind us of this story because Cheyenne women have always been warriors and leaders. (Veronica, 2007, p. 2)

Veronica also described the political service her relatives have performed for the Crow Nation and the adversity they experienced in a man's world. She explained:

> My mother was the first Crow woman to be a Crow Tribal Officer; she was the Crow Tribal Vice-Secretary. My grandparents raised my mom not only as a Crow woman, but also as a Crow man; she was more comfortable being in a man's world than in a woman's world…. However, it became ever so clear to Mom that she was living in the red man's world, the world of insecure egotistical Crow men. (Veronica, 2007, p. 3)

In explaining the response taken to adversity, Veronica conveyed the strength and courage necessary to lead.

> Although Mom has gone over to the other side, she has left a lasting legacy of strong and wise leadership with me and my brothers. Mom loved and knew the political field and territory of how to gain leadership within the Crow tribe. (Veronica, 2007, p. 4)

In addition to connecting and conveying leadership stories of her ancestors, Veronica drew a clear intergenerational connection from ancestors to posterity.

> My oldest brother, Ivan, broke the ice for future Native American school administrators by making it to the final round of two very competent school superintendent applicants in the Hardin School District … Perhaps someday, my niece, Roxanne, who is a teacher in that school district and an "I LEAD" [Indian Leadership Education and Development] candidate, will be able to ascend to the Hardin School District superintendency! (Veronica, 2007, p. 4)

IV. Contextualization of the Situation.

Throughout her topic proposal, Veronica noted the generalized attributes of specific theories, but they were consistently linked to a specific context as the theories were discussed. One example of this is her use of reference sources. In addition to references to the literature on transformational leadership theory, Veronica, also includes references from the Billings Gazette. For example, she wrote:

> Most of the impediments women face in the leadership domain stem from incongruity between the female gender role and the leadership role …. They must come across as extremely competent but also be seen as appropriately 'female', a set of standards men are not held to. (Northouse, 2007, p.280), "… despite the critical role they played in Indian society, Indian women are almost ignored in history, even Indian history where the 'invisible, silent status' typically conveyed in history and literature ignores the significant role Indian women had. American Indian women are virtually ignored by the

> historians, instead the focus is on the men's leadership, their warrior exploits and their leadership," (Billings Gazette, 11/20/05). (Veronica, 2007, p. 10)

Another way that Veronica demonstrated contextualization was through her use of voice and by framing the narrative as a personal journey. Throughout this assignment, Veronica used the first person singular form. Her personal voice narrates a personal journey of growth. This assignment was approached as more than an academic exercise. Veronica talks about the many hats she wears and the various roles she negotiates, "It took many years of self-reflection and counseling to emotionally recover and to value myself first as a woman, wife, mother, grandmother, legislator, and educator," (Veronica, 2007, p. 8). She also shared her personal reflections on her experiences, "You see, I lost my self-esteem and I needed to rebuild," (Veronica, 2007, p 8). Throughout the narrative, she conveyed lessons that were learned along the way of the journey, such as: "I have even realized that I must analyze my failures and learn from them," (Veronica, 2007, p.8), and "Stereotypic expectations not only affect others' perceptions and evaluations of women leaders but also can directly affect the women themselves," (Veronica, 2007, p.9).

V. Spirituality.

Another recurring theme throughout the paper was Veronica's demonstration of spirituality. For example, "It is my prayer for Janine to become not only the first Native American Indian Woman president of Rocky Mountain College …," (Veronica, 2007, p.6). Spirituality was not just seen in an expression of prayer, but as transformational, "… I have come to realize how God has changed me over the past fifteen years and how my new marriage has helped me to become a stronger woman," (Veronica, 2007, p.7), and as a gift, "…I have come to realize that I need to not only be thankful, but to realize that God gave me some natural talents and that I need to be ever changing and growing into a transformational leader," (Veronica, 2007, p. 8)

VI. Culturally Competent Instructional Assessment.

There is no universally accepted worldview; however, a Western paradigm is imposed in academe (Scheurich and Young, 1997). For many American Indian students in higher education, meeting the expectations and conforming to the standards framed in the dominant worldview while respecting traditional ways of knowing, being, and doing, requires a delicate balancing act, (Kirkness and Barnhardt, 1991). Since individuals see the world through their respective cultural lenses, it follows that they would interpret the requirements for a writing assignment through their personal worldview. Consequently, a Crow graduate student who embraces an Indigenous paradigm would produce a personal research topic proposal reflecting her cultural understanding and personal interpretation of the assignment while the instructor would be expecting a product that conforms to the Western paradigm.

If the instructor adheres to a rigid Western paradigm while assessing the student's work, he or she will frame his or her expectations for success from his or her worldview. He or she could, therefore, be disappointed in the Crow student's more subjective, more fluid, differently framed research topic proposal and he or she could judge the student's work to be less than satisfactory. On the other hand, if the instructor is to fairly evaluate the student's work and not be biased by the student's cultural heritage, then he or she must design new, flexible assessment

standards that allow for a more inclusive interpretation of the assignment but yet exhibit an equal level of quality. The practice of culturally competent instruction requires the use of unbiased standards—standards that take into account both the cultural worldview of the student as well as that of the instructor.

Standards need to be renegotiated to be more inclusive. Differentiated instruction requires differentiated assessment thus making a renegotiated standard critical. Maintaining standards based on the Western paradigm perpetuate a deficit model of diversity because any work developed from a non-Western paradigm will be considered substandard (Swartz, 2003). As an analogy using base-10 mathematics, (the dominant paradigm) 4 + 4 = 8; however using base-5 mathematics 4 + 4 = 13, both equations are correct within the mathematical base specified; however, when the mathematical base is not specified, a base-10 system is assumed resulting in the equation using a base-5 system being viewed as incorrect. Before holding students who view the world from a different epistemological system to a standard developed solely from the perspective of our own epistemological system, we must question the assumptions inherent in those standards and renegotiate the standards to be more inclusive. In other words, continuing the mathematical analogy, we must stop assuming that all students are solving the equation from a base-10 system, and ask what system the student is using to arrive at his or her answer.

Renegotiating standards should not be construed as lowering standards. Lowering standards perpetuates oppression by giving the illusion of access without providing empowerment because the outcome expectations have not changed. Renegotiated standards require a sincere dialogue between members of different cultures who possess differing epistemologies. Through the process of dialogue, a comprehension and appreciation for different ways of knowing and seeing the world emerges. It is this process that makes differentiated assessment and renegotiated standards possible because the outcome expectations are transformed by the process of inclusion. The catalyst for such a process to occur lies in the instructor-student relationship, and in the instructor's ability to learn from the student as a function of teaching.

Indigenous pedagogies highlight the reciprocal relationship between teaching and learning, and differ greatly from the Western philosophy on education. The incongruence between these two pedagogical approaches has had a negative impact on Indian students since the Boarding School era (Smith, 2005). In the dominant paradigm the idea that knowledge should be approached through the intellect leads to the belief that scholarship must be objective rather than subjective, that personal emotions, histories, and motives must be removed if the conclusions are to be valid. Veronica's scholarship exhibited this subjective framework in terms of cultural identity, relational framework, contextualization, and spirituality as discussed above.

The rational categorization of knowledge assumed by the dominant research paradigm is at odds with a more holistic Indigenous perspective. Tafoya, as quoted in Wilson, (2008) explains this by saying that Western scholarship "has a history of people being told to amputate a part of themselves to be able to fit something that's rigid, and not built for them in the first place" (p. 56). Practices within the Western paradigm, as evidenced from this example, can isolate aspects of one's cultural identity by focusing on individual components rather than by looking at the person as a whole. Comparing Western and traditional knowledge, we see that educational practices and research procedures are not universal but culturally bound.

VII. A Proposed Framework for Renegotiated Assessment Standards.

Kirkness and Barnhardt (1991) identify four requirements for promoting more equitable relationships and interactions between Indigenous peoples and the academy. These four Rs include: respect, relevance, reciprocity, and responsibility. Practicing respect demands a negotiation that addresses cultural standards and a repositioning of the instructor from interpreter to listener with an openness to learning from non-dominant perspectives rather judging based on dominant assumptions (Bishop 2005; Smith, 1999).

Cajete (2008) notes, "meaning is key to relevance," (p. 496) and it is incumbent on the instructor to consider the intersection of scholarly practice and the cultural landscape. Assigning universality to Western knowledge maintains the frameworks for scholarship and the representation of knowledge (Findlay, 2000; Smith, 1999). "Indigenous [and non-Indigenous] scholars and intellectuals are pressed to produce technical knowledge that conforms to Western standards of truth and validity" (Denzin, 2005, p. 936). Recognition of the relevance of non-Western knowledge calls into question the tacit assumptions contained within Western standards. These assumptions need to be identified and questioned to facilitate culturally competent instructional assessment. Questioning academic practices is tantamount to acknowledging the lack of neutrality in academic rationality and from this recognition assessment standards can be renegotiated to facilitate cultural equity.

Reciprocity implies a give-and-take within the teaching and learning process that has largely been absent in Western academic standards. It is an issue of power. The power differential is determined by whose knowledge is valued, who determines the importance of ideas, and who determines the rules for procedures for examining knowledge (Fine, Tuck, and Zeller-Berkman, 2008). Dismantling or interrogating this power differential requires an examination of purpose and clarification of protocols. Reciprocity demands collaboration, interchange of ideas, sharing power, learning *from* the "other." Hermes (1997) defines the concept of reciprocity as "going back and forth between the problem, the practice, and the community" (p. 23). However, this process is more complex than it first appears. Jones and Jenkins (2008) point out that overcoming the power differential through a dialogic process may move participants to disregard or downplay differences in the movement toward shared understandings, which leads to a spirit of unity. While this may be useful when working toward a shared goal, the melding of ideas may also establish a sort of hybridity or democratic ideal of equality or sameness that, in reality, does not exist. Grande (2008) argued this point in terms of sovereignty and self-determination through protection of tradition and language as necessary considerations to maintaining identity as Indigenous peoples. Recognition of ever present issues of power and privilege are necessary for the instructor and student to successfully engage in truly collaborative and reciprocal relationships.

The most important responsibility for instructors is a willingness to learn from rather than about those who primarily think and operate from a non-Western epistemological system. This creates opportunities for a re-conceptualization of assessment standards that recognize issues of sovereignty, identity, culture, and place (Lincoln and Cannella, 2009; Mihesuah, 1998). Instructors are also responsible for ethical use of knowledge that has been entrusted to them. This translates into providing a venue for the voices of the "other" as well as a critical examination of the systems and discourses that continue to promote colonization. Indigenous knowledge and heritage are sacred gifts and responsibilities that must be honored and held for the benefit of future generations," (Battiste, 2000, p.144).

Many Indigenous scholars emphasize the importance of relationships, not just current human relationships, but the connection Indigenous peoples have to their ancestors, the future generations, nature, and to the land. When Wilson (2008) polled his colleagues, "Several stated that the relational way of being was at the heart of what it means to be Indigenous," (p. 80). He emphasized that the sharing and participation that relationship building entails is an important aspect of ethical Indigenous research. Deloria (1992) stated, "The Indian principle of interpretation/observation is simplicity itself: "We are all relatives," (p.36). He further explains that relying on our interconnectedness as a methodological tool for obtaining knowledge "means that we observe the natural world by looking for relationships between various things in it," (Deloria, 1992, p. 37). The four Rs, as discussed earlier, are practices that provide entry to the relationship building process; however, it is relationality that will allow both parties to create intimate, on-going relationships and is the key to understanding and embracing Indigenous ways of knowing. According to Wilson (2008), if Indigenous ways of knowing have to be narrowed through one particular lens (which it certainly does not), then surely that lens would be relationality. In fact, the key to being included has just as much to do with how well you have connected with members of that community than the work you have done in the past.

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Insights regarding the usefulness of partial notes in mathematics courses

Fabiana Cardetti[1], Nirattaya Khamsemanan[2], and M. Carolina Orgnero[3]

Abstract: Note-taking is a widespread practice used by college students to record information from lectures. Unfortunately, even successful students' notes are incomplete and, therefore, may lack the potential to positively impact their academic performance. Research suggests that instructors can help students improve their note-taking skills by using partial notes in their classes. The purpose of this exploratory study was to understand the potential usefulness of partial notes in mathematics courses. Findings showed that students perceived partial notes as beneficial to their learning. Course examination scores further confirmed that partial notes related strongly to high academic performance.

Keywords: note-taking, partial notes, mathematics, instructional strategy

I. Introduction.

Note-taking is a widespread practice used to record information in written form. This practice is very common among college students; in fact; Palmatier and Bennett (1974) found that 99% of the students they surveyed took notes during an instructor's lecture.

The practice of note-taking has been the subject of educational studies for over 75 years. In his seminal work of 1925, Crawford analyzed the benefits of taking notes during a lecture versus listening without taking notes and concluded that note-taking itself enhances students' examination performance. More recently, Einstein, Morris, and Smith (1985) analyzed students' notes and found that students could recall 40% of the material in their notes but only 7% of the material that was not in their notes. They also compared notes of successful and less successful college students and concluded that successful students included more of the main ideas in their notes than did less successful students.

Unfortunately, even successful students' notes are incomplete and, therefore, may lack the potential to improve their academic performance. Indeed, successful junior students record, at most, 70% of the critical ideas that are presented in lectures (Kiewra, 1984), and first-year students include only 11% of such ideas in their notes (Hartley and Marshal, 1974). Researchers have suggested several ways in which instructors can help students improve students' note-taking skills, such as: lecturing at slower rates (Peters, 1972); using verbal cues (Titsworth and Kiewra, 2004); providing students with lecture notes (Kiewra, 1985a). Kiewra encourages instructors to address directly the problem of students' poor note-taking skills. He states, "Teachers should be aware of students' relatively incomplete note-taking behaviors, and, therefore, [should be] encouraged to provide learners with adequate notes for review" (Kiewra, 1985a, p.77). This proviso applies to mathematics instructors as well as others, since note-taking directly affects students' ability to follow and understand mathematics lectures. In this article, we

[1]Department of Mathematics, University of Connecticut, Storrs, CT 06269-3009, USA. Fabiana.cardetti@uconn.edu
[2]Present Address: Sirindhorn International Institute of Technology. Thammasat University, Thammasat-Rangsit, Thailand.
[3]Center for Continuing Studies and Department of Educational Leadership, University of Connecticut, Storrs, CT 06269-4056, USA.

focus on assisting students by providing them with a specific format of partial rather than complete lecture notes. The present work constitutes the first step towards understanding the full potential of partial notes in fostering significant learning in mathematics courses.

II. Framework.

The literature cited above suggests that instructors should be proactive in student note-taking efforts, for example, by providing lecture notes. Studies have shown that when students receive complete lecture notes from their instructors, they achieve higher test scores than when they rely only on their own notes (Kiewra, 1985c; Maqsud, 1980). It may seem natural, then, to think that instructors can help their students by making copies of lecture notes available to them. However, there are some caveats regarding providing students with complete lecture notes. Students may feel that when they receive the notes they do not need to take notes themselves or be attentive in class (Pardini, Domizi, Forbis, and Pettis, 2005). In some extreme cases, if students receive complete notes, they may not feel the need to attend lectures at all, thus promoting absenteeism (Potts, 1993; Russell, Caris, Harris, and Hendricson, 1983). To address these caveats, instructors can provide partial notes instead of full notes, thus requiring students to be present in class to complete their notes; moreover, students have to be attentive to complete their notes correctly, which gives them a reason to attend classes. These partial notes generated by the instructor can take the form of outlines or graphic organizers which, depending on the amount of information they contain, can be categorized as complete, partial, or skeletal notes (Katayama and Robinson, 2000).

Several studies have been conducted to compare the effects of partial notes and full notes on students' achievement. For example, Annis (1981) compared examination performance amongst students using their own personal notes, the instructor's complete notes, or partial notes prepared by the instructor. Annis found that students using personal or partial notes scored significantly higher on the essay items of the examination than did students using complete notes. In another study, Russell, Caris, Harris, and Hendricson (1983) analyzed the performance of medical students on multiple-choice questions and on critical-thinking questions. Students were provided with complete notes, or partial notes, or skeletal notes. Russell et al. found that the group of students using partial notes scored significantly higher than the other two groups did, particularly on the critical thinking questions. They concluded that " the partial handout was the best compromise between the skeletal handout, which promotes alertness during the lecture but may be less valuable for review several months later, and the comprehensive handout, which encourages passivity in class" (Russell *et al*., 1983, p. 636). In a more recent study, Cornelius and Owen-DeSchryver (2008) examined the impact of partial and full notes on students' learning outcomes. Students using partial notes performed significantly better than students using full notes on examinations taken towards the end of the semester and on the cumulative final examination. In particular, students using partial notes performed better on cumulative conceptual questions (i.e., questions that demand understanding beyond just the definition of a concept and that require the elaboration of information). These studies suggest that students benefit from the use of partial notes, especially for courses that emphasize problem-solving and critical thinking.

Reliable lecture notes are especially important in mathematics classes because of the large amount of challenging content that is covered in each class and the cumulative nature of mathematics that requires full understanding of an idea before moving on to the next. In addition,

course examination questions consist primarily of critical thinking questions that require a solid understanding of the concepts covered and the relationships among them. While the studies previously reviewed were conducted in fields such as psychology, medicine, and education, our review of the literature revealed no studies about partial notes in mathematics classes. However, the literature does suggest that partial notes could benefit students in mathematics courses, and we did find two studies about teaching foundational skills that would prepare math students to deal effectively with partial notes. One of those studies (Backman, 1994) was an action research project by a high school mathematics teacher, designed to help students learn effective note-taking for studying, organizing, and remembering information. As a result of this project, students were able to refine their note-taking skills. The other study (Eades and Moore, 2007) examined the benefits of a systematic note-taking procedure in a developmental mathematics course. Results from surveys and instructors' observations revealed that the system increased student understanding and motivation.

The present article attempts to further the understanding of this instructional strategy in mathematics courses. Specifically, this work explores the potential usefulness of partial notes in mathematics courses. We base our findings on the analysis of students' perceptions regarding the use of partial notes and on students' performance on course examinations. The article concludes with a discussion of the findings, a summary of key recommendations for practice, limitations and future research aimed at learning more about the effectiveness of this instructional technique.

III. Method.

A. Context and Sample.

One of the authors of this paper taught a calculus course at a large northeastern public university in the United States of America. The framework of the instructor's lectures was based on her typed personal notes. These notes consisted of complete statements of theorems, explanations, and full solutions of examples. In the Fall, 2007 semester, the instructor decided to try a different instructional strategy that would promote active engagement of students with the material. To that effect, she introduced partial notes that she handed out to students at the beginning of every class.

Partial notes (PN) are typed versions of the instructor's personal notes. They are called *partial* because the solutions to examples are omitted and blank spaces are left, so that the students can add their own solution to each of the examples within the PN. The instructor followed this format of PN for her classes because she felt this would be beneficial to her students. Certainly, other PN formats are also possible (e.g., leave blanks for definitions, names of properties, etc.) An example of a four pages long PN is provided in Figure 1. Since partial notes saved the instructor some lecture time because she did not have to write examples or problems on the board, she used the extra time to engage students in interactive in-class activities without sacrificing the amount of material she had to cover. For example, once the instructor had worked through enough examples on the board, students were asked to solve a few extra examples on the partial notes on their own. The instructor also asked volunteers to solve each problem on the board. These volunteers were given extra credit points that counted towards the

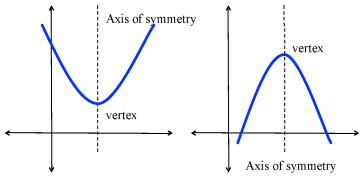
A7: Quadratic Functions

Disclaimer: This is MY attempt to help you study for the material. Don't use this as your main study tool. There might be some typos and/or mistakes. This material is adapted from our textbook *Calculus: Applications and Technology* (3^{rd} edition) by Edmond Tomastik.

Quadratic functions are of the form

$$f(x) = ax^2 + bx + c, a \neq 0,$$

where a, b and c are constants and a is not zero. The graph of any quadratic function is a curve called parabola and is similar in shape to the graph of $y = x^2$.



The turning point on the parabola is called the **vertex**. The **axis of symmetry** of the parabola is the vertical line passing through the vertex.

Example 1. *Sketch the graph of the function* $y = x^2 - 2x + 3$.

Solution

1

The following procedure can be used for any quadratic function $f(x) = ax^2+bx+c$ with $a \neq 0$ to complete the square and arrive at the standard form of the function.

$$\begin{aligned} f(x) &= ax^2 + bx + c \\ &= a\left(x^2 + \frac{b}{a}x + \frac{c}{a}\right) \text{ Factor out } a \\ &= a\left(\left[x^2 + \frac{b}{a}x + \frac{b^2}{4a^2}\right] - \frac{b^2}{4a^2} + \frac{c}{a}\right) \text{ add and subtract } \frac{b^2}{4a^2} \\ &= a\left(\left[x + \frac{b}{2a}\right]^2 - \frac{b^2}{4a^2} + \frac{c}{a}\right) \text{ Complete the square} \\ &= a\left(x + \frac{b}{2a}\right)^2 + \left(c - \frac{b^2}{4a}\right) \text{ Multiply by } a \end{aligned}$$

If we set

$$h = -\frac{b}{2a} \text{ and } k = c - \frac{b^2}{4a}$$

the quadratic function can be written in standard form

$$f(x) = a(x - h)^2 + k$$

Properties of the graph of $y = ax^2 + bx + c$

By completing the square, the equation of a parabola $y = ax^2 + bx + c$ can be rewritten in the form

$$y = a(x - h)^2 + k,$$

where

$$h = -\frac{b}{2a} \text{ and } k = c - \frac{b^2}{4a}$$

In this form, the vertex of the parabola is (h, k) and the axis of symmetry is the line $x = h$. The parabola opens upward, if $a > 0$; and opens downward, if $a < 0$.

2

Example 2. *Sketch the graph of the function* $f(x) = -2x^2 + 4x + 6$ *and specify the vertex, axis of symmetry, and maximum or minimum value of* f.

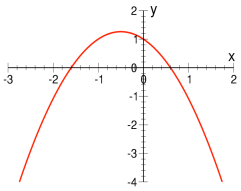
Solution:

The Quadratic Formula

The zeros of the quadratic $y = ax^2 + bx + c$ are given by

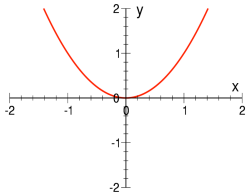
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- If $b^2 - 4ac > 0$, there are two zeros.

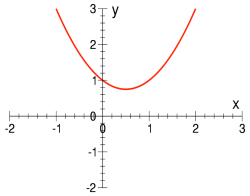


3

- If $b^2 - 4ac = 0$, there is one zero.



- If $b^2 - 4ac < 0$, there are no zeros.



Note that the zeros of the quadratic are the same as the x-intercept (where the graph meets the x-axis.)

Example 3. *Find the zeros of the quadratic* $y = x^2 - 2x - 1$.

Solution:

4

Figure 1. Example of a four-page long partial note.

weekly quiz score for the course. The students' perception of this instructional strategy (use of PN) became apparent to the instructor when she read the students' feedback on the mid-semester and end-of-semester open-ended questionnaires of Fall 2007. This feedback was gathered as part of standard educational practices for the course. Later on, these preexisting aggregated data became the basis of the inquiry that drove this exploratory study.

The instructor had taught the same course in the Fall, 2006 semester. That year she used her full personal notes to guide her instruction but did not provide students with either full or partial notes. In the 2007 semester the instructor used the same personal notes to guide her teaching and to prepare PN. Thus the material covered in the 2006 semester and the 2007 semester was identical. Other aspects that were identical to both courses, in addition to the material and the term of the year, were the days and times of the week in which the lecture took place, the length of each class meeting, and the total number of weeks in the semester. Furthermore, there was diversity of ethnic backgrounds with a predominance of Caucasian students in both semesters. The main difference between the courses was that in 2007 the students had access to partial notes.

B. Research Questions and Data Collection.

The aim of this exploratory study was to assess the potential usefulness of partial notes in a mathematics course. Specifically, the research questions were:

1. Among students in the Fall 2007 course, what themes characterized their perceptions of the instructor-generated partial notes?
2. To what extent did course examination scores differ between students who did not have access to partial notes and students who did have access?

Qualitative data were used to answer the first research question. These data were collected anonymously from questionnaires that students completed in the middle and end of the semester in the Fall 2007. Further details about these questionnaires can be found below.

Quantitative data were collected from the students' course examination scores to address the second research question. We compared the examination scores from Fall 2006 and Fall 2007. For the purposes of this study, scores were imported from the grade books to a separate file, students' names were removed, and scores were recorded in increasing order for each semester. Thus all the quantitative data were analyzed anonymously and in aggregate. Further details about the examinations can be found below.

Mid-semester Questionnaire. Seven weeks into the semester and 2 weeks after the first examination, students completed an anonymous mid-semester questionnaire. The mid-semester questionnaire was a short, open-ended questionnaire developed by the instructor. Its purpose was to obtain anonymous feedback from the students that would help improve their learning experience in the remaining weeks of the semester and to obtain feedback about her teaching effectiveness. Students completed the questionnaires in the first 15 minutes of the lecture while the instructor was out of the room. The items on the mid-semester questionnaire were as follows:

1. What is going well for you in lectures?
2. What is not going well for you in lectures?
3. What can I do to further help your learning in this class?
4. What can you do to make the lectures more productive for yourself?
5. Other comments/concerns/suggestions.

End-of-Semester Questionnaire. As is customary in many institutions, at the completion of each semester students were asked to complete an anonymous official student evaluation of faculty. At our institution this evaluation takes place each spring and fall semester. This evaluation consists of two pages: the first page is a 10-point-scale quantitative form to numerically rate the instructor's effectiveness; the second page is an open-ended questionnaire wherein students can provide a short narrative of the instructor's performance. For the purposes of this study, we focused on the second page questionnaire that consisted of the following items:

1. What was the most positive aspect of the way in which this instructor taught this course?
2. What can this instructor do to improve teaching effectiveness in the classroom?

The results are used by the instructor for improving teaching performance and for promotion, tenure, and reappointment of the instructor. Each instructor receives the results after the semester has ended and grades have been distributed.

Examinations. Three examinations were administered in-class in both the Fall 2006 and the Fall 2007 semesters. In each semester, the first examination took place during the sixth week of classes, the second examination during the eleventh week of classes, and the cumulative final examination during the official Finals Week at the end of the term. The examinations consisted of computational questions as well as conceptual questions. Only the final examination was cumulative. In 2007, these questions were only slightly modified in content to avoid concerns of contamination across years. Additionally, we compared the scores of the two groups on the mathematics section of the Scholastic Aptitude Test (SAT) to control for general mathematical ability prior to taking the course.

C. Data Analysis.

Mid- and End-of-semester Questionnaires. Data analysis consisted of several steps. First, each of the authors coded the data separately following the constant comparative method (Corbin and Strauss, 2008) without seeking to build theory. The constant comparative method "involves continually comparing one unit of data with another in order to derive conceptual elements" (Merrian, 2002, p. 8). Next, we met, compared, and refined codes. Patterns that repeated were collapsed or enhanced to form categories until we identified emerging themes (Miles and Huberman, 1994).

To add rigor to our work, we generated individual analyses, and met periodically to discuss our findings. Disagreements about codes, categories, and themes were resolved during our meetings, creating an iterative process of dialogic collaboration (Paulus, Woodside, and Ziegler, 2008).

Examinations. Examination scores of the different groups were compared to determine if significant statistical differences existed. Ideally, the authors would have preferred to carry out an ANCOVA with the SAT score as the covariate, but this was not possible because the data were only available in aggregate. In lieu of such analysis, tests of equal variances, homogeneity, and skewness were performed to justify application of a t-test that measured examination scores differences. Finally, we also performed a t-test to determine if significant statistical differences existed between students' SAT scores.

IV. Findings.

A. Qualitative data from open-ended questionnaires.

The analysis of the responses to open-ended questionnaires was performed to understand students' perceptions of partial notes. Four themes emerged from the analysis: *(1) Students defined partial notes in their own words. (2) Partial notes allowed students to follow the lecture attentively. (3) Students perceived the lecture structure as beneficial. (4) Students perceived partial notes as a helpful aid for studying.* Each of these themes is described in detail below.

Students defined partial notes in their own words. The instructor made no attempt to call students' attention to partial notes because the objective of the course was to help students learn the fundamental mathematical concepts of the course. Consequently, students were never given a specific name for the partial notes. In spite of that, students found ways to define partial notes, using their own words to comment on the course strength both in the middle of the semester and again at the end of the semester when they responded to the questionnaires. For example, many students referred to partial notes as "handouts," or "packets." A lower number of students referred to them as "notes." Among the comments made were the following, "The handouts are extremely helpful," "The packets are a good way of presenting the material…," and "I really liked how we got a handout every class with all the notes and examples. It really helped me." Overall, the students used their own words to refer to partial notes in their comments.

Partial notes allowed students to follow the lecture attentively. A key benefit of partial notes is that it allowed students to follow along with the lectures. When students did not need to take notes feverishly, they could concentrate on the highlights of the lecture and devote their efforts to listening attentively to the instructor's explanations. Many students referred to this aspect of partial notes. For example, one student mentioned that the partial notes were effective in keeping up with the instructor: "I like following along in the lesson through the packets. It is quite effective." Another student explained the effect that having the definitions and examples already in written form had on listening to the lecture: "I like how you give us everything (definitions and examples). It makes it easier to follow along and listen to your examples." When students had to take full lecture notes on their own, their attention was divided between listening, processing information, and note-taking. On the other hand, with the aid of partial notes, students' attention was focused on what the instructor was saying at the moment, allowing for meaningful processing to take place.

Students followed the lecture attentively in two distinct ways. Some students liked partial notes because they could listen to the lecture attentively without the distraction of taking notes, as the following student explained, "I really like that you give us handouts of class in a worksheet so that we can concentrate more than trying to scribble every word down." Some of these students also commented on the fact that critical lecture ideas were readily available on the partial notes, "The handouts were a big help because they allowed students to focus on the main points of the lecture rather than waste time doing extra writing." Other students liked using partial notes to follow the lecture because they could rephrase the instructors' comments or explanations in their own words to complement the content of the provided notes, "The handouts are very useful. It helps to write down notes on the papers because I can add my own notes, if needed. But I am not worrying about writing down definitions." Similarly, another student mentioned, "I like the fact that we get a handout for each class that we can follow along with but still fill in the examples." Using partial notes, students were able to either put down their pencils

and focus on listening to the instructor's explanation, or they were able to combine attentive listening with meaningful note-taking.

Students perceived the lecture structure as beneficial. A few students did not refer to partial notes explicitly but alluded to the structure of the class when they reflected upon the positive aspects of the course. For example, one student liked having the opportunity to independently attempt problems before seeing the instructor's explanation, "Dr K. provides thorough explanations in class and also allows us to work at problems prior to explaining them on the board for practice." Another student reflected upon the uncluttered nature of partial notes and on the structure of the class; and in particular alluded to the extra points quiz policy described in the Context section above, "Gave good explanation of problems without cluttering examples with unneeded information. Also gave great quiz opportunities such as examples on the board." The use of partial notes allowed the instructor to structure the lecture in such a way that all of the above was possible (i.e., clear presentation of topics, extra time to solve problems, etc.), so that she could incorporate extra activities within the allocated time.

Students perceived partial notes as a helpful aid for learning and studying. Some students pointed out that learning the lecture material was facilitated by partial notes. For these students, partial notes helped them learn the concepts covered, "Going through the section of focus with the printed out guide is very helpful for me to learn the material." Students also found partial notes useful in the reviewing process after the lecture, when they were studying for examinations, "The handouts each week were very helpful because they are easy to review for test time." Students also mentioned another key skill for learning and studying: organization, "Handout materials were wonderful. Kept me organized." Overall, students used partial notes as an aid in the cognitive processing stages (learning) and in the review or product function of note-taking (studying) (Suritsky and Hughes, 1991).

B. Quantitative data from examinations.

For the analysis of the scores, the alpha level was set at .05. Effects that produced p values between .05 and .10 are reported as marginally significant effects.

First, we looked at the differences between the two groups (2006 and 2007), comparing the mean scores on the course examinations. Table 1 shows the descriptive statistics for all examination scores across the two groups. Students using partial notes scored significantly higher (M=41.43, SD=6.64) on the first examination than did those without access to partial notes (M=34.67, SD=7.94), $t(52)=3.50$, $p<0.001$. The standardized mean difference effect size[4] (ES_{sm}) between the two groups on the first examination was very large (ES_{sm}=0.90). The analysis of the scores on the second examination indicated that the students using partial notes scored marginally higher (M=38.86, SD=9.13) than did those students with no access to partial notes (M=34.59, SD=7.98), $t(54)=1.61$, p=0.056. The standardized mean difference effect size between the two groups on the second examination was moderately small (ES_{sm}=0.41). Finally, the results indicated that students using partial notes scored significantly higher on the final examination (M=58.83, SD=14.52) than did those without access to partial notes (M=34.59, SD=7.98), $t(55)=2.62$, p=0.014. For the final examination scores, the standardized mean difference effect size between the two groups was moderately large (ES_{sm}=0.67).

[4] Notation for effect size index (ES_{sm}) from *Practical meta-analysis*, by M.W. Lipsey and D.B. Wilson, 2001, Thousands Oaks, CA: Sage.

Second, we assessed the statistical significance of differences in the mean score of the mathematics section of the SAT between the two groups. The results of the t-test indicated that the group using partial notes scored significantly lower (M=572.67, SD=76.15) than the group that did not have access to partial notes (M=606.45, SD=73.19), $t(59)$=1.77, p=0.04. There was a medium standardized mean difference effect size in SAT scores between the two groups (ES_{sm}=0.45).

Table 1. Descriptive Statistics for Examination Scores Across Groups.

	Without partial notes[a]		With partial notes[b]	
Examination	M	SD	M	SD
Examination 1*	34.67	7.94	41.43	6.64
Examination 2[c]*	34.59	7.98	38.86	9.13
Final Examination *	49.7	14.53	58.83	14.52

[a]n=30. [b] n=29.
[c] Two students and one student were absent from each group respectively.
*$p \leq 0.05$

V. Discussion.

The analysis of the students' comments on the questionnaires illuminated how students reacted to instructor-generated partial notes. In fact, the qualitative analysis showed that students identified partial notes as a key factor to aid their learning.

The instructor did not formally introduce the concept of partial notes to her students. She used partial notes as a way of presenting the material and making sure that students would be engaged with it. What became surprising to her was that students perceived she was using an instructional technique that was making a difference in their learning. Thus, students indicated they had noticed this instructional technique by using a variety of names to describe partial notes in the questionnaires they completed in the middle and at the end of the semester.

The findings highlighted the importance students attributed to follow along with the lecture. As Williams and Eggert (2002) pointed out " attempting to record all the details could detract from one's understanding of the main idea(s). Notetakers can miss main points while recording minutia." (p.177). Partial notes address students' preferences to process information by listening attentively to the instructor's presentation without worrying about recording every detail and instead focusing on the information being presented.

The evidence also revealed that students perceived the opportunity to explore the concepts in class on their own as beneficial to their learning. Research consistently supports the effectiveness of student engagement on a broad range of learning outcomes. Astin (1993) reported that student involvement is one of the most important predictors of success in college. Using partial notes, the instructor gains considerable time by not having to write everything on the board (e.g., all the definitions, examples, or statements). That time can be used to engage students in other activities like having students work on problems independently or showing their solutions on the board. Such activities promote student engagement and involvement with their own learning (Smart and Csapo, 2007).

The final point that the findings suggested is that students also relied on partial notes to learn the material and to review for examinations. We speculated that students' familiarity with partial notes increased the efficiency of the review process. These conclusions are consistent with results from research studies that confirm the significant correlations between reviewing

notes and academic achievement (Hartley, 1983; Kiewra, 1985b). Therefore, an effort should be made to make students aware of the benefits of reviewing the notes in preparation for examinations.

To summarize, the themes that emerged from the analysis of the qualitative aggregate data are taken as an indication that partial notes may have played a role in students' improvement of learning. This evidence was further confirmed with the analysis from the quantitative data.

Results from the comparison of the quantitative data helped us assess differences between the students who did not have access to partial notes (Fall 2006) and students who did have access (Fall 2007). The mean scores for all the examinations in the course were consistently higher for the group using partial notes. Statistical analysis of the first examination scores revealed that the students using partial notes outperformed the group that did not use partial notes. Results were not as promising for the second examination, for which the higher mean in the scores of the partial notes group was only marginally significant compared to the group that did not use partial notes. Although we do not have a specific explanation for this result based on the available data, we speculated that overconfidence, because of the very high scores on the first examination, may have been somewhat counterproductive in the students' preparation for the second examination. Nonetheless, by the end of the semester, the partial notes group outperformed the group that did not use partial notes in the final examination. Given the cumulative nature of the final examination, this evidence suggested that the partial notes group overall performed significantly better academically. These results suggested that the use of partial notes might be a factor in improving student academic performance.

Finally, analysis of students' prior mathematical knowledge based on scores on the mathematics section of the SAT showed that students using partial notes performed significantly lower than the other group. Therefore, high academic performance of the partial notes group cannot be attributed to superior mathematical ability. We concluded that participation in the course using partial notes related strongly to higher academic performance.

VI. Conclusion.

The results of this exploratory study suggest that providing students in mathematics classes with partial notes is beneficial to their learning. The students' voluntary comments about partial notes indicated that they appreciated the strategy. Students emphasized that partial notes were beneficial for keeping them engaged with the lecture, providing opportunities to participate actively in class, and to effectively review for examinations. In addition, the comparison of the examination scores suggests that partial notes might have been a factor contributing to the improved student performance.

A. Implications for Practice.

In this work we presented some of the benefits of providing students with one format of instructor-generated partial notes in mathematics courses. For the instructor who ordinarily types the lecture notes, this strategy could be easily implemented in his/her classes. For the skeptical instructor, the results of this exploratory study should be a starting point to show that the benefits might be worth the extra effort involved.

The benefits of partial notes go beyond the specifics addressed in this study. Partial notes may have the same benefits, detailed in the previous section, in other mathematics courses and in

many science courses. Instructors can adjust the format of the notes to the students' levels and experience and they may find outlines to be more appropriate for upper-level courses than partial notes as described in this article. Partial notes may be particularly beneficial for coordinators of multi-section courses, ensuring uniform coverage of the material across all sections. Coordinators can use partial notes to help new teaching assistants and foreign instructors who might not be familiar with a particular educational system.

Partial notes can also enhance the learning experience of learners whose native language may be different from the language of instructors, and of students with disabilities who are easily distracted and might miss important lecture ideas. Students who find the pace of the class too fast and students with bad handwriting may also benefit from the use of partial notes.

B. Limitations and Future Research.

As an exploratory study, this work offered valuable insights regarding partial notes, but its limitations need to be addressed. One major limitation of this study was that we worked with aggregated data that were analyzed after the semester concluded. Therefore, there were no follow-up questions or interviews that could allow for a deeper understanding of what students meant on the open-ended questionnaires. While partial notes were the only instructional difference the instructor introduced in the Fall 2007 semester (compared to Fall 2006), the researchers could not entirely attribute students' improvement of their performance solely to the presence of partial notes. Therefore, the researchers are cautiously optimistic about the success reported here because of the exploratory nature of this study.

The findings of this exploratory study revealed only the tip of the iceberg of this promising strategy in mathematics courses. Further research should delve deeper into the students' PN preferences in mathematics classes as well as examine other formats of partial notes that would eventually lead students to take their own efficient notes. Since this instructional strategy is not content-dependent but cognitive-dependent, we feel confident that readers teaching other disciplines will find this article relevant to their contexts.

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Book Review
To Improve the Academy: Resources for Faculty, Instructional and Organizational Development, Volume 28

Kate L. Forhan[1]

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Publisher Description: The development of students is a fundamental purpose of higher education and requires for its success effective advising, teaching, leadership, and management. Professional and Organizational Development Network in Higher Education (POD) fosters human development in higher education through faculty, instructional, and organizational development. A smart mix of big-picture themes, national developments, and examples of effective faculty development initiatives from a variety of schools, *To Improve the Academy* offers examples and resources for the enrichment of all educational developers. This annual volume incorporates all the latest need-to-know information for faculty developers and administrator.

One of the most remarkable changes in the academy within the last twenty years has been the development of formal centers for faculty development, found today on virtually every American university campus. Called variously "Centers for Teaching," "Centers for Teaching and Learning," or "Offices of Teaching Effectiveness," these organizations are often poorly staffed and financed, and may rely heavily on external funds for their activities. At their origins, they often lacked credibility among faculty, who, as many of us remember, learned to teach simply by getting into the classroom and following the examples of our own professors. Today, centers have become institutionalized, professionalized, and provide a variety of services. A few of these many facets include developing new teaching methods, mentoring junior faculty, and providing formative evaluation. However, they may also assist faculty in developing grant proposals, assessment plans, writing-intensive curricula, and on-line courses.

To Improve the Academy is directed primarily to professional staff –many with academic credentials--within centers for faculty development. It focuses on four themes: 1) improving the professional standards, expectations, and qualifications for centers and their personnel, 2) understanding faculty goals and priorities to foster engaged teaching, 3) the insights of scholarship about teaching techniques and their impacts on students, and 4) appropriate activities and programs for the next generation of centers for teaching. While the links between these essays are sometimes strained, on the whole, there are useful insights, not only for center professionals but also for chairs, deans, and provosts.

Section 1 might seem to be of interest only to center professionals, since it provides models and frameworks for center organization. It demonstrates a desire on the part of these

[1] Professor of Political Science, Provost and Vice-President for Academic Affairs, University of Southern Maine

professionals to be more integrated into the life of the University community, and even presents University committee work as both a bridge to faculty and a mechanism to increase the visibility and credibility of centers. Yet, there needs to be some caution in this vision. As the national ratio of tenure-track to contingent faculty continues to decline, university "service" obligations fall more and more on fewer and fewer tenure line shoulders. From the faculty perspective, center professionals are "administrators" and, in unionized environments especially, their participation may be seen as a threat to faculty autonomy in curriculum, teaching, and other areas. Tenure-line faculty may engage in service less if "administrators" participate more, with unanticipated consequences for universities as a whole. This section of the book also has an excellent chapter on techniques of formative evaluation through observation.

Section 2 addresses faculty, and includes some practical research and information on the effectiveness of some center activities. It includes an important chapter on patterns of faculty response to negative feedback, which could be useful to those engaged in faculty mentoring or personnel evaluation. For academic administrators such as chairs and deans, the chapters of Section 3 are especially valuable since they address several common beliefs about teaching and students. In Chapter 11, the authors posit that small classes are not necessarily more effective, and in Chapter 8, that "rigor" is not always what faculty think it is. Chapter 14 provides an in-depth discussion of academic dishonesty, and Chapter 13 takes on classroom discussion techniques.

Section 4 is noteworthy and valuable for its focus on the future. As centers seek to provide new programs to address faculty development, they are offer services to both individual instructors and the university as a whole. Universities facing budget cuts cannot often afford sending individuals to administrative conferences. Our aging professoriate requires us to foster effective succession planning. In the course of a thirty-year career, a faculty member will move through multiple roles, depending on his or her interests and opportunities. He or she may serve as a department chair, as a clinical supervisor, as a faculty senate president, an associate dean, a personnel committee chair, a dean, or even a provost or a president. Faculty development programs that take a holistic approach to career development and provide training for administrative roles will be increasingly useful, not only for individuals, but also for the academy at large. In short, Centers for Teaching are no longer sufficient for the needs of the 21st century university. A successful center will position itself to provide professional development in all three areas of faculty life: teaching, research, and service, especially administrative service.

JoSoTL
JOURNAL OF THE SCHOLARSHIP OF TEACHING AND LEARNING

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

1. Data-driven studies: formal research projects with appropriate statistical analysis, formal hypotheses and their testing, etc. These studies are either with a quantitative or qualitative emphasis and authors should indicate the appropriate domain. Acceptable articles establish a research rigor that leads to significant new understanding in pedagogy.

2. Reflective essays: integrative evaluations of other work, essays that challenge current practice and encourage experimentation, novel conclusions or perspectives derived from prior work

3. Reviews: Literature reviews illuminating new relationships and understanding, meta-analysis, analytical and integrated reviews, etc.

4. Case studies: These studies illustrate SOTL and its applications, usually generalizable to a wide and multidisciplinary audience.

5. Comments and communications: Primarily, these are comments based on previously published JoSOTL articles, but can also include book reviews, critiques and evaluations of other published results in new contexts or dimensions

Submissions

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

- **Traditional Research Reports: data driven studies with either a quantitative or qualitative emphasis**
- **Reflective Essays on SoTL**
- **Reviews of current themes in SoTL research including meta-analysis**
- **Case studies illustrating SoTL and its applications**
- **Comments and Communications on previous Journal articles, or book or software reviews**

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

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

Every submission must include a cover page preceding the article with the following information:
Title of article
For each author:
    Name and affiliation
    Postal address
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Abstract (less than 100 words)
Keyword list related to the submission (less than eight words or short phrases)

This cover page should be followed by the article formatted according to the JoSoTL Style Sheet (available in either .doc or .pdf format).

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Authors will be required to sign a Copyright Agreement with the Trustees of Indiana University. Authors must be prepared to sign this agreement upon acceptance of their work and prior to

publication in the Journal. For more information regarding copyright, please see the statement of copyright and terms of use.

If you have any questions regarding the submission policy, please e-mail Kimberly Olivares (JoSoTL Production Coordinator) or call her at 317-274-0086, or contact a member of the Editorial Board.

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Journal of the Scholarship of Teaching and Learning, Vol. 10, No. 1, January 2010, pp. 99 - 101.

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

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

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

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

I. General Guidelines for the Manuscript.

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

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

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

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

II. Section and Sub-Section Headings.

A. Major Sections.

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

[1]Department of Educational Philosophy, Indiana University Northwest, 3400 Broadway, Gary, IN 46408, jdewey@iun.edu.
[2]Institut Pasteur, University of Paris, 75015 Paris, France.

B. Sub-Sections.

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

III. Tables and Figures.

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

Table 1. The title of the table.

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

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

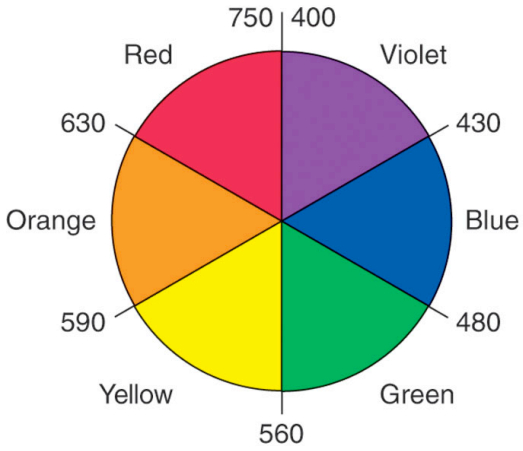

Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

Acknowledgements

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

Appendix

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

Appendix 1. The Title of the Appendix.

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Editorial Board Members

Contact Info for the Journal

JoSoTL Editorial Office

Indiana University Purdue University Indianapolis
755 W. Michigan St, UL 1180D
Indianapolis, IN 46202

josotl@iupui.edu

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