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# THE LEARNING ASSISTANCE REVIEW

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## ***About The Learning Assistance Review***

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*The Learning Assistance Review* is an official publication of the National College Learning Center Association (NCLCA). NCLCA serves faculty, staff, and graduate students in the field of learning assistance at two- and four-year colleges, vocational and technical schools, and universities. All material published by *The Learning Assistance Review* is copyrighted by NCLCA and can be used only upon expressed written permission.

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## Letter from the Editors

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For a moment, consider the following: Learning Centers are the “heart” of student success. Just as each heartbeat surges life sustaining blood into the body, so, too, does each intersect with a student infuse the opportunity for success to the student, to the center, and to the college. This rhythmic beat repeats itself throughout the day and throughout the academic calendar, increasing at mid-terms and finals and easing back to a “resting” beat between semesters. This journal issue looks at different types of “beats,” from the actual to the symbolic.

The article “Psychophysiological Measures of Learning Comfort: Study Groups’ Learning Styles and Pulse Changes” reports on an empirical study that actually measures students’ heartbeats to see how the heart reacts when students are tutored following their preferred learning styles.

The rhythmic communication from tutor to tutee (metaphorically, the beat within the tutoring session) is studied in “Dominance and Peer Tutoring Sessions with English Language Learners,” exploring how best to best direct the communication needs.

Just as when people reach middle age, their hearts sometimes need attention for them to keep beating, so, too, do upper level students sometimes need an academic boost to keep them viable in their academic careers. “Supplemental Instruction: Supporting Persistence in Barrier Courses” presents the impact on providing SI to upper level courses.

The article “Utilizing Multiple Interlocking Learning Communities to Form a Center for Teaching and Learning” presents a case study that provides an example of integrating a learning center with a teaching center, symbolically connecting one essential “chamber” of the heart—instructors—to the other part of the heart—the students. This case study highlights how all benefit from this intersect.

Finally, we wish to get every member of NCLCA’s heart beating a little faster by encouraging everyone to participate in the Fall conference “The Rhythm & Blues of Research and Practice” and by considering submitting manuscripts to *TLAR*.

**Christine Reichert**  
Editor

**Susan Shelangoskie**  
Managing Editor





# Psychophysiological Measures of Learning Comfort: Study Groups' Learning Styles and Pulse Changes

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## Abstract

*This study provided empirical support for tutor-led study groups using a physiological measurement and study survey data. The scope of this preliminary study included determining differences in biology and chemistry study group members' (N = 25) regarding learning styles and pulse rate changes. As hypothesized, there was significant evidence that pulse rate decreased during the sessions, suggesting less stress. Significant differences in final and initial pulse rate were found for biology students when their learning style was matched to the style of instruction. The results suggest that gearing instruction styles to students' learning styles may reduce learning stress in some cases.*

Creating measurable and relevant learning outcomes is a crucial portion of education and has become an important strategic objective for higher education in addition to grade school. The trend towards outcomes assessment has implications for developing ways to more effectively facilitate instruction and learning (Johnson, 2006). Learning style refers to the compilation of preferences and abilities an individual has relating to information gathering and processing (Johnson & Orwig, 1998). Learning styles include both biological and psychological aspects of the individual (Davis & Franklin, 2004). Based on these characteristics, some learning and teaching methods are more effective for some individuals and less effective for other individuals. Therefore, learning style is an important factor in how an individual learns and in creating and assessing learning outcomes. R. Dunn (1984) posited that teaching in a format that was consistent with a student's preferred learning style was one of the most efficient ways to customize individual instruction. There are different learning styles

mentioned in the literature including sensory preferences, such as the Dunn and Dunn learning model (Dunn, 1990), or those associated with personality characteristics such as those identified with the Myers Briggs Type Indicator (Jie & Xiaoqing, 2006; Myers, 1962).

One of the challenges with assessing learning assistance outcomes is gathering data that is both objective and relevant. This is due in part to the presence of many possible confounding variables. Additionally, the modes of learning assistance, such as one on one tutoring, do not naturally fit the constraints of experimental research such as the inclusion of a control group or random selection. Finding ways to measure physiological and psychophysiological data may help to strengthen educational research by the addition of some rigors associated with scientific inquiry. Pulse rate is one measure of psychophysiological arousal, such as stress (Youngmee, 2006). D. Rowland, A. Kaarianinen, & E. Houtsmuller (2000) demonstrated a connection between psychological response to a stimulus and physiological arousal in a learning activity. However, no research revealed in a literature search extended psychophysiological measures to learning styles. Therefore, this research helps fill a gap in the literature by demonstrating a preliminary connection between psychophysiological data as a measure of a student's learning comfort and information presented in accordance with different sensory learning preferences.

## **Background**

The sensory model of learning styles is the model that can be most closely matched with stimulus processing in the brain. Because this empirical study sought to gather psychophysiological data, this model was the most appropriate to use for assessing students' learning styles. This model posits that there are four major forms of modality of learning styles: visual, auditory, kinesthetic, and tactile (DiCarlo & Lujan, 2006).

Students with a visual preference learn best through a pictorial form or via other visual information. Students with an auditory style favor auditory stimuli, such as through lectures or discussions. Students with a tactile style prefer to learn through interaction with textual materials where they can hold the pencil or touch the paper handout, for example. Students with a kinesthetic preference learn better through performing or doing activities that promote physical involvement and manipulation of objects (DiCarlo & Lujan, 2006). Thus, the model of learning style that focuses on sensory preference suggests that signals between sense organs and information processing in the brain are modulated by individual preferences for one type of information over another.

Findings in cognitive psychology have suggested that pulse rate increases when the student reads a sentence that he or she does not recognize or understand, and pulse rate decreases when the student reads a sentence that he or she comprehends (Beyda & Spence, 1980). Consistent with the literature on stress and heart rate, a decrease in heart rate could suggest less stress or anxiety and, therefore, higher levels of comfort with learning such as obtaining information via the preferred sensory pathway. Thus, measuring pulse rate change provides a measure of student comfort with material.

## Method

### *Participants*

The participants (N = 25) consisted of adult coed students taking BI 101 and CH 101, introductory level biology and chemistry courses. Students in all sections of these classes were invited to participate in the study group. After attending an information session about the research, students who agreed to participate in the research signed documents indicating their informed consent.

### *Measures*

This study utilized three measures, the Barsch (1980) Learning Style Inventory (LSI), students' pulse rate, and a self-disclosing Likert-type survey. The Barsch LSI was developed to indicate students' preferences towards visual, sensory, tactile, or kinesthetic learning styles. The students received training in manually measuring their pulse rates and applied this training two times during each session to obtain an initial and final pulse rate. A self-disclosing Likert-type survey was completed at the last study session to assess students' perceptions of study group outcomes. The surveys were approved for use by faculty and an administrator.

### *Procedure*

The Barsch (1980) Learning Style Inventory was administered to all students in the study groups, and the dominant learning style was then analyzed for each student according to the inventory key. Students were informed of their learning style preference, but they were not told what learning style was the primary mode of delivery for each study session. The students attended a one-hour study session for their course once a week for four weeks. The BI 101 and CH 101 study groups met separately because the content for each session was specific to each course.

Each session included three elements: it was conducted by an experienced peer tutor with College Reading and Learning Association Certification, it contained a specific learning activity delivered primarily through one sensory mode, and it included two pulse rate measurements. Each student took his or her initial resting pulse rate five minutes into the study session to allow for the student's pulse rate to recover from normal activity involved in getting to the session. Each student also took his or her final pulse rate, according to directions from the peer tutor, at the halfway point of the one-hour session, after the student engaged in the learning activity. Study sessions were held once a week for each course. The content for each session was based upon what the students were learning in their classes during a given week. The sensory mode featured at a given session was randomly alternated for each course. The same peer tutor led every session.

*Week 1.* The BI 101 study group featured visual delivery while the CH 101 study group relied on tactile information. In the BI 101 study group, the tutor used pictures, chalk diagrams, and computer animation to visually explain and clarify the structure of the cell and its organelles. In the CH 101 study group, students used paper, pencils, and textual materials in the form of worksheets, crossword puzzles, and practice problems of the topics being covered in class. These topics were solving stoichiometry problems,

balancing chemical equations, and calculating molarity.

*Week 2.* The BI 101 study group focused on the kinesthetic mode of learning. The tutor instructed one student to hold a basketball at different heights while the other students jumped to reach it to demonstrate the role of activation energy in chemical reactions. To demonstrate differences between anabolic and catabolic reactions, the tutor instructed the students to link arms to represent building up a larger unit from smaller parts and then releasing one another to indicate being split into smaller parts. Thus, the students got to act out their understandings of the biological processes being studied.

The CH 101 study group used the auditory mode of learning. The tutor provided a mini-lecture and asked the students to talk with each other about what they understood from the lecture. The students also verbally explained to one another how they would approach each question the tutor asked them in order to achieve the correct answer.

*Week 3.* The BI 101 study group emphasized tactile information in the form of worksheets, crossword puzzles, and practice problems about photosynthesis and cellular respiration. The CH 101 study group learned about Hess's Law and the fundamental concepts of calorimetry through visual information, pictures, and equations written on the board. The students demonstrated learning by identifying the pictures that were conceptually correct and which problems were correctly solved.

*Week 4.* The BI 101 study group engaged in auditory learning by receiving a mini-lecture from the tutor on the cell cycle. The tutor explained the stages of cell division and, after the students discussed the topic with one another, aurally quizzed the students to test their knowledge of the material covered in the session. The CH 101 study group featured kinesthetic information. The tutor used inflated balloons to represent atomic orbitals. The students manipulated the balloons to learn about the shape and layout of atomic orbitals. The tutor provided a kinesthetic learning activity for Hund's Rule by placing paper on the floor to represent atomic orbitals. Each student, representing one electron, took his or her place on a piece of paper until each piece of paper had one student standing on it. The remaining students were then paired with the students already standing on the paper. The action involved in this activity represented electrons spreading out in orbitals until all orbitals had one electron before electrons formed pairs in orbitals.

At the last session, students completed the self-disclosing, Likert-type survey to assess their perceptions of the study sessions. Students responded to the following items using one (strongly disagree) to five (strongly agree) rating: a) material was presented in an understandable way, b) tutor explained concepts clearly, c) in session activities and materials were helpful, d) would recommend study group to others, and e) study group increased performance in class assignments and tests.

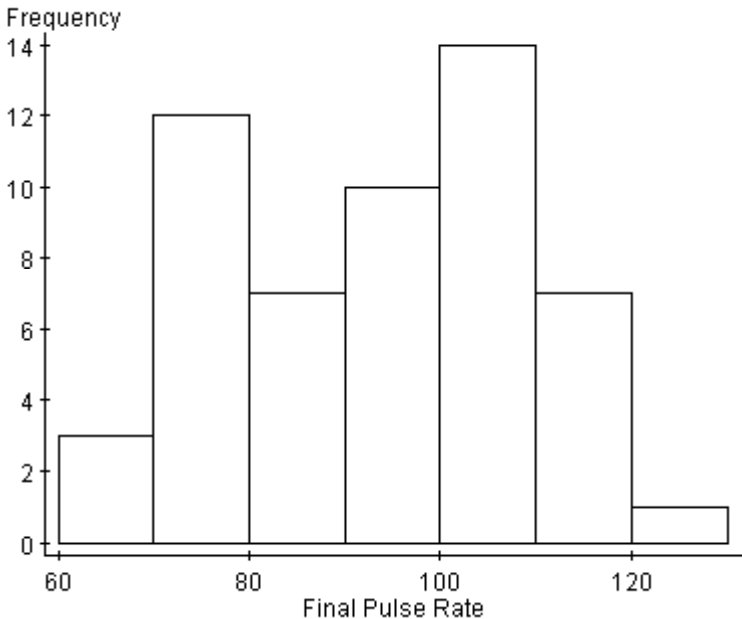
## **Results**

The data was examined from the following perspectives: composition of study groups according to learning style preference and pulse rates, pulse rate changes when students' preferred learning style matched or did not

match a session's delivery style, and pulse rate changes and self-disclosure data to identify whether student comfort was increased through participating in the study sessions as a whole.

The results of the Barsch (1980) inventory showed that 34% of the students in the biology study group had a dominant visual learning style, 22% of the students in that group preferred kinesthetic learning, 22% of the class preferred a bimodal learning style (two styles close together in preference) of visual and kinesthetic, 11% of the students preferred the auditory style, and 11% of the students favored tactile learning. Visual learning was also the dominant mode in the chemistry study group with 44% of the class scoring highest on this style of learning. Auditory was the second most preferred style, 25%, followed by kinesthetic, 19%, tactile, 6%, and bimodal visual and kinesthetic.

In addition to describing the groups in terms of sensory learning styles, the mean final pulse rates for two of the study sessions were calculated and compared to normal pulse rate ranges for healthy adults, determined to be between 60 and 100 beats per minute (Klabunde, 2007). The distribution of final pulse rate for all students was roughly symmetrical and was consistent with the normal adult range (see Figure 1).



*Figure 1. Combined distribution of participants' mean pulse measured at two study sessions.*

Establishing that the students' pulse rates were close to the normal range was important for controlling for some pulse rate abnormalities that might impact how well the results could be generalized to a larger population.

To determine whether there was a statistically significant decrease in pulse rate when instructional style matched dominant learning style, a paired-sample t-test was conducted. The results showed that the students in the BI 101 group whose learning style matched the style presented in the study session had a significantly lower pulse rate than the students whose learning style was not matched in a given session. The same analysis of the CH 101 did not detect a significant difference in pulse rate when the students' learning styles matched the instructional styles of focus (See Table 1).

*Table 1*

*Comparison of Mean Pulse Rate Changes*

<u>Learning Style and Instructional Delivery</u>	<u>Biology</u>	<u>Chemistry</u>
Matched vs. Not matched	$H_A : \mu_1 - \mu_2 > 0$	$H_A : \mu_1 - \mu_2 > 0$
Mean Pulse Rate Difference	12.64	5.00
Standard Error	5.14	6.96
<i>t</i> statistic	2.46	0.71
<i>p</i> -value	0.0108	0.2412

*Note.* Based on information retrieved using StatCrunch 4.0.  $H_A$  refers to alternative hypothesis;  $\mu_1$  refers to mean of unmatched;  $\mu_2$  refers to mean of matched. The null hypothesis:  $H_0 : \mu_1 - \mu_2 = 0$ .

The mean pulse rate of the biology study group members whose learning style matched instructional style of focus was lower than the mean pulse rate of students whose learning style was not matched during the session. In contrast, results from the chemistry study group did not show a statistically significant difference between matched and unmatched pairings of learning style and instructional style of focus. However, data from both study groups showed that without considering learning style and delivery style final pulse rates were lower than initial pulse rates. The mean difference was 9.41 beats per minute with a standard error of 2.41. The t-statistic was 3.91 and the p value was less than 0.0001. This supported the notion that participating in peer-led study groups led to decreased physiological arousal, consistent with higher levels of learning comfort.

The statistical analysis suggested that for the biology students the visual and kinesthetic delivery styles were most effective because the average final pulse rate was significantly lower than the average initial pulse rate ( $p < 0.02$ ). For the chemistry students, the most effective learning styles were the tactile and auditory modes because their average final pulse rate was significantly less than their initial pulse rate ( $p < 0.05$ ).

In addition to the physiological data, the students' responses to the evaluation showed that students perceived the study sessions to be helpful (See Table 2). Possible responses were 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). All response means for each question in the evaluation instrument were 4.66 or higher. For the items material presented in an understandable way, session activities and materials were helpful, and recommend study groups to other students, all students' responses were strongly agree.

Table 2

*Study Group Evaluation Summary.*

Item	BI 101 Mean	SD	CH 101 Mean	SD
1) Material presented in understandable way.	5	None	5	None
2) Tutor explained concepts clearly.	4.83	.44	5	None
3) Session activities and materials were helpful.	5	None	5	None
4) Recommend study to others.	5	None	5	None
5) Study group increased performance in class assignments and tests	4.66	.44	4.66	.44

Note. Microsoft Excel 2003 used to analyze data.

## Discussion

The most promising implications of the results from this empirical study are two-fold. First, physiological data, along with self-disclosure surveys, supports the efficacy of peer-led study groups as a way to increase student comfort and enhance learning. Second, psychophysiological data may allow researchers and practitioners to better customize learning assistance strategies, such as delivering material in a way that takes into account the students' learning styles in some cases. The data from the study groups affirmed the theories applied and matched with survey responses that study groups were helpful and material was presented in an understandable way. Results from the self-disclosure survey clearly indicate that students found the study sessions beneficial, believed the study groups had boosted their academic performance, and would recommend the sessions to others. Lower heart rates were consistent with higher comfort through each session.

Results of the study provide initial support for the effectiveness of peer-led study sessions in decreasing stress and, therefore, increasing comfort associated with learning. Final pulse rates were significantly lower than initial pulse rates for both biology and chemistry study groups. Additionally, the biology study group members' results indicated an increased comfort when material was presented in a format consistent with their dominant learning style as opposed to their non-dominant learning style. The chemistry study group did not show statistical evidence of increased comfort when learning style and instructional style were matched. This difference in the biology and

chemistry study groups upholds the value of providing learning assistance techniques that match the students' major learning style in some settings. The findings simultaneously raise questions for future research to consider regarding when (and why) matching delivery and learning style matters.

### *Implications*

In addition to the aforementioned research avenue, there are several other crucial praxis implications of the findings:

- ◆ Learning comfort may play an important role in student retention. B. Linn & R. Zeppa (1984) and C. Struthers, R. Perry, & B. Menec (2000) noted a relationship between academic performance and stress students' experienced during studying. Therefore, learning assistance techniques such as the study groups used in this research and incorporating delivery methods that reached different learning styles in some settings could help mitigate student stress and increase student retention.
- ◆ Empirical support of the use of tutor-led study groups strengthens the field of learning assistance and is useful for learning center personnel who need to provide their administrators with outcomes-based evidence.
- ◆ Because students' vary according to the type of sensory information they prefer, it is important for tutors to be adept at practical and creative ways to meet students' learning needs.
- ◆ There appears to be certain classes or course areas where presenting information in multiple sensory modes is more efficient. This is indicated by the differences in the biology and chemistry study groups with regard to matching learning and delivery style. This study highlights the need for additional understanding of the differences between the role of learning styles and learning comfort in the two science courses featured in the study sessions. With this knowledge, learning center administrators could better use their resources and train tutors on the appropriateness of incorporating and applying learning style knowledge.

### *Further Study*

Running the study groups again along with a physics study group and an organic chemistry study might provide some insight as to whether a difference in the results could be explained by whether the course is more heavily math-based (e. g., physics or chemistry) or conceptually based (e. g., biology and organic chemistry). Future research might also benefit from overcoming the limitations of this study by utilizing a larger sample size, multi-institution sample, and proportionate random sample. Additional research regarding possible confounding variables such as age, gender, ethnicity, familiarity with the subject (e. g., having had college level courses previously), or degree of science anxiety might help clarify the results more fully. A pre-test and post-test design might allow researchers to track the impact of the study sessions while accounting for baseline levels of scientific knowledge. Future research might also benefit from more regulated experimental conditions or more sophisticated physiological measures, such as measuring blood pressure, or monitoring pulse rate continuously.



However, the challenge with implementing these suggestions is that doing so may take away from the efficiency of the students' experiences or take the focus from providing learning assistance services.

Other suggestions for future study might be using a different learning style instrument and comparing the results using the Barsch (1980) questionnaire with other learning style models. The research could also benefit from a stronger qualitative component or more extensive survey questions to determine what helps foster the comfort and to learn more fully how students perceive the learning assistance they receive. An obvious example might be including an anxiety scale to assess students' perceptions of anxiety before, during, and after the study group sessions. Longitudinal research could examine whether the findings are part of a larger trend.

### Conclusion

This study provided support for the role of psychophysiological data in determining the efficacy of learning assistance methods and the application of learning style theories. The results indicated that students who participated in the study groups had significantly decreased pulse rates, pointing to enhanced learning comfort. Increased comfort has been associated with better academic performance and retention. Thus, the research upheld the value of learning assistance techniques in academic achievement and retention. The results also suggested that matching information delivery and learning style aided student comfort in some cases, such as those in the biology study group, although explaining and predicting these differences will need to be shown through additional research and practice. Understanding both students' preferred learning styles and matching instruction to learning preferences can help educators make decisions about customizing the lesson to the students' individual preferences (DiCarlo & Lujan, 2006).

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# Dominance and Peer Tutoring Sessions with English Language Learners

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## Abstract

***In order to better understand the complex dynamic that often occurs during writing center sessions between native English speaking (L1) tutors and English language learners (ELL), this study investigates linguistic dominance through time-at-talk, turn-taking, agenda-setting, and content analysis. We conclude that, in keeping with theory and practice of tutor training in inquiry-based pedagogy, ELL students and peer tutors vacillate between the linguistic dominant position, indicating that participants establish a collaborative and egalitarian environment. However, L1 tutors may experience dissonance because the agenda set by ELL students often focuses on surface features such as grammar and diction rather than on global revisions.***

The Writing Center peer tutor reads a paper just presented to her, while the engineering student, whose first language is Mandarin Chinese, shifts uneasily in his seat across the small table. He nervously glances at the clock hanging on the cinder-block wall. An awkward silence hangs between them, and the anxiety becomes even more palpable as the tutor hesitantly offers a suggestion:

I think that's fairly straightforward, but you might want to, see I don't know. Mmmm, where is that part? I don't know if in something like this you're supposed to have a hypothesis that you state up front. I don't really know, but it might be helpful to say that this is your working hypothesis. This is what you think is gonna happen but you acknowledge that possibly it could be that. So, maybe make that more explicit that this is what you're thinking will happen and that you recognize that this is possible.

In this one simple example, the peer consultant reveals her uncertainty with

hedges like “might,” “maybe,” and “I don’t know,” a total of six times in six sentences. This typical short utterance illustrates the discomfort that often occurs in writing center sessions between consultants who are speakers of English as a first language, what we will designate as L1 speakers, and student clients who are non-native speakers learning English as a second --or tertiary--language. In the above example, the consultant responds to global issues, but in doing so uses linguistic hedges, perhaps because of her discomfort in dominating the focus of the session. Although she responds to global issues in the student’s writing as she has been trained to do, he wants her to specifically address his grammar usage. His agenda for the session is different from hers, resulting in a clash of cultural preferences that complicates the communication process for both parties.

It comes as no surprise that, like the tutor excerpted above, writing tutors often feel apprehensive about giving direct advice for a student paper, especially when the students with whom they work depend on them as an authority figure, a rhetorical position that peer tutors try to minimize in order to create a more egalitarian space for collaboration within the tutoring session. It is common practice to train tutors using the inquiry-based method, a strategy wherein the more experienced peer tutor asks relevant and probing questions that lead students to establish a topic, refocus their ideas, reorganize their evidence, rethink their claims, or make other changes to their work. The key is that the tutor, rather than directing specific changes, merely engages students in thought processes that help them work through their rhetorical decisions. Writing tutors are trained to facilitate rather than control the revision process and to help students with the process of writing rather than direct specific surface-level changes. However, English language learners are often, understandably, preoccupied with correcting surface features of writing such as grammar and diction. To further complicate matters, ELL students often come to the writing center with a heightened view of the tutor as an authority figure because international models of education usually emphasize the authority of teachers and tutors (Powers, 1993a, 1993b; Wiegler & Nelson, 2004; Bell & Youmans, 2006).

In “Rethinking Writing Center Conferencing Strategies for the ESL Writer” (1993b), Judith Powers asserts that “collaborative techniques depend so heavily on shared assumptions or patterns, conferences that attempt to merely take the techniques we use with L1 writers and apply them to ELL writers may fail to assist writers we intend to help” (p. 93). This assertion underpins this research project, hinting at the reason for the tutor’s uncertainty in ELL consultations and highlighting potential imbalances and concerns with the practice of collaboration within ELL sessions. When tutors rely on the patterns they establish when working with L1 writers, superimposing similar strategies in sessions with English language learners, they often recognize that the collaboration is somehow out of sync, but they don’t have the necessary techniques to get back on track. S. North (1984) asserts that while writing center assistance is collaborative, it is also student-centered, and consultants must “begin from where the student is, and move where the student moves” (p. 439).

Students who comprise the average writing center clientele bring varied majors and academic backgrounds to each tutoring session, and research

indicates that ELL writers bring many challenges to the writing process and composition instruction because of past writing experiences, academic expectations, and differences in schemata for topics (Leki, 1992; Bell & Youmans, 2006; Thonus, 2004; Williams, 2004). So, in addition to the usual responsibilities writing center tutors encounter when working with native speaking students struggling to write, they must also attempt to meet the more complex needs of ELL student writers, and they must delicately balance their role as expert tutors with their authority as representatives of the university (Bell & Youmans, 2006). Jane Cogie (2001) finds that tutors must continue to draw on their training as peer facilitators to act as an equal during consultations, even when confronted by students, like English language learners, who expect more professional help and authoritative opinions. Cogie's article "Peer Tutoring: Keeping the Contradiction Productive" defines the conflicting roles that must be enacted by the tutor; these conflicting roles complicate the assistance these tutors provide to students. She explains that "peer versus tutor, supporter of the student versus representative of the university, advocate of the writing process versus expert on the written product" are all dichotomous roles that tutors must find a way to integrate to be effective (p. 37).

In order to better understand the dynamic that can occur during sessions that present clashes in cultural expectations of the learning environment, this study explores peer tutoring sessions between native English speaking (L1) tutors and ELL students. This work investigates those issues by looking at linguistic dominance, which is a way to exert power by controlling the language through which communication occurs. Tutors trained in inquiry-based pedagogy facilitate rather than control the language of the session, following the lead and authority of the student. However, tutors often experience dissonance when working with ELL students because they feel tension between what the student wants out of the session, which is often help with surface features and grammar, and what the tutors have been trained to address, which is process orientation and global issues. So, although writing tutors are taught to defer to the student when determining the focus and topic of a session, cultural and linguistic differences create tensions between their session goals and English language learners' session goals. Should tutors follow the inquiry-based principle that the student should determine the content of the writing center session? If so, then the content of student-dominated ELL sessions can easily become grammar-based. Or do they follow the tenet that they work on global issues first? If so, then the session becomes tutor-dominated since the tutor will be determining the focus of the session rather than the student. Either way, tutors are put in the difficult situation of favoring one set of best practices at the expense of others. Thonus (1999) explains that "dominant individuals possess functional access to power through control over properties of discourse such as turn-taking [and] topic selection (p. 228). Linell (1990) finds a direct correlation between dominance and time-at-talk. Thus, linguistic dominance through turn-taking, topic selection, and time-at-talk are important constructs in writing center peer tutoring sessions and provide a framework through which to investigate cross-cultural sessions. Studying the factors that influence dominance, such as those indicated in the Thonus and Linell studies, will help us better understand the ELL tutoring situation and train peer tutors to anticipate differences between their L1 and ELL clients.

Specifically, this study investigates dominance in writing center interactions with ELL students through both quantitative and qualitative evidence. Quantitative evidence includes traditional linguistic measures of time-at-talk and turn-taking. Additionally, content and agenda-setting analysis of session dialogue sheds light on other factors that influence dominance. Finally, qualitative evidence, taken from post-consultation interviews, provides insight into the sometimes conflicting expectations of the consultation by both the tutor and the ELL student. Each data point provides a means through which to gauge, evaluate, and analyze the linguistic dominance established during the consultation, key components in determining the perceived effectiveness of peer tutoring sessions. Clear indication of dominance throughout the session by one participant or the other creates an imbalance that can compromise the overall effectiveness of the session because the session becomes less egalitarian and inquiry-based. However, when the power in a session is shared, which is the desirable environment for an inquiry-based writing center session, then those factors that point toward dominance will shift throughout the session, indicating that participants were able to establish an effective collaborative learning environment that values input by both peer tutor and student.

### **Methodology**

The purpose of this project is to investigate how dominance in writing center sessions between L1 consultants and ELL students unfolds through examining tape recordings of 30 minute sessions. Using the categories established by linguists Thonus (1999) and Linell (1990) in their well regarded work on linguistic dominance, we focus on time-at-talk, turns in discourse, session content, and agenda setting. Post-session interviews were also recorded and analyzed. The purpose of this study is to analyze not only what took place in the recorded and transcribed sessions, but also to look at information gleaned from the post-session interviews in order to answer the following research questions:

- ◆ Who dominates the session based on time-at-talk?
- ◆ Who dominates the session based on turn-taking?
- ◆ Who sets the agenda?
- ◆ What constitutes and who determines session content?

These questions help identify the dominant party in the interaction that occurs between the tutor and the ELL student during a session. In order to fully answer these questions, it is important to examine the context in which the project took place, the participants chosen for the study, and the relevant terms and methods used for the analysis of data.

### *The Writing Center and Peer Tutors*

All of the recorded and transcribed writing center consultations took place within a two-week span at a mid-size state funded southern university. The writing center operates under the supervision of a director, who is an associate professor of English, and two graduate students in the department of English. The center, open 50 hours a week, frequently assists students and faculty from all five colleges of the university, averaging about 2,000 individual sessions per year.

The center also includes 12 undergraduate peer tutors, who are hired based on teacher recommendation and academic performance. They undergo intensive training to ensure that they approach every session with a substantial toolbox of methods and strategies. Through training, the tutors are taught that their sessions should focus on the writing process and the writer, not on the individual products the session might yield. Tutors achieve writing center goals by engaging in collaboration with the students, often through the inquiry method that utilizes open-ended questioning strategies that help students think critically about their work in an attempt to help develop the students' composing processes and approach to writing. Attention in any writing session must first be directed to global issues dealing with establishing focus, organizing ideas, and supporting evidence. Secondly, and only if time remains, the consultants address local issues such as paragraph structure, transitions, introductions, and conclusions. The final concern is with editing and proofreading issues that address grammar, typographical errors, and citations. This hierarchy follows common writing center practice and theories of writing pedagogy.

### *Student Participants*

The four writing center clients who participated in this study are all non-native speakers of English enrolled in English as a Second Language (ESL) composition courses at the time of the recordings. They were chosen due to their various linguistic backgrounds, areas of study, and university enrollment status. Their ESL instructors required visits to the writing center, and the students volunteered to have a regular writing center session recorded. Additionally, the students submitted copies of the written rough drafts used during the consultation and later sent final drafts of the same assignment via email for the study. They all agreed to participate in a brief post-consultation interview and signed informed consent forms acknowledging their willingness to participate in the research. For all but one of the four students, their first visit to the writing center was recorded so as not to complicate analysis of the interactions with previously established dialogue patterns. The two engineering graduate students were paired with writing center graduate teaching assistants who are familiar with graduate level writing expectations.

The students will be identified throughout the study by (S) for student and A,B,C, or D to distinguish their different backgrounds. The following table indicates the students' backgrounds and status.

Table 1

*Student Identification*

Student Identification	Gender	Level of Study/Area or College	Linguistic Background
Student A (SA)	Male	Graduate/Engineering	Mandarin Chinese
Student B (SB)	Male	Undergraduate/ Freshman Business	Russian
Student C (SC)	Male	Graduate/Engineering	Hindi and Indian English
Student D (SD)	Female	Undergraduate/ Sophomore German	Japanese

Student topics ranged from proposals for lab experiments to arguments about military base realignment (BRAC). SA came to the writing center with a draft of a paper for a graduate class in which he proposed lab experiments on an engineering issue he called “phase lock.” The session focused on four main issues: IEEE formatting, summary, genre issues (proposal), and grammar/word choice. SB worked on a draft of a paper for a 100 level class in which he argued that U.S. outsourcing and job mobilization is positive for the economy. This session focused on thesis, evidence, quotations and MLA formatting, and grammar/word choice. Student C brought in a draft of a paper for a 100 level ESL class in which he argued that a local military base should not be closed as part of the military’s base realignment program. In this session, the focus was on voice/credibility, and grammar/word choice. Finally, SD brought in a draft of a paper in which she compared Meji philosophy to moral education in the U.S. During this session, the tutor and student worked on genre, organization, documentation, and grammar/word choice.

*Terms of Analysis: Quantitative and Qualitative*

Our first measure for analysis is **time-at-talk**. The study “Dominance in Academic Writing Tutorials: Gender, Language Proficiency, and the Offering of Suggestions” by Terese Thonus (1999) suggests that previous discourse studies make “direct correlations between dominance and measures such as time at talk [sic]” (p. 228). Robert Bales (1970) explains that “to take up time speaking in a small group is to exercise power over the other members of the group for at least the duration of the time taken” (p. 76). Thus, in this study, we calculated time-at-talk in order to examine whether or not one party, either the tutor or the student, dominated the conversation through talk-time and, even more importantly, whether or not this talk-time seemed to “exercise power” or dominance over the other participant. In order to determine time-at-talk, we listened to the entire recorded session and timed each speaker’s utterance with a stopwatch. The sum of total seconds at talk excludes pauses and breaks while the consultant or student reads or searches resources for information.

The second area of analysis, **discourse turn-taking**, is harder to define because of the many ways it can be analyzed. For this study, we counted a turn in the conversation as when a speaker had the floor, and we marked it with an arrow in the left margin of the transcript. We did not count any utterances that “did not interrupt the current speaker’s discourse or cause



the speaking turn to shift" (Moder & Halleck, 1998, p. 122).

For example:

**Consultant:** Does she think that you're using too much other people's words to support your own where it seems like you're, what you're saying is drowned out too much, maybe, by what the experts are saying? So, it kind of seems like what you're saying isn't as important?

**Student:** What I'm saying doesn't seem like it's mine.

**Consultant:** Okay.

**Student:** I didn't know how to fix that.

The utterance "okay," in this example, does not cause a shift in discourse, so it is not considered to be a turn since the flow of speech would not change if the "okay" were not in the discourse. We marked assertive turns-taken, interruption, with the notation "\*taken" on the transcript because these changes of the floor happened mid-sentence for the previous turn. According to linguistic researchers Sacks, Schegloff, and Jefferson (1974), "transitions from one turn to the next" take place "with no gap and no overlap," but when the overlap occurs, it does not adhere as much to the rules of turn-taking (p. 708). Instead, these interruptions indicate a more forceful taking control of the flow of conversation, and this could indicate possible dominance on the part of the speaker.

The third level of linguistic analysis, the category of session content, indicates the type of commentary given to ELL students during the session. In this analysis, tutor suggestions fall into the separate categories of a) Global, b) Local, or c) Proofreading. According to Ryan (2002), a global suggestion concerns big picture issues of "content, focus, organization, point of view, and tone" (p. 9). Local suggestions address clarification within paragraphs, sentence organization, transitions between ideas, introductions, and conclusions. Proofreading suggestions target grammar, word choice, typographical errors, and citation. We divided tutors' suggestions into these categories based on how they impact the paper ideas and organization. Remember, writing center pedagogy stresses that tutor training should follow the hierarchy of global first, local second, and proofreading last. The tutors in this study were trained according to these standards. Thus, this level of analysis is especially interesting because it demonstrates the degree to which the tutors adhere to standard writing center pedagogy and practice in ELL sessions despite the ELL students' wish to focus on proofreading, particularly grammar.

The final level of analysis for dominance is the qualitative evidence from **post-session interviews**. Participants responded to questions about their expectations of writing center sessions and the perceived effectiveness of those sessions. The findings from this qualitative data help determine which party sets the agenda for the session and thereby establishes session content and tutor response; this evidence is essential in determining whether one participant dominates the overall session.

### Study Findings and Data Analysis

Our findings conclude that, in keeping with theory and practice of tutor training, ELL students and peer tutors both demonstrate dominance at different times and in different areas in their writing consultations despite the fact that tutors often feel as though they dominate sessions with these international students. Quantitative evidence indicates mostly parity in factors that determine dominance between peer tutor and ELL student, with a slight preference toward linguistic dominance by the tutor. However, the qualitative evidence clearly shows that tutor dominance over agenda setting and feedback is negligible. Despite linguistic and cultural differences, ELL students and their peer tutors share session dominance when it comes to the overall structure and session content.

#### Time-at-Talk

The following table indicates the time-at-talk for each participant as well as total time-at-talk for the session. Consultants are shown as C1, C2, and C3. Only three consultants participated in the recordings; C1 worked with two student participants. Times are in seconds and minutes, and the talk-times do not include significant pauses, reading, or searching in style guides for documentation information. The final two columns indicate percentages of time-at-talk for the entire consultation by the L1 tutor and ELL student.

Table2

#### Time-at-talk

Consultant/ Student	Consultant Time	Student Time	Total Time	Percentage Tutor	Percentage Student
C1/SA	418sec. 7 min.	200 sec. 3.3 min.	618 sec. 10.3 min.	67.6%	32.3%
C2/SB	1093 sec. 18.2 min.	678 sec. 11.3 min.	1771 sec. 29.5 min.	61.7%	38.2%
C1/SC	608 sec. 10.1 min.	498 sec. 8.3 min.	1106 sec. 18.4 min.	54.9%	45%
C3/SD	887 sec. 14.8 min.	504 sec. 8.4 min.	1391 sec. 23.2 min.	63.7%	36.2%
TOTAL	3006 sec. 50.1 min.	1,880 sec. 31.3 min.	4886 sec. 81.43 min.	61.5%	38.4%

This data shows that tutors average 61.5% of the time-at-talk compared with the students, who accumulated approximately 38.4% of the talk time. Tutors often have to speak more as they explain their responses and suggestions, so a slight preference toward the tutor for time-at-talk is expected. However, these numbers do show a preference for the tutor in the time-at-talk category, which points to the fact that tutors have an advantage and, therefore, show dominance in this category. It is interesting to note that even though the session topics differ in task and the drafts differ in genre, and despite the fact that some sessions have over twice the amount of total time-at-talk in comparison to other sessions, the percentages

of talk-time for the tutor and student stay within close range for all four consultations, revealing a recurring pattern and demonstrating reliability in data collection.

### *Turn-taking*

The next dimension in our study looks at turn-taking to help determine dominance during writing center sessions with English language learners. As described before, turns in discourse occur any time the floor changes, when the flow of conversation shifts to another participant. The number of turns taken indicates linguistic dominance in conversation and turns taken assertively, where the one speaker interrupts the other, indicate power and dominance. Based on the turns labeled and counted on the transcripts for this study, the following, Table 3, summarizes the results. Note the turns taken assertively (\*taken) indicate an interruption of speech. Total turns include the turns by the tutor and the student. In this calculation, the turns with (\*) do not count more than the original turn count for each party.

*Table 3*

### *Turn-taking*

Consultant Student	Turns by Consultant	Turns by Student	Turns Taken (*) by C	Turns Taken (*) by S	Total Turns
C1-SA	32	30	1	1	62
C2-SB	66	64	6	3	130
C1-SC	37	38	1	3	75
C3-SD	48	47	3	0	95
TOTALS	183	179	11	7	362

The data in the table above shows a quite different picture of dominance than in the time-at-talk category. When viewing the data on turns by student and turns by tutor, it is significant to note the parity of turns-taken by both parties. Although the tutors take more turns than the students, the difference in the amount of turns is negligible. Out of total turns-taken, tutors take only a total of four more turns than ELL students, and if we look at each session individually, tutors take either one or two more turns than the students in three of the case studies, and in the third, the student takes more turns than the tutor. The second consultation, C2-SB, which focused on outsourcing and dealt with the writing issues of thesis, evidence, transitions, and quotations/MLA formatting, far outnumbered other consultations in turns-taken because it was significantly longer than the other sessions.

These numbers show a very different picture of dominance emerging. If we look specifically at turn-taking, we see more of an egalitarian, collaborative session in which both parties contribute equally to the conversation. In fact, the third consultation, C1-SC, is worth noting. During this session, the ELL student showed dominance by taking more turns than the L1 tutor and, even more interesting to note, the student also took more assertive turns, at a significant rate of three to one.

It is worthwhile to discuss the findings from time-at-talk and turn-taking in conjunction because the meaning of this data is opaque when viewed in isolation. The slight time-at-talk dominance on the part of the tutors suggests that their turns were longer in the overall view of the session. However, the parity in the turn-taking better illustrates the movement of the session. Turns were almost even in number for all four sessions. Similar results emerge when comparing the turns taken aggressively (\*) because in one session, the student took more aggressive turns; in another, aggressive turn-taking was even; and then two sessions demonstrate aggressive turn-taking by the tutors. These results indicate that tutors show slight dominance over ELL students through time-at-talk; however, they show equality in turn-taking. If we look at these categories together, the numbers are not significant enough to claim that these examples prove that tutors dominate sessions with English language learners.

The final quantitative analysis of this study emphasizes language and provides insight into the content of the writing sessions. It can be assumed that the participant who sets the agenda for the session is more dominant. Just as in the previous two quantitative samples, the content analysis was tallied from a review of the transcripts of the four sessions. This analysis identifies whether the content of the session contains suggestions for revision that focus more at the global or local level, which mirrors tutor training, or whether the agenda moves more toward editing and proofreading, which would indicate that English language learners, who understandably have more concerns than L1 students for surface comments, dominate the content of the session. Our methodology was to underline all suggestions made by tutors during a writing center session and then classify them according to our established categories. Table 4 summarizes the findings:

*Table 4*  
*Session Content*

Consultant/ Student	Global Comments	Local Comments	Proofreading Comments	Percentage Global	Percentage Local	Percentage Proofreading
C1-SA	1	2	7	10%	20%	70%
C2-SB	1	3	10	7%	21.4%	71.4%
C1-SC	0	3	6	0	33%	66%
C3-SD	1	3	7	9%	27%	64%
Total	3	11	30	6.8%	25%	68%

Significantly, this data shows that, despite intensive training that teaches tutors to focus first on global and local comments, these ELL sessions overwhelmingly favored proofreading suggestions. In fact, tutor comments focusing on proofreading issues outnumbered local and global suggestions combined by approximately 50%. Global comments accounted for merely three of 44 total suggestions, and local comments accounted for only 11 of the 44 total suggestions. These quantitative findings clearly show a trend toward suggestions on surface level issues, which research has shown (Leki, 1992; Cogie, 2001) to be a distinct preference for English language learners working in writing center settings.

Our transcripts bear out this preference and demonstrate that ELL students showed dominance in setting the agenda and determining the content of the sessions. As the transcripts demonstrate, ELL students often insisted that tutors change their session strategies to focus on diction and other surface features. The following is a typical example of a session transcript in which it becomes clear that the ELL student dominated content of the session by pressing for answers to issues of grammar and diction even though the consultant tried to guide him to think more carefully about voice and evidence, both global issues. This example indicates the student showed dominance when looking at session content, even though the tutor dominated in time-at-talk.

**SC:** This one. I want to transition from here to say that I concluded here by saying that there are benefits but there are some concerns. . . I want to say what is going on right now. In outsourcing, right?

**C1:** Are you mainly worried about your transition from this topic to that?

**SC:** Does this [pointing to sentence] give you the idea of what I just described?

**C1:** Ah, I think you probably do need a little more detail, maybe another sentence that transitions and makes it more explicit. Maybe having discussed the benefits (\*transition)

**SC:** Having discussed the benefits—does that sound alright?

**C1:** Yeah, because what I hear you saying is that you've looked at the benefits, but now you want to get a fuller picture of benefits plus anything else that's a part of what's happening, so maybe just have something at the beginning of the sentence that acknowledges that's what you've looked at and you're going to turn and look at something else. Then the transitions there as well— it's clear where you are going.

**SC:** Exactly. I wasn't sure about this is really coming the meaning that I wanted. Also, I'm not sure I transitioned. (Reading his paper out loud) How does this sentence look? Does it look alright?

**C1:** uh huh. Yeah, I mean, it's straight forward and it flows into the next. Yeah. Fine.

**SC:** It's fine?

**C1:** What were you worried about with it?

**SC:** Just the sentence construction.

In the above example, it is evident that SC pushes the graduate level tutor to evaluate his sentence construction and diction in detail. And even though the tutor tries to explain that the student may need more content and evidence concerning the benefits of outsourcing, the ELL student can't seem to move past individual words and their placement in the sentence. His tactic is to pose specific questions repeatedly until the tutor capitulates and provides him with the diction advice he seeks. This type of exchange is typical of the other transcriptions in this study and provides evidence that ELL students often determine the content of the dialogue and, therefore, demonstrate dominance in agenda-setting.

In the post-session interview, C1 underscores this finding when he states that, although he knew that there were global issues that should have been addressed, in the end he allows the student to determine the content for the session: "I asked him what his concerns were and I structured the rest of the consultation based on what he told me, or at least I tried to." Since the ELL student set the agenda for the session, sentence level issues took precedence over global issues at a rate of 66% for this particular session. The tutor explains, "He came with the questions, so, I mean, . . . he pretty much directed it." This transcript and the follow-up interview clearly indicate that, although the quantifiable data of talk time (55% for C1 and 45% for SC) shows the tutor to be dominant, and turn-taking (37 for C1 and 38 for SC) shows neither party to be dominant, content analysis and qualitative interviews situate SC as the dominate interlocutor in terms of content in this session. Of course, this finding does not negate the importance of time-at-talk and turn-taking, which are more traditional evidence for dominance; it does mean that session content is another important dimension when considering session dominance. Other transcripts bear out this same finding.

The result of these findings is that, although the tutor dominates time-at-talk at a rate of 61.5% to 38.4% and the turn-taking shows parity with tutors taking only four more total turns than students, content analysis shows an overwhelming preference for surface-level comments, evidence that ELL students more commonly set the agenda and determine the content of the sessions. Overall, allowing students to set the agenda is keeping with tutor training. However, because ELL students tend to focus on surface features such as grammar and diction, dissonance occurs for tutors because they are trained to focus first on global and local issues before attending to grammar and diction. This dissonance might account for much of the anxiety and discomfort expressed by L1 peer tutors when they describe sessions with ELL students. Despite their knowledge and training in working with English language learners, tutors still experience tension when they feel as though they are being guided to focus on product rather than process.

### **Implications**

Understanding the complicated issues of dominance that often arise in peer education between L1 tutors and English language learners can help those of us in learning assistance better prepare our peer educators to work effectively with students of various cultural backgrounds. Session strategies that promote an egalitarian relationship that includes both participants equally participating in talk-time, smoothly taking appropriate and non-

aggressive turns, and alternately guiding session content remains the ideal. However, practice is often messier. Helping tutors work with English language learners can include offering acknowledgement of the dissonance that can occur when tutors encourage students to set the agenda only to realize that the content of the session runs counter to their training. Providing ongoing training on ELL issues that includes mock sessions, sample papers, and presentations by ESL faculty can help tutors prepare themselves for the tensions they will experience. The goal of training, however, shouldn't be to placate that tension, but instead the dissonance should serve as a sounding board, as a moment in which to reflect on the practice of writing center work. Balancing what the field knows about responding to student writing with the needs of the individual student can be tricky. Helping tutors negotiate these competing needs remains worthwhile in their development as peer educators.

Future research in this area might include case study analyses of the ways that dominance is negotiated in ongoing tutorial relationships, both with English language learners and with L1 students. Does the negotiation of time-at-talk and agenda-setting change over time as both parties become more familiar with each other and their expectations of the writing center session? In what ways does that negotiation occur? Does tutor dissonance decrease or shift with additional training in cross-cultural understandings of the tutorial setting? And most importantly, in what ways might we close the gap between these often disparate expectations in order for both participants to feel confident that the needs of the students have been met?

These questions help us reflect on the complexities in the burgeoning field of peer education. In this study, discourse analysis along with follow-up interviews help illuminate the ways in which English language learners and peer educators negotiate power and dominance in face-to-face writing center sessions. However, it is important to understand that the act of negotiation is not the means to an end, but instead creates an important space within which to learn. The negotiation of power is, in itself, a teachable moment.

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# Supplemental Instruction: Supporting Persistence in Barrier Courses

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## Abstract

***Courses that interfere with undergraduate students' persistence are barriers that appear all along the undergraduate continuum. Supplemental Instruction (SI) may contribute to students' achievement in a barrier course and, therefore, to their persistence in their academic program. The purpose of this single-case descriptive study was to explore student and instructor perceptions of SI in an upper-level chemistry course with a reputation for being a barrier to academic success. The case study methodology used included a focus group, one-on-one interviews with instructors and students, document review, and class and SI statistics. Results indicated that faculty and students perceived SI to be a valuable resource in achieving persistence or academic success.***

**A**lthough the number of students enrolling in higher education has increased over the last 30 years, the percentage of students who are retained through graduation has not. According to the Division of Science Resources Statistics of the National Science Foundation, "trends in bachelor's degrees over the past 20 years...in engineering, physical sciences, and mathematics generally dropped or flattened out, especially since the mid-1990's" (Science and Engineering Indicators, 2006 page # 1-5). Providing undergraduate students academic resources that support academic achievement of the baccalaureate degree in their chosen field of study was the impetus for this study.

The variety of factors that influence a student's decision to stay in school cannot be underestimated and will no doubt continue to be the subject of significant consideration at institutions of higher education for the foreseeable future. The retention of undergraduate students has been the focus of study and consideration for thirty-plus years (Astin, 1975; Moxley, Najor-Durack, & Dumbriague, 2001; Seidman, 2005; Volkwein, 1995). Further, the literature on student retention has considered the implications of institutional choice and the students' comfort at their chosen institution, students' involvement in academic and social activities, and students' perception of the value of

a college degree coupled with the financial demand of college attendance. Research has also explored the significance of race, gender, and socioeconomic background as they relate to enrollment to degree completion success (Astin, 1975, 1984; Bean, 1980, 1983; Ford, 1996; Milem & Berger, 1997; Panos & Astin, 1968; Seidman, 2005; Tinto, 1975, 1982, 1988). The focus of this paper is academic barriers, specifically those courses that interfere with a student's successful continuation, persistence, in his or her well-chosen major – the barrier courses.

## **Background**

Thirty years ago, A. Astin's (1975) seminal study researching retention in college found that "many undergraduate institutions fail to capture the interest of substantial numbers of students, including some of the highest achievers" and that "if ways can be found to involve students more in the life and environment of the institution, their chances of staying in college are improved" (p. 148). According to Astin (1975, 1984) and others (Milem & Berger, 1997; Tinto, 1988) providing students with activities that include academic as well as social interactions enhances retention. A compounding issue is persistence. "The words persistence and retention are often used interchangeably. The National Center for Education Statistics, however, differentiates the terms by using retention as an institutional measure and persistence as a student measure. In other words, institutions retain and students persist" (Hagedorn, 2005, p. 92). Resources that support students' persistence automatically result in improved retention rates.

Activities directed at improving retention rates have been initiated at an increasing number of colleges and universities such as first year seminars, cluster courses, and living-learning communities. The preponderance of these programs addresses the needs of first year students (Markham, 1996; Tinto, 2005). Frequently such programs are aimed at helping students learn how to become more successful students. One such program is known as Supplemental Instruction (SI). SI is an academic support program that combines academic and group activity by providing peer support in the courses that many students find difficult. SI sessions are regularly scheduled reviews that focus on recent course content; SI leaders are role models for academically achieving undergraduates. The University of Missouri Kansas City, original home and current international center for SI, maintains a website that lists colleges and universities across the United States and in 11 other countries that offer SI programs.

Although not considered a remedial program, a review of many of these sites seems to indicate that SI programs are often directed toward first or traditionally considered gateway courses. While these programs are certainly important (Ford, 1996), it is equally important to consider that there may be academic barriers all along the undergraduate continuum, through the upper-level advanced courses. The researcher and author of this article is the director of an academic support center that provides the setting for this study. A continual effort to improve the program led to this study.

The Summer 2006 volume of the *New Directions for Institutional Research: Reframing Persistence Research to Improve Academic Success*

(St. John & Wilkerson, 2006) suggests that programs to support persistence are needed, especially initiatives that address campus specific needs and are assessed for their value: "Although substantial gains are apparently being made in retention during the first two years of college, there are also critical challenges related to persistence to degree completion" (p. 101). The popularity of SI in this upper-level chemistry course suggested that students appreciated the resource. This study was undertaken in order to determine if SI is viewed as an effective strategy for academic achievement in a perceived barrier course required of science majors at a public doctoral/research extensive flagship university, referred to here as Flagship State University (FSU).

Students' lack of persistence in their chosen field of study has a variety of personal, institutional, and, in some cases, national implications, as previously noted. Persistence in a student's major is indicated by academic success through graduation; courses known to interrupt this success are referred to here as barrier courses. The contribution of SI to student success, particularly in barrier courses, may be a proactive intervention that is effective in reducing attrition rates and supporting persistence.

## Methodology

A case study methodology was employed to explore the perceived benefits of SI in a course (Physical Chemistry) that is well known for its difficulty among students and faculty alike. This course is required for Biochemistry and Molecular Biology, Chemical Engineering, and Chemistry majors and is populated with upper-level achieving science students. A trial semester of SI in this course resulted in higher than anticipated attendance at SI sessions, making it a most compelling case for investigation.

This research took place at a doctoral/research extensive land grant university, herein referred to as Flagship State University, FSU. This university is the flagship campus of a 5-campus state university system in the Northeast. SI was first offered at FSU through an academic support center in 1996. Consistent with the approach to SI offered elsewhere, SI sessions were open to all students and presented as simply an option for increased exposure to difficult material in four to eight entry-level classes. SI leaders attended every session of the class and held regularly scheduled twice-weekly 75-minute review sessions at the academic support center. SI is now available in 25 to 30 courses every semester at FSU. A combination of student and faculty requests has dictated the inclusion of SI in these courses. A few notable requirements in the sciences remain some of the most difficult for students to successfully complete, among them Physical Chemistry.

Surveys of students in courses offering SI suggested that attendance at the sessions was largely dictated by a combination of course difficulty and importance and the relative benefit of SI. Students who attended SI sessions appreciated the support it provided them to achieve in those courses. The degree of course difficulty and the importance of the course relative to students' academic goals were, however, reportedly the important criteria

in students' decision to attend SI sessions. This observation seemed to suggest that SI could positively contribute to students' persistence in their chosen major when and if there was support for them in the courses that they found most difficult.

As noted earlier, Physical Chemistry has a reputation among students and professors in the sciences as an academic hurdle or barrier (or 'weeder') course for many students. A student already employed by the academic support center suggested that the students in this upper-level chemistry course would benefit from SI support because, according to this student, it requires mathematics that students do not otherwise make use of, contributing to the perception of this course as a barrier to academic success. The professor teaching the course was contacted and responded with interest in a trial of SI support for Physical Chemistry. As a result, SI was offered in Physical Chemistry during the fall 2001 semester. At least 85% of the students enrolled in the course participated in a minimum of 2 SI sessions during that trial semester. SI support was provided for Physical Chemistry the subsequent semester and attendance was comparable. As noted, this study was undertaken to explore the perception of SI as an effective strategy for academic achievement in this course with a reputation that tends to generate anxiety. The primary participants were students enrolled in Physical Chemistry during the fall 2006 semester. All students enrolled in Physical Chemistry during the fall 2006 semester were informed of this study and agreed to participate; respondents were given an Informed Consent Form explaining the objectives and purpose of the study and their rights as participants which they all willingly signed. Pseudonyms have been used to protect the identification of people and place throughout.

The primary method for data collection was one-on-one interviews with students enrolled in Physical Chemistry; the past and present course instructors and the current SI leader were also interviewed. One focus group comprised of six students was held and provided an opportunity to review students' interview questions and begin to get a feel for students' opinions. According to Yin (2003), the interview provides essential information for a case study. Coupled with focus groups, one-on-one interviews provided greater opportunity to explore selected students' perceptions of SI and assured that the student voice was the primary data source. Six students enrolled were interviewed individually. Interviews with the professors corroborated information reported by students. Saturation occurred early in the interview process; no additional data was revealed after completion of several one-on-one interviews with students although several additional one-on-one interviews were completed. Saturation indicates that continued interviewing will no longer yield additional information (Rubin & Rubin, 1995; Creswell, 1998; Hatch, 2002). Student responses were more similar than anticipated; saturation occurred and categories emerged. Interview data was consistent with student responses noted anecdotally by learning center staff. Document review included course description and requirements as well as any other printed material regarding Physical Chemistry. Attendance records from SI sessions and final grades were collected and analyzed as was a class survey on SI participation.

## Results and Discussion

Four categories were identified in the field notes as pivotal to students' engagement in SI. They included anxiety about the course, course content, characteristics of students, and students' perception of academic resources.

### *Anxiety*

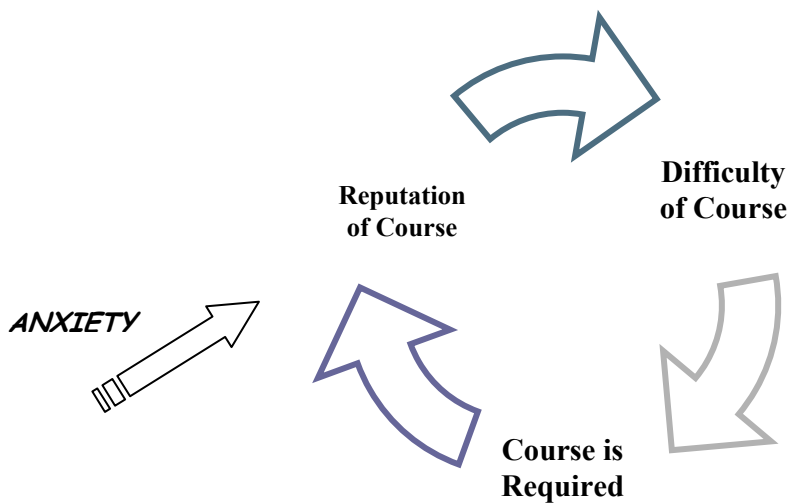
The reputation of Physical Chemistry instigates the apprehension students report related to Physical Chemistry. Three factors frame this academic hurdle: it has a reputation, it is a requirement, and it is a challenge. Further, the significance of the anxiety reported regarding this course is noted in the regard of this course as a barrier. This perception tends to be reinforced as students cycle through an academic barrier.

The caution students report in anticipation of Physical Chemistry is notable. Students admit feelings that range from caution to dread prior to their enrollment in this course. The study of physical chemistry is perceived as a hurdle even before experience with the course begins. The forewarning students receive regarding this course leads to the apprehension students frequently experience when they consider enrolling in this course. Some students admit to putting off the study of Physical Chemistry until their last year as an undergraduate simply because they are afraid of it. It is this reputation that initiates the cycle of an academic barrier.

The cycle is perpetuated by the fact that the course is required; this exacerbates the feelings of anxiety students report regarding Physical Chemistry. Both students and faculty admitted knowing someone who changed their major field of study while an undergraduate student because of fear about the required Physical Chemistry course. Switching from a chosen field of study to avoid a required course is an extreme reaction to a course, yet knowing someone who had done exactly that was mentioned in several of the one-on-one interviews and referred to among focus group participants. Many of the students in the majors that do require the study of Physical Chemistry plan on attending graduate school, and they need to do well in this course to do so. This required course is a necessary hurdle.

The challenge for academic achievement in such a difficult course completes the cycle of an academic hurdle or barrier (see Figure 1). The course is important not only because it is required but because students need to be competent in the subject matter to continue in their discipline. The subject matter is complicated and challenging throughout the semester. Students frequently remain anxious about this course even when they are taking advantage of resources, particularly SI, and performing well on examinations.

The cycle of an academic barrier is illustrated in Figure 1. The cycle begins with a course's reputation. This initiates the feelings of anxiety that make students wary about a course even before they are introduced to the subject matter. Students are clear that this course is a major hurdle for them. The difficult course material is a challenge for the duration of the course. As students rotate through this barrier during the semester, anxiety is present throughout. This pattern is diagramed below.



*Figure 1. Cycle of an Academic Barrier*

### *Course Content*

The course content is complex; the case study data revealed two major factors that have significance regarding the implications of the course content: the mathematics and the complex nature of the course material.

The study of Physical Chemistry is the combination of mathematics and physics as well as chemistry. The mathematical component is a major hurdle for many students; transitioning between the disciplines is an additional hurdle. Although all students must complete the same prerequisites for this class, their backgrounds vary depending on their major. Most students find the mathematical component challenging—even when their mathematical background is strong. The complex nature of Physical Chemistry demands an ability to integrate conceptual information from three sciences. Apparently it is not the chemistry that is difficult but rather the physics and mathematics and eventually the integration of all three.

Students intent on completing their bachelors' degrees in one of the three majors that require the study of Physical Chemistry are accustomed to difficult course work. They are also accustomed to receiving good grades in these difficult courses according to data collected in interviews with participating students. Course instructors are aware that the typical student enrolled in Physical Chemistry is unaccustomed to struggling to understand course material. Physical Chemistry is a hurdle for most students. The cycle of an academic barrier is evidenced in the challenge students face while they are enrolled in Physical Chemistry. The difficult nature of the course promotes the continuing perception of this course as an academic barrier.

### *Student Characteristics*

Students do confirm their willingness to take advantage of academic resources. They also appreciate the value of working through difficult material in a group, led by an experienced student. Participants in this class frequently refer to the fact that a number of their classmates are known to them from previous science classes and that they have occasionally struggled through labs together. They have struggled with their colleagues before and are willing to do so here. Students in Physical Chemistry tend to be aware of available resources and frequently expressed their appreciation for SI in this course. The cycle of a barrier course continues through this stage of students dealing with the academic challenge of Physical Chemistry.

The previous course professor was quite convinced that the fact that all students enrolled in Physical Chemistry are generally in their third year of study at a university and committed to their studies contributes significantly to the number of students who attend the SI sessions for that course. These are serious students accustomed to working hard and doing well. This is possible in Physical Chemistry but for most it requires taking advantage of resources. The current professor firmly believes that because these are students accustomed to doing well in class they prefer the safety of their peers to practice with the difficult material as opposed to the potential for or at least the perception of judgment by the authority, the course instructor. Students confirm this belief. As one student reported,

It's more like you go when you've been presented with something in class that you're like 'what?' and the you go [to SI] and there is someone you can talk to on your level that can explain it to you....Just the whole age and peer-to-peer kind of learning I think is so much more effective.

### *Students' Perceptions of Academic Resources*

A. Astin (1975) noted that achieving students are apt to take advantage of available resources, particularly with difficult courses. Instructors acknowledge the difficult courses and support students in this direction. All respondents talked about the value of SI in Physical Chemistry. The factors noted regarding SI and Physical Chemistry are the reduction of student anxiety, the support of student learning of complex course content, and the academic resource fits students' needs.

The particularly difficult subject matter and the perceived benefit of participating in SI have resulted in the noted attendance pattern in the SI sessions of Physical Chemistry. All but six students in the fall 2006 cohort of 56 students attended at least one session of SI; seven students attended only one SI session. One of the students who reported only attending one session said that she simply does not struggle the way many of her colleagues do; in fact, she is enthusiastic about the challenge of Physical Chemistry. Her appreciation for the exciting challenge of the difficult course material is not shared among her classmates. Regardless of her enthusiastic attitude about the challenge of Physical Chemistry, she is equally enthusiastic about SI. She willingly admits not wanting to consider Physical Chemistry (or Organic Chemistry) without SI.

The anxiety that this course generates has been amply noted. SI gives students the opportunity to work with difficult material in as many ways as they desire. Participating faculty and students suggested that this opportunity helps reduce this anxiety—both by increasing their time on the task in a supported environment and by the chance to process the difficult course material with their peers. Students frequently commented on SI as the perfect place to get help with complicated homework. A number of these students were known to each other from previous science courses. They basically followed each other to an initial SI session; most students repeated visits throughout the semester. Students were clear that they considered SI to be extremely valuable not only for help with homework but for a greater understanding of difficult course material. Students who did not attend SI sessions frequently were as supportive about the benefits of SI, particularly with regard to Physical Chemistry, as students who attended more frequently. In all cases students were glad it was available to them. Physical Chemistry is clearly considered an academic hurdle—SI provided the necessary support for their academic achievement, thereby allowing them to persist in their science major.

### *SI Attendance and Grades*

Only one professor at FSU has taught Physical Chemistry both with and without SI. When asked if there was a notable difference between the classes, he replied that, given that no two classes are actually alike, there were two obvious differences between the last year without SI and the first year with it. One difference was the reduced frequency that students came to his office hours struggling with course content. The other difference was the amount of students who received the grade of A. "In general I've tended to give roughly ten percent of the class A's. That's kind of the ball park, so in a class of fifty there'll typically be about five A's. But the last year there were twenty-five [out of fifty-six enrolled students]!" (S. Albert, Personal Communication, September 25, 2006). Attendance patterns at SI sessions for Physical Chemistry are a clear indication that students find this a valuable resource. Whether or not this resource actually contributes to improved academic performance is not as clear. The grades from Physical Chemistry for the fall 2001 semester, the last semester of teaching this course without the support of SI, were compared to Physical Chemistry from the fall 2003 and 2004 semesters which the same professor also taught. The grades from Physical Chemistry fall 2001 semester were also compared to Physical Chemistry 2005 and 2006 fall semesters which were taught by the current professor. The homogeneity of variance assumption was satisfied, so we can assume that the same variety was present in each population. The population of scores from each semester was entered as populations in a One-way Analysis of Variance (ANOVA) to test for the differences between the groups. Results of these planned comparisons indicate that differences in grades with and without SI, regardless of instructor, are statistically significant. These findings demonstrate improved grades, defined as an increase in the grades of B and better, with the inclusion of SI. The professor's report of



the higher scores on examinations and homework assignments throughout the semester corroborate this statistic. The improved distribution of grades without the inclusion of SI in 2001 and with in 2006 is demonstrated in the table below. Although these grades reflect two distinct although similar class cohorts, the relative improvement in grade of B or better is notable.

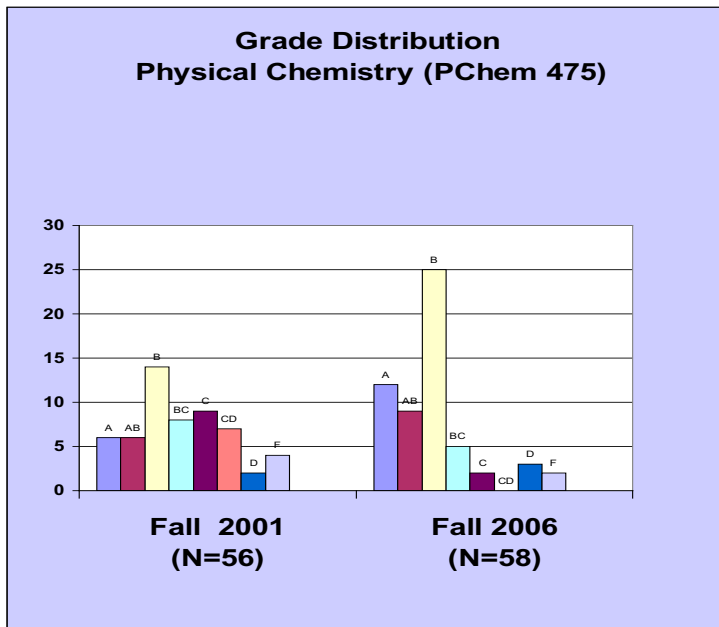
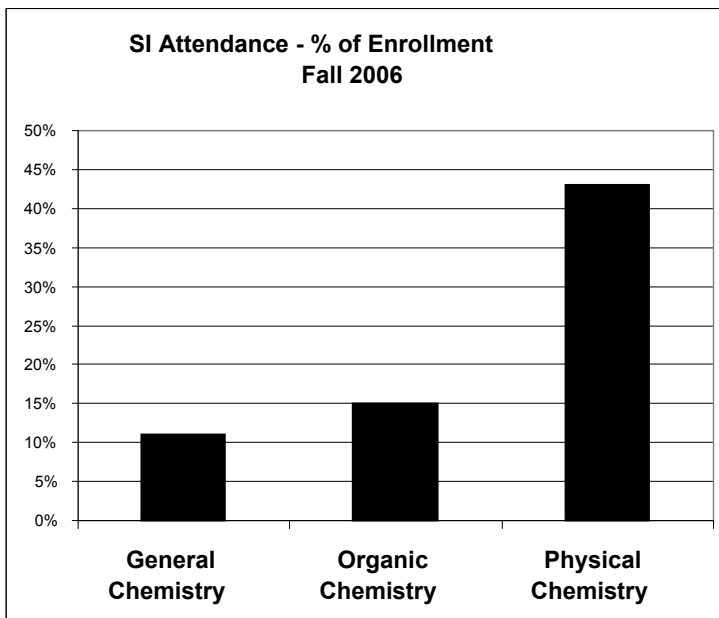


Figure 2. Grade Distribution in PC4 2001 (no SI) v. 2006 (with SI)

At FSU, not unlike other colleges and universities, attendance at SI sessions is voluntary. Students are free to attend whenever they choose. SI leaders respond to students' questions and prepare worksheets with strategies for learning the difficult course material. Peaks in attendance are an obvious reflection of preparing for examination or completing a difficult graded homework assignment. The academic resource center staff noted that there are some courses that seem to have steadier attendance patterns than others. A comparison of attendance patterns of courses along the chemistry continuum illustrates this point. The table below reveals the increase in the average percentage of students who participated in SI for General Chemistry (1xx), Organic Chemistry (2xx), and Physical Chemistry (4xx).



*Figure 3. Average SI Attendance*

Students enrolled in Physical Chemistry were given a survey in class during the penultimate week of the fall 2006 semester. Students were asked whether they had participated in any SI sessions for this course. If they had, they were asked whether they were helpful and if they believed that attending SI sessions helped them obtain a better grade. Thirty-seven surveys were returned; of those, 32 attended at least one SI session, 30 students attended at least two sessions. Five students indicated that they had not attended any SI sessions; only one of those students reported that s/he didn't feel they were necessary. The remaining four students had time constraints that precluded their attendance at any SI sessions although they were interested in attending. Only four students who reported attending at least one SI session did not believe that attendance improved their grades; only two students reported that the SI sessions were not helpful to them.

Attendance patterns alone suggest that students enrolled in Physical Chemistry appreciate the value of Supplemental Instruction, SI. The statistics that describe the differences in grades between the several semesters confirm what a professor noticed and students indicate: SI is an appreciated resource.

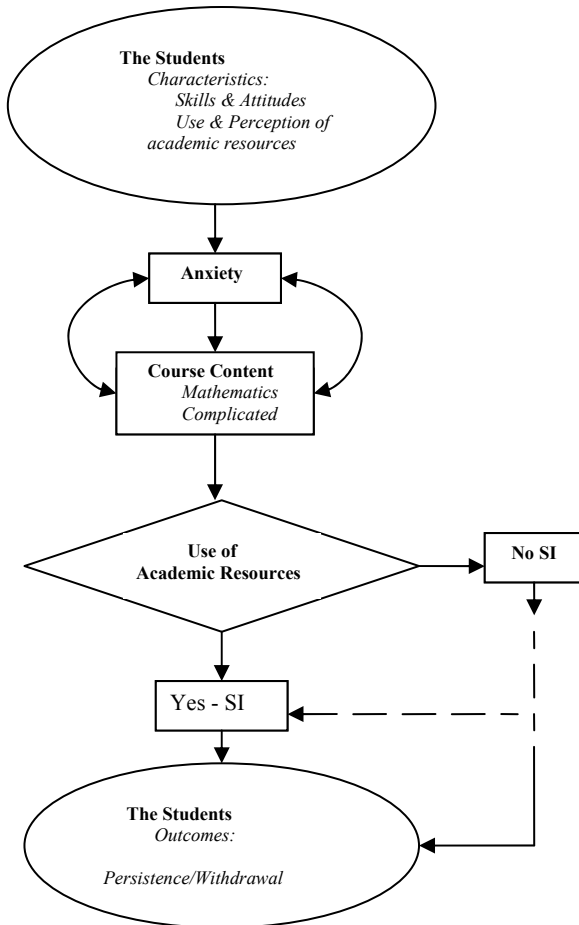
## Discussion

This study asked why students in Physical Chemistry participate in SI and what factors influence this decision; and if SI is an effective strategy in supporting persistence in SME majors. According to interview data and improved grades, it does appear that participation in SI contributes to academic success and therefore persistence through this difficult course. Students who participated in SI in Physical Chemistry were enthusiastic in their appreciation for this resource. They expressed interest in its availability for other difficult courses along their academic trajectory. This may suggest that SI could contribute to improved persistence in SME disciplines. Students who take advantage of this resource in order to succeed in this course, thereby assure their persistence in their science major.

Students become aware of the “weed-out” or barrier course either because it is referenced as such by a member of the faculty, it is discussed by students, or it is taught at a level that favors the most advanced students (Seymour & Hewitt, 1997). It is clear that these barrier courses actually occur throughout the undergraduate journey. Barrier courses occur in a wide variety of disciplines; however, they all share a reputation that generates anxiety, they are all difficult, and they are all required courses. Just as SI has been shown to positively influence students’ academic achievement consistently in first-year courses over the past 30 years, it can positively contribute to academic achievement in the very courses that make it difficult for students to persist in their chosen discipline.

SI is a highly effective academic support program: “This model, which has been used for more than thirty years, still yields strong results in student learning, higher final course grades, and lower DFW rates across disciplines, types of colleges, and student ethnicities” (McGuire, 2006, p. 21). Its value as a resource is evident. As students progress through the academic continuum of their undergraduate years, they hit academic barriers or hurdles along the way. Occasionally these barriers are enough to derail students.

It seems that the perception of a barrier can begin before the student ever enters the classroom. The reputation of a difficult course precedes a student’s enrollment and can even dissuade a student from ever entering the classroom. Students who have familiarity with the SI program may anticipate participating in SI in the barrier course whether or not they have ever participated in an SI session related to previously taken courses. The relief of its presence can be enough to convince a student to at least enter the classroom. This study suggests that the cycle of an academic barrier can be interrupted by a well-received academic program as noted in Diagram 2, which depicts the process through an academic barrier.



Note: Anxiety cycles before as well as throughout the course  
Opportunity to change decision indicated by broken line

Legend: ○ = input/output  
□ = action  
◇ = decision

Figure 2. The Process Through an Academic Barrier

Recommendations for future research relate to student development. Research regarding the upper-level students' self-identity as competent students willing to seek assistance may contribute to further understanding of first and second year students as they struggle to become successful

autonomous university students. This study indicated that the students interviewed were in a place along the developmental continuum to take advantage of whatever resources were available to them. Helping first and second year students understand the importance of available resources would certainly be beneficial. Further studies should continue exploring ways to provide academic support programs that address students' needs before the barriers interfere with their progress.

### **Broader Implications**

The application of the scientific method to mentoring activities is applicable to all academic areas—not just the sciences. Although my mentoring activities primarily involve students in the areas of science, technology, engineering, and mathematics, other faculty members at the Center for Academic Success mentor protégés in a wide variety of disciplines. The steps involved in applying the scientific method to mentoring are generally applicable to any mentoring experience. Learning about the characteristics of the protégé, developing hypotheses about the problem to be addressed, jointly developing a menu of strategies, implementing the strategies, analyzing the success, developing conclusions about the efficacy of specific strategies, and subsequently modifying strategies based on the results will make the mentoring experience an enjoyable and satisfying one for both the protégé and the mentor. The broad applicability of these methods suggest that they can be used for students in all types of institutions and at all levels. The specifics of the mentoring experience will change, but the basic framework is sufficiently robust so that, when applied according to the scientific method, it will yield positive results in any mentoring situation.

### **Conclusion**

The process through an academic barrier begins and ends with students. The reputation of a required difficult course can create the perception of a hurdle or academic barrier. The unique skills and attitudes of students contribute to their expectations of a course as well as their ability to succeed. In a course perceived to be as difficult as Physical Chemistry, students report a level of anxiety throughout the semester. The expectation of difficult course material is confirmed throughout the semester. Students report that academic resources, particularly SI, abate anxiety and support academic success for those who participate. SI participation is completely voluntary and students are able to decide to participate in SI throughout the semester. Students suggested that participation in SI positively contributed to their academic achievement in Physical Chemistry. It provided a safe environment and peer support in the course, breaking the cycle of an academic barrier.

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# Utilizing Multiple Interlocking Learning Communities to Form a Center for Teaching and Learning

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## Abstract

*The trend toward implementing models for Centers for Teaching and Learning (CTL) for academic support in higher education is gaining momentum. Whether due to external influences, such as the Carnegie Academy for the Scholarship of Teaching and Learning, which promotes inquiry about teaching and learning, or more related to internal forces such as the pressure to improve student retention, learning assistance administrators and teaching faculty increasingly share a common mission. The CTL movement assumes that significant learning takes place in multiple environments in and out of the classroom and that learning is a social interaction dependent on multi-layered and diverse learning communities. A case study at Randolph-Macon College suggests that moving learning centers toward the CTL model can effectively address some of the biggest challenges in the current postsecondary climate, such as retention, use of limited resources, and increased access.*

Faculty and administrators openly acknowledge that major challenges are facing colleges and universities in the new century, including an increasingly diverse learning population, financial challenges, pressure to improve retention rates, and a renewed emphasis on defining specialized institutional missions (Hanes, 2007; Marcy & Guskin, 2003; O'Meara, Kaufman, & Kuntz, 2003). Unfortunately, pressure from unfunded mandates, emphasis on change for change's sake, and turnover in key personnel can result in collective institutional frustration, or, perhaps more critically, may distract stakeholders from making use of assets already in place to address such issues. The recognition and utilization of non-traditional learning communities on campus, in conjunction with an emphasis on the scholarship of teaching and learning, can lead to positive solutions to many of these problems.

## Background

There is a growing recognition that colleges and universities are complex organizations that contain many overlapping and unique learning communities (Blande & Bergquist, 1997; Cambridge, 2000; Gabelnick, 1990; Leskes, 2003; Marcy & Guskin, 2003; Shapiro & Levine, 1999). For example, education students entering the teacher training program become a special cohort within the larger school and, in essence, become their own learning community. Students and faculty participating in an advising cohort for freshmen only also become a unique learning community. Faculty members engaging in specific pedagogies, like active learning, may form a learning community (Cambridge, 2000).

Within a larger organizational structure, communities such as these can support one another without compromising their individual core missions, and by doing so, they may create new and better learning communities (Delohery, 2006). Although the idea of colleges and universities as laboratories for group behavior theory may seem to reside more within the realm of the sociologist than the pure pedagogue, the collaborations and multiple learning interactions beyond any specific discipline or degree track taking place on campus historically have been a defining aspect of what is a college education (Light, 2001; Marcy & Guskin, 2003; Moore, 2006; Shapiro & Levine, 1999).

One recent trend in higher education aimed at addressing the current challenges has been the grouping of services for the support of both teaching and learning in the same physical location. As older tutoring centers, advising spaces, and specialized facilities from the 1960s and 1970s are remodeled or replaced with newer structures, many schools have intentionally reorganized various offices that fit naturally together. In some literature, this trend is referred to as centralizing the core mission of teaching and learning (Cambridge, 2000). This trend recognizes and values many types of learning, including the learning that faculty experience as well as the learning that takes place outside of the classroom. The desire to better understand the teaching and learning mission has resulted in the creation of Centers for Teaching and Learning (CTL), like those at Stanford University and Harvard (C. Roland Christensen Center for Teaching and Learning, Harvard Business School, 2007; Cambridge, 2000; Denman, 2006; Freedman, 1994; Teaching and learning: The Center for Teaching and Learning, Stanford University, 2006). CTL as organizational entities are predicated on the philosophy that teaching and learning do not take place in a vacuum and that campus communities are self-reflective, dynamic, and constantly evolving (Leskes, 2003). The emergence of CTL is symptomatic of the growing need colleges and universities have to take advantage of and cultivate multiple interlocking learning communities that already exist (Marcy & Guskin, 2003; Shapiro & Levine, 1999).

A thoughtful examination of these extant campus learning communities immediately uncovers new opportunities for connecting teachers and learners. Many colleges and universities have already redefined their freshmen curricula using such a philosophy, particularly in order to emphasize small and interconnected learning communities in the first year experience. In doing so, most have found that freshmen retention rates go up, students

find areas of personal interest more quickly, and the classroom becomes more dynamic, interactive, and reflective (Erickson, Peters, & Strommer, 2006). Other schools have redefined learning communities within special programs or content majors, deliberately creating small cohorts of students within larger programs (Kight, Gaynor, & Adams, 2006).

A national focus in higher education on the shared teaching and learning mission has intensified in recent years. More institutions are growing outward from traditional student learning assistance centers to establish learning-and-teaching effectiveness centers to assist faculty development and to increase the effectiveness of student learning (Arendale, 1997). Such Centers for Teaching and Learning rely implicitly on collaboration between various learning communities (faculty, advisors, coaches, students, staff, etc.). Nor is the trend limited to higher education (DiRamio & Wolverton, 2006; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). There is also recognition that learning communities are a key to successful inclusion classrooms at the middle school and secondary school level, to cite one example (Berry, 2006). In simple terms, there is an increasing awareness that colleges and universities have the potential to be far greater enterprises than the sum of their various parts (Leskes, 2003). Savvy faculty members and administrators should be poised to tap into these dynamic possibilities and should view the process as one of enhancement, rather than improvement for change's sake. Likewise, the tendency to view any type of change as a potential threat to administrators' influence or self-determination should not obscure the fact that the CTL model may actually increase the status of the learning center and the influence it can wield in the academic community.

### *Randolph-Macon College as a Case Study*

The impetus for examining multiple learning communities can occur as a result of direct action or more indirectly through policy renewal or curriculum updates (Leskes, 2003). Colleges or universities struggling with retention rates, dwindling finances, or even crises of mission should consider the CTL model as a natural opportunity for creative renewal.

At Randolph-Macon College (R-MC), a small, private liberal arts college in central Virginia, such a change came about as a result of direct administrative action. A recent reorganization of the student learning center, The Higgins Academic Center (HAC), along with the adoption of a new curriculum, provided the opportunity for a new interlocking of existing learning communities. For example, a writing center that had formerly operated as a separate entity was re-conceptualized as part of a Writing Across the Curriculum initiative and moved administratively into the central learning center, the HAC. The many changes initiated at R-MC, largely due to the new curriculum, make it an appropriate case study to examine in the effort to maximize the potential of various learning communities.

### *Pre-History of the Higgins Academic Center*

The Higgins Academic Center at R-MC evolved from the merger of several separate programs designed to provide academic support for students. In the late 1970's, an English professor created a writing center within the English department to assist students with their writing. In the mid-1980's, a compensatory program called RISE (Randolph-Macon's Initiative

for Successful Education) was developed to address the needs of incoming freshmen at-risk in English and mathematics skills. Also in the 1980's, the writing center added peer-led tutoring for other subjects as well as a peer mentoring program.

The Center united academic support and disability support services for students in the early 1990's and named the center in memory of an alumnus with a learning disability who died shortly after graduation. The HAC was housed in a few small rooms in a women's residence hall with a staff of two full-time professionals, a center director, and a disability support services coordinator. Both reported to the Dean of Students within the Student Affairs division. By the late 1990's, the Center was providing tutoring and mentoring support for all enrolled students with an emphasis on those with disabilities and freshmen who were identified as struggling academically in the first semester. The HAC was a successful academic support center for students but did not have as a primary mission providing faculty support for teaching.

### *The HAC Evolves from Various Learning Communities*

In 2003, the liberal arts curriculum at the College was radically altered to better reflect the updated mission of the College. The curriculum's objectives focused on the cultivation of "those qualities of mind and character that contribute to life-long learning" (R-MC academic catalog, page 7). At the heart of the new curriculum was a three-course first-year experience (FYE) required of all freshmen and eligible transfer students. As a result of the new curriculum with its focus on active student learning and increased student engagement, greater emphasis was placed on excellence in teaching (Peters, 2006).

As an outgrowth of the new curriculum and its focus on pedagogy, the academic Dean of the College determined that the HAC could physically and philosophically house a Center for Teaching and Learning (CTL) that would continue to support students but also provide resources and support for faculty. The administration moved the center's reporting line from under the aegis of the Dean of Students to the academic Dean of the College in order to provide academic emphasis to the changes. Simultaneously, the Center's physical location was moved to a newly remodeled residence hall with a spacious first floor specifically designed to serve as a CTL. The space included faculty meeting areas, other important academic offices, and an atrium available for larger meetings.

Concurrently, the Dean renamed the Director of the center "Director of Instruction," elevated the DSS coordinator to a Director of Disability Support Services, and added three new Directors of Technology Support Services, Speaking Across the Curriculum, and Writing Across the Curriculum. The center was then comprised of five major strands and directors, all of whom reported directly to the associate academic Dean of the College. The final addition to the new structure was the appointment of the "Higgins Fellows," five experienced professors who were to serve as advisors to the five Directors and to generate faculty-led initiatives under the CTL umbrella.

### *The Higgins Fellows*

Randolph-Macon is a close-knit community of scholars dedicated to the liberal arts and active in their professional disciplines. The faculty recognizes that to instruct students to meet the challenges of a rapidly changing world, their teaching effectiveness must constantly be enhanced by vigorous professional and intellectual activity. “Effective teaching requires continued change, development, scholarship, inquiry, improvement, growth and awareness of developments in the discipline and in pedagogy” (Faculty Handbook, 2006). Five master teachers, recognized by their colleagues as outstanding models of teaching, are appointed by the academic Dean for two year terms as Higgins Fellows.

The Fellows advise the five HAC Directors on programming needs voiced by the faculty and also lead faculty discussions concerning teaching practices as well as advances and changes within the field of higher education. Programming ranges from informal morning coffees focused on topics of mutual interest to formal sponsorship of distinguished guest speakers chosen for their outstanding merits related to some aspect of the teaching experience.

The appointment of the Higgins Fellows represented a bridge between the old curriculum and the new way of connecting teaching and learning across various learning communities and, thus, was a most important piece in the redesign process. In a time of great change, they facilitated and articulated the faculty mind in relationship to the new CTL and the changes to the new curriculum.

### *The First Year Experience (FYE)*

At the heart of the liberal arts education is the curriculum. The newly adopted curriculum at R-MC offers students a comprehensive educational opportunity and includes exposure both to broad perspectives across disciplines and a deeper understanding of the single discipline in which they major. To foster learning in both areas of the curriculum, the faculty created a first year experience to increase student engagement in the learning process. The first year experience has as its foundation three courses, a two-course First-Year Colloquium and the First-Year Seminar in Exposition and Argument. First-Year Colloquia are two-semester, interdisciplinary courses open only to freshmen and eligible transfers, with speaking instruction embedded across the curriculum rather than taught in separate classes. Writing skills are taught in the seminar in English and Argument and are intensively reinforced across the curriculum. Students in the FYE are guided in this endeavor by faculty dedicated to excellence in their disciplines. The newly reorganized Higgins Academic Center hires professionals who serve as resources and sponsors for programming on professional teaching techniques, academic strategies, and other research-based educational resources useful to those teaching in the FYE. Support to students and faculty is now available in all areas of teaching and learning, expanding upon traditional programs like peer tutoring for students and faculty mentoring to include new initiatives, such as the Higgins Fellows’ lunch time workshops. Integration of various learning communities is an intentional keystone to the new curriculum (Mentkowski & Associates, 2000).

### *Office of Instruction*

The Instruction area of the HAC not only continues to provide traditional academic support to students, but it now also provides more resources and support to faculty and staff. For students, a team of peer tutors and mentors, trained and supervised by the Director, work as partners with students who seek tutoring, mentoring, supplemental instruction, or supervised study hall services. The staff also provides academic support for students in the FYE who require more intensive structured intervention. As an example of an expanded interlocking of existing services, the Directors of Instruction and Disability Support Services now work as a team to map out academic support strategies with students who may be referred by faculty, parents, coaches, staff, or themselves. The major goal of this intervention is to assist the students in identifying and developing more successful learning strategies.

The two directors also collaborate directly with academic advisors and instructors to provide better feedback. For example, in collaboration with the Director of Instructional Technology and faculty, a new computerized system that provides feedback via e-mail to referring faculty was installed in the center. In addition, far more often than under the former tutoring center model, the Instruction and Disability Directors now provide more teaching resources for faculty, coaches, and staff. Departments may request consultations with the learning center professionals on issues related to teaching students with learning differences, and they may request that the directors provide direct instruction to their students.

Other collaborations between the Director of Instruction and staff members include partnership with coaches to provide special support to at-risk athletes. The Director of Instruction also collaborates with the Director of Counseling and Career Planning Services to provide non-academic support for students in addition to the academic side. Through these interlockings of existing learning communities, the Instruction area's services have evolved from the traditional tutoring center support for students to a more inclusive center supportive of students, faculty, and staff.

### *Office of Disability Support Services (DSS)*

Since the disability support services office was joined with the tutoring program in the early 1990's, R-MC has been committed to providing reasonable accommodations for students with disabilities. In addition to providing support to individual students, the office has grown within the new CTL model and now provides faculty with more direct access to resources related to disability through workshops, newsletters, special class offerings, and individual consultations with faculty.

The office also provides consultation and direct instruction related to disability and accommodation to class groups and athletic teams at the request of professors and coaches. Changes in the new model have also resulted in disability being integrated into the new curriculum through courses offered to all students through the honors, sociology and/or first-year experience departments. The DSS office also disseminates disability research findings and leads new cooperative research with faculty (particularly FYE) and/or other HAC directors.

### *The Speaking Center and Speaking Across the Curriculum*

New to the re-formed center is the position of Director of Speaking Across the Curriculum and an accompanying speaking center. The new curriculum requires that faculty in the first year colloquia provide instruction and emphasis on improvement of communication skills. The new Speaking Center, located within the HAC, supports the College's efforts to improve students' abilities and to use a range of communication activities as tools to enhance student learning. The Center offers peer consulting and tutoring for students as well as resources to assist faculty. Speaking Center professionals also collaborate with faculty to provide classroom instruction. The Director supports faculty by sponsoring programming on professional teaching techniques related to the discipline and by providing academic strategies and other research-based educational sources.

### *The Writing Center and Writing Across the Curriculum*

The Writing Center, another reconfigured branch of the newly modified learning center, supports the College's effort to improve student writing across the curriculum (WAC). A full-time director of WAC in a tenured faculty position was added to the staff of directors when the HAC was expanded. The Writing Center offers workshops and other resources to support faculty across the curriculum as they prepare and enhance courses that emphasize writing. Students also seek help from the Writing Center, which provides free tutorial services staffed by the program director and CRLA-trained peer tutors. The director collaborates with other HAC staff on program development and initiates opportunities for better collaboration with faculty.

The Writing Center has also sponsored a number of formal and informal writing groups on campus, building additional learning communities that include students, faculty, and staff participants. The net result is a heightened sense of R-MC as a community of writers.

### *The Office of Instructional Technology*

The Director of Instructional Technology position was added to the HAC team as part of the reorganization to focus on teaching and learning with technology. The director offers support to faculty and students on the use of various instructional technologies with an emphasis on the design and development of programs that enhance teaching and learning. The director also works in the classroom with FYE groups and other classes, faculty, and staff and collaborates with other HAC Directors to provide technology training to CRLA-certified peer tutors who work with students and faculty.

## **Implications and Discussion**

Over the course of several years, the transition at R-MC from a traditional academic support center for students to a true teaching and learning model within a Center for Teaching and Learning was filled with successes and challenges. The construction of additional administrative positions and programs, for example, immediately created a budget challenge, but it also produced a heightened intellectual synergy.

The benefits, however, are tangible and quantifiable. To cite just a few examples, retention rates and graduation rates for students with disabilities have improved dramatically as a result of becoming part of the CTL (roughly 90% of an original 2001 freshman cohort graduated in the spring of 2005); the process of identifying struggling freshmen has been refined and prioritized earlier in the first year experience (compliance rates for freshmen in probation programs increased two years in a row); and the numbers of freshmen going into probation programs have decreased (from 26% in 1999 to 17% in 2007).

At R-MC, literally dozens of learning communities have been identified that function outside of the classroom. An advisor and his or her group of advisees is a perfect example of a learning community that exists outside the classroom. In a less formal setting, all of the residents along a students' dorm hall are part of a learning community. The programs organized by the Higgins Fellows create small learning communities of faculty and staff. Increasingly, faculty and staff at R-MC are viewing the teaching and learning mission as predicated on recognizing and utilizing all of the diverse learning communities on campus.

Most administrators, such as the president or provost, are in unique positions to impact learning communities. When they recognize and cultivate learning communities, the mission of the CTL is enhanced. In many cases, a chief administrator may be in the best position to see how diverse and plentiful the learning communities are.

Administrators of CTL must view their centers as key pieces in the learning communities puzzle. CTL are by definition positioned to serve diverse constituencies and enhance programs that are already in place. In times of fiscal challenge, CTL are able to engage in activities that don't necessarily require more money. At R-MC, for example, tutors now schedule their drop-in hours within athletic study halls and no additional funding is required. Another unique learning community was created. Creating such opportunities requires recognition of how comprehensive and complex the postsecondary learning environment already is and identifying preexisting relationships that can be connected.

The annual summer school program at R-MC is another example of how preexisting learning communities can be complementary. The summer school administrator has consistently noted how faculty responded positively to the opportunity to teach something different or to work with a smaller group of students during the summer term. The summer school program creates a learning community within the larger community, and those relationships carry over into the next semester and into other programs. There are unique learning experiences that can only occur in the relatively short summer term.

These types of opportunities are obviously not earth shattering news to many people, but they should open eyes to the possibilities. The opportunities created have not cost significant new amounts of money—in the case of summer school they actually generated positive income (the unexpected boost in enrollment generated additional tuition revenue)—and they simply required recognizing the myriad forms of learning that had already been



taking place for many years. The recognition of such learning sets the stage for thinking outside of the box and imagining other possibilities.

To cite another example at R-MC, a unique learning community was created by the partnership between the Career and Counseling Center and the freshman academic support program (Macon Academic Progress) that resulted in new activities and cooperative interventions. Peer tutors and mentors working with at-risk freshmen were trained by counseling center personnel. Other learning communities at R-MC include learning center relationships with athletics, the study abroad office, residence life personnel, advisors, etc. When these communities are connected through the CTL and consistently linked to classroom learning and to other services, groups, and communities, exciting things become possible.

Learning center administrators, like presidents or provosts, are often in a unique position to see all of the parts interacting with the others (Delohery, 2006). From that position, many other audiences (faculty, other campus offices, peer tutors and mentors, etc.) would likely be very interested in knowing how to make sense of it all and how to use principles of leadership to help others take advantage of cooperative opportunities. By moving toward a Center for Teaching and Learning model, colleges and universities make it more likely for the creative opportunities to crystallize.

## Conclusion

The experience at R-MC and the literature on CTL and learning communities suggest that there is great untapped potential in the varied learning already taking place on college and university campuses. By utilizing the CTL structure and fostering institutional support for recognition of diverse learning communities, colleges and universities may be able to refine their educational missions and do so within the budgets they already have. They may also be able to adopt and embrace a philosophy that is as old as the notion of the liberal arts education itself: no learning exists in a vacuum; learning is a social activity and we are social beings; and everything is connected.

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# Book Review: *Survival Guide for General Chemistry with Math Review and Proficiency Questions*

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Atwood, H. C., (2007). *Survival Guide for General Chemistry with Math Review and Proficiency Questions* (2nd ed). Belmont, CA: Thomson Brooks/Cole.

## REVIEWED BY WALTER POELZING, OHIO DOMINICAN UNIVERSITY

H. Atwood's work is intended for any student interested in honing essential components in introductory college chemistry courses. Per his preface, the purpose of his work is to increase the personalization of material so readers feel as if they were sitting beside the author at his desk and he was helping them solve problems. Comparing this work to his original work (Atwood, 2005), the style is foundationally the same, but additions in graphical representation were used to point out key difficulties in the processing of subject matter. Specifically, he includes a TIPS icon, which identifies clues and techniques that were not addressed in his previous work.

His book is organized in modules. Topics range from Understanding Significant Figures, Chemical Reactions, Molecular Shapes, Heat Transfer and Thermodynamics to Electrochemistry and Nuclear Chemistry. Being a science workbook, it follows the standard explanatory methods of algorithmic presentation (step 1, step 2, etc...), yet, he uses a variety of graphical representations which more visual learners may find easier to follow (Fisher-Frey, 2004). Specifically, he uses directed flow chart structure in many of his graphical organizations. In addition, all of his modules are broken down in proficiency levels, allowing students/tutors to determine fairly quickly if they are novices or experts in the particular topic.

With respect to a learning assistance tool, it is evident that this workbook can easily be adapted to assist a tutor or SI leader in a General Chemistry Course. Since each module is preceded by a set of Predictor Questions, these pages can be used by the tutor or SI Leader to quickly refresh their understanding. Each set of Predictor Questions follows with solutions on the next page, allowing for immediate response to the correct solution. If an SI leader, tutor, or tutee needs more review, each can obtain a quick yet detailed review in the actual module section. The Predictor Questions can be used as starting points for an SI session and allow the SI Leader to quickly figure out the general level of student understanding without having to ask a series of questions. From a mathematical perspective, in the first module, the author presents basic mathematical steps and algorithms that are required to solve standard chemistry conversions using his graphical techniques. In

later modules, he provides highlighted box components that give quality literary explanations on each step and at the end of specific topics within the module; he usually accompanies the ending with an INSIGHT or TIP that provides higher level reasoning into why the process works the way it does. This can be a good starting point for tutors and SI leaders to go into further detail on the subject matter.

He continues to give mathematical assistance in his final section called Math Review, which is a good summary of scientific notation, roots, rounding, the Pythagorean theorem, and logarithms. The only suggestion I would make to have these mathematical ideas is that the book make reference within the module section to the Math Review. For assistance, the Pythagorean theorem is used in Module 13; States of Matter, page 115. The Pythagorean Theorem is mentioned relative to calculating a radius of a single Pb atom, but the guide does not suggest that readers go to the Math Review section if they are having trouble remembering what it is. This is a relatively minor point, but something that could be addressed in future editions. Maybe a small italicized point at the bottom or side of the page could be placed, letting readers know where they can get additional assistance with the workbook.

In conclusion, I would recommend this survival guide as a tool to accompany a chemistry tutorial or SI session. Individually, for students who have studied the material beforehand, the guide gives a strong sense that a professional is giving guidance on points they should have been exposed to. For groups, the workbook can be adapted fairly easily. By having the SI leader/tutor review the material beforehand, the predictor questions, solutions, and module explanations can form a good foundational process whereby the group leader goes over the chemistry material with his/her tutees.

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# Pertinent Publishing Parameters

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*The Learning Assistance Review (TLAR)*, the national peer reviewed official publication of the National College Learning Center Association (NCLCA), publishes scholarly articles and reviews that address issues of interest to learning center professionals (including administrators, teaching staff, faculty and tutors) who are interested in improving the learning skills of postsecondary students. Primary consideration will be given to articles about program design and evaluation, classroom-based research, the application of theory and research to practice, innovative teaching and tutoring strategies, student assessment, and other topics that bridge gaps within our diverse profession.

## Categories for Submission

### *Articles:*

- ◆ **Topics:** *TLAR* will accept manuscripts that address our purpose: to publish scholarly articles and reviews that address issues on program design and evaluation, classroom based research, the application of theory and research to practice, innovative teaching and tutoring strategies, student assessment, etc.
- ◆ **Types:** *TLAR* will accept manuscripts following all four of the article types outlined in the American Psychological Association Manual: empirical study and articles on review, theory, and methodology. Follow APA manual (chapter 1.4) for specific requirements and structure for each type; regardless, all manuscripts need a clear focus that draws a correlation between the study, review, theory, or methodology and learning assistance practices.

### *Joining the Conversation:*

- ◆ **Idea Exchange:** Discussion directly related to articles published in *TLAR*. A more formal and in-depth extension of professional list-serves that provides a forum for networking on ideas that impact learning assistance. Submissions are limited to less than four paragraphs and are to be constructive idea exchanges. In addition to the name, title, college, and contact information from the submitter, Idea Exchange submissions are to include the details of the referenced article (title, author, and volume/number, and academic semester/year). A submission form may be found online on the *TLAR* website.
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*Book Review:*

- ◆ Book review requests should be accompanied with two copies of the book to facilitate the reviewing process.
- ◆ Potential book reviewers are urged to contact the editorial team for details.

**Manuscript Guidelines**

- ◆ Manuscripts and reference style must be in accordance with the *Publication Manual of the American Psychological Association* (5<sup>th</sup> ed.). Submissions that do not comply with APA style will be returned to the author(s).
- ◆ Manuscripts must be original work and not duplicate previously published works or articles under consideration for publication elsewhere.
- ◆ The body of the manuscript may range in length from 10 to 20 pages, including all references, tables, and figures. Longer articles will be considered if the content warrants it.
- ◆ The authors are responsible for the accuracy of all citations and references and obtaining copyright permissions as needed.
- ◆ The only acknowledgments that will be published will be those required by external funding sources.

**Submission Guidelines**

- ◆ Submission packets must include: a cover page, the original manuscript, and a masked manuscript for review. One hard copy of these materials must be mailed to the address listed below and an electronic copy submitted to the e-mail address listed below.
- ◆ The title page must include the title of the manuscript (not to exceed 12 words); the name(s) and institutional affiliation(s) of all authors. The lead author should also provide work and home addresses, telephone numbers, fax, and e-mail information. All correspondence will be with the lead author, who is responsible for all communication with any additional author(s).
- ◆ The second page should be an abstract of the manuscript, maximum 100 words.
- ◆ To start the reviewing process, the lead author will be required to sign a certificate of authorship and transfer of copyright agreement. If the manuscript is accepted for publication, all author(s) must sign an authorization agreement.
- ◆ Figures must be black and white, camera ready, according to APA style; tables should not be tab aligned.



**Please send your comments and/or article submissions to:  
tlareditor@lourdes.edu with a hard copy to:**

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- ◆ Author(s) will receive an e-mail notification of the manuscript receipt.
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- ◆ Authors may expect the review process to take approximately three months.
- ◆ Authors may receive one of the following reviewing outcomes: (a) accept with minor revisions, (b) revise and resubmit with only editor(s) review, (c) revise and resubmit for second full editorial board review, and (d) reject.
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## NCLCA Membership Information

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### What is NCLCA?

The National College Learning Center Association (NCLCA) is an organization of professionals dedicated to promoting excellence among learning center personnel. The organization began in 1985 as the Midwest College Learning Center Association (MCLCA) and “went national” in 1999, changing the name to the National College Learning Center Association (NCLCA) to better represent its nationwide and Canadian membership. NCLCA welcomes any individual interested in assisting college and university students along the road to academic success.

NCLCA defines a learning center as a place where students can be taught to become more efficient and effective learners. Learning Center services may include tutoring, mentoring, Supplemental Instruction, academic and skill-building labs, computer-aided instruction, success seminars and programs, advising, and more.

### Join NCLCA

NCLCA seeks to involve as many learning center professionals as possible in achieving its objectives and meeting our mutual needs. Therefore, the NCLCA Executive Board invites you to become a member of the Association.

The membership year extends from October 1 through September 30. The annual dues are \$50.00. We look forward to having you as an active member of our growing organization.

### Membership Benefits

- ◆ A subscription to NCLCA's journal, *The Learning Assistance Review*
- ◆ Discounted registration for the Fall Conference and for the Summer Institute
- ◆ Regular issues of the NCLCA Newsletter
- ◆ Voting privileges
- ◆ Opportunities to serve on the Executive Board
- ◆ Special Publications such as the Resource Directory and the Learning Center Bibliography
- ◆ Opportunities to apply for professional development grants
- ◆ Access to Members Only portion of the website
- ◆ Announcements of other workshops, in-services, events, and NCLCA activities

# Membership Application

On-line membership application or renewal available with PayPal payment option at: <http://www.nclca.org/membership.htm>. Contact Membership Secretary to request an invoice if needed.

OR

Complete the information below and send with your \$50 dues payment to the NCLCA Membership Secretary. Be sure to check whether you are a new member or are renewing your membership. If you are renewing your membership, please provide updated information.

**Please check one:**  New member  Membership renewal

Name \_\_\_\_\_

Title \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State/Province \_\_\_\_\_

Zip/Postal code \_\_\_\_\_

Phone number \_\_\_\_\_

Fax number \_\_\_\_\_

Make check payable to NCLCA.

Send completed application form and dues of \$50.00 (U.S. funds) to:

**NCLCA Membership Secretary**  
**Tammy Pratt**  
**Director, Assessment and Learning Center**  
**University College at OU**  
**650 Parrington Oval**  
**Norman, Oklahoma 73019**  
**405-325-4336**  
**[tpratt@ou.edu](mailto:tpratt@ou.edu)**











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