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About The Learning Assistance Review

The Learning Assistance Review, an official publication of the National College Learning Center Association (NCLCA), is published by the General College, University of Minnesota. 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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Keynote Speakers
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Letter from the Editors

To Our Readers:

On behalf of the membership of the National College Learning Center Association (NCLCA), we would like to express our appreciation to Martha Casazza and Nancy Bornstein for their many years of service as editors of The Learning Assistance Review. With Karen Quinn, Martha was one of the founding editors of the Journal in 1995. The first issue of The Learning Assistance Review was published in spring 1996. Nancy has served as editor since spring 1998. Without Martha's and Nancy's many hours of editing and mentoring, NCLCA would not have been able to support an undertaking like a national publication of this caliber.

With this issue, we introduce you to a new look for The Learning Assistance Review. The covers of the two issues of each volume will be color-coded in order to distinguish them from previous years' journals. You will also find several formatting changes within the covers of this issue. We wish to thank Karen Beucke, graphic designer with the Communications Office of the University of Minnesota's General College (GC), for her leadership in this endeavor, and for formatting the manuscripts published in this issue. Karen's time on this project has been generously donated by GC Dean David Taylor, who is also providing support for a half-time, 12-month graduate research assistant (GRA) and miscellaneous day-to-day expenses, such as long distance telephone service and photocopying.

At this time we would also like to introduce you to our three additional editorial staff members. GRA Emily Goff will serve as Associate Editor of the Journal, and will handle most direct correspondence with authors and reviewers. Emily is a doctoral candidate in adult literacy. David Arendale, assistant professor of history in GC and long-time NCLCA member, will serve as Book Review Editor. David would appreciate receiving suggestions for new books to be reviewed for coming issues. Contact David at arendal1@umn.edu to recommend a book or to volunteer to write a review. Robert delMas, who we are pleased to announce has been recently promoted to associate professor of mathematics and statistics in GC, will serve as The Learning Assistance Review’s statistician. Although we each have strong statistical backgrounds, Bob will be double checking for us to make sure that all statistical tests published in research articles in the journal have been conducted appropriately.

We invite members of NCLCA to become more involved in the development and publication of NCLCA's journal. Due to the extraordinary number of manuscripts that have been submitted over the past six months, we are seeking additional editorial board members and guest reviewers. If you are interested in serving in one of these capacities, please contact us at
Supplemental Instruction (SI) and the Personalized System of Instruction (PSI), can capitalize on the strengths of both to enhance learning through self-regulation. In the second article, White presents the results of his research that examines the physical aspects of learning centers, focusing on location, whether centralized or decentralized, furnishings, equipment, and aesthetics. White’s survey also explored whether learning center personnel believed that their centers had adequate resources for serving student needs now and in the future. “Join the Conversation” presents a model named after authors Knowles and Paglia (hence K-P) for comprehensive learning assistance for mathematics students. The K-P Model acknowledges the importance of a collaborative approach in addressing affective barriers to achievement in mathematics. Finally, this issue concludes with Holschuh’s review of College Reading Research and Practice: Articles from the Journal of College Literacy and Learning, by Paulson, Laine, Biggs, and Bullock.
Abstract

Supplemental Instruction is a widespread educational intervention for use in courses where many students have difficulty. However, it has not typically been subjected to rigorous analysis. It also has not been used widely with mastery learning models of instruction. In this study, we present evidence that combining these two models of instruction can be of benefit to developmental students at the highest risk for academic failure. We also make suggestions for productive uses of Supplemental Instruction.

Supplemental Instruction (SI) began in 1973 at the University of Missouri-Kansas City (Center for Academic Development, 1992; Martin, Lorton, Blanc, & Evans, 1977). Martin and her colleagues point out that SI was designed to increase academic performance and reduce attrition rates in "high-risk" courses defined as having 30% or higher rates of Ds, Fs, and withdrawals. An SI program typically invites students to voluntarily attend peer-facilitated study sessions led by an SI leader who is a successful former student in the target course. The SI leader models successful student behavior by attending the course lectures, taking notes, reading all assigned materials, and using this information to facilitate three to five SI sessions per week (Wilcox & Koehler, 1996). SI leaders are trained to help students take effective notes; use notes and note cards to study; differentiate among key concepts and supporting data; manage time; develop their own visual aids; construct didactic diagrams; drill with flash cards; predict test questions; analyze test questions and foil in multiple-choice examinations; review examination performance; identify and correct error patterns in examination performance; and appropriately use syllabi, texts, and supplementary readings (Blanc & Martin, 1994).

Research on SI consistently supports the conclusion that students who participate in SI out-perform nonparticipants (Blanc, Debuhr, & Martin, 1983). However the research often suffers from lack of appropriate control groups,
making it difficult to know if SI or pre-existing motivation is responsible for the positive effects of the treatment. A recent study by Gattis (2002) attempted to control for the possible higher motivation of SI participants. Although Gattis' analysis showed a positive main effect on student grades for SI participation compared to non-SI groups, it is unclear whether his motivation control group specifically differed from the SI groups. Also, few quasi-experimental studies have been done on the effects of SI in courses that are not taught using traditional lecture pedagogies, and few studies focus specifically on the effectiveness of SI in enhancing the performance of underprepared students. The purpose of this study was to evaluate the effects of SI on underprepared students enrolled in a course that used an individualized mastery approach based on Keller's (1968) personalized system of instruction (PSI) and Bloom's (1956) model of mastery learning.

In the mid 1950s, Bloom (1956) created a structure for categorizing the level of abstraction of questions that commonly occur in educational settings. Bloom developed six levels of abstraction that progress from the simplest to the most complex. These levels are designed to assess a student's competency through basic knowledge, comprehension, application, analysis, synthesis, and evaluation. He followed this work with his concept of mastery learning that involved requiring students to master elementary levels before they proceeded to more complex ones (Bloom, 1976). In his formulation of the mastery learning model, he suggested that students with academic deficiencies can be nearly as successful in mastery learning courses as well-qualified students.

In the 1960s Keller (1968) developed what has often been called the Keller Plan or PSI. Key aspects of this teaching method include students working at their own pace, mastery learning, and tutoring and proctoring. Research studies have shown PSI to have a number of advantages over conventional educational methods, and few disadvantages. In a meta-analysis of PSI studies, Kulik and his colleagues (Kulik, Kulik, & Bangert-Drowns, 1990) found superior student learning in PSI compared to traditional forms of instruction, with this advantage even greater for students with lower academic ability. Students, especially those who would normally perform at the lower or middle levels, learn significantly more, as measured by final examinations and by tests of long-term retention in subsequent semesters. Students evaluate the classes and tutoring offered through PSI positively, and develop good habits that carry over to other courses and learning activities. These findings led Kulik to recommend that teachers of developmental students consider using PSI (Bonham, 1990).

However, PSI has weaknesses that could be addressed through SI. One weakness is that PSI does not intentionally provide peer support for learning. Students work independently of each other, so interaction is between individual students and staff members. Because SI is a group-based intervention, it may provide peer support for learning to complement the more individual focus of PSI. A second weakness of PSI is that students must rely on texts for information. Students who are poor readers may avoid the task or not have many reading strategies in their repertoire. Because there are no lectures in a PSI course, the SI leader could help students identify strategies for learning from written text. Another potential disadvantage of PSI is the problem of procrastination. PSI offers students some control over when they will accomplish the course tasks. Making good decisions about how to pace one's work requires self-regulation. Zimmerman (1989) defined this behavior as "actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners" (p. 329). Central to Zimmerman's concept is self-observation, which "refers to students' responses that involve systematically monitoring their own performance" (p. 333). SI leaders can show students how to monitor their performance.

Thomas and Rohwer (1986) proposed a specific approach to the development of self-regulation in learning. They advocated teaching a process called executive monitoring to facilitate learning: students appraise their need for further study, deploy strategies to meet those needs, and assess their learning progress. This technique can foster feelings of self-efficacy: believing one has the capabilities to attain academic success (Bandura, 1986; Shunk, 1990). According to self-efficacy theory, students require feedback on their learning progress and positive feedback results in an increased sense of their ability to master learning tasks. Stahl, Simpson, and Hayes (1992) recommended that instructors help "high-risk" students (i.e., those with histories of poor academic performance) develop self-regulating studying behavior. If acquisition of self-regulating behaviors is a goal for high-risk students, perhaps a combination of SI and PSI could facilitate this behavior. Two questions required answers before we could endorse this recommendation.

The first question is whether SI is truly effective or only appears so because of student self-selection. That is, students typically have a choice of whether they will make use of the intervention. Consequently, more highly motivated or academically able students might come to the SI sessions because they want to make certain they will succeed in the target course or because they think it will provide some "insurance" for a good grade. The second question concerns what elements of SI would be most appropriate for high-risk developmental students enrolled in a PSI course. For example, because PSI de-emphasizes lectures, one of the central SI functions of helping students with lecture notes would not be as useful.

To answer these questions, we conducted a quasi-experimental study in which we paired a mandatory SI course with a General Psychology course taught in the General College (GC) of the University of Minnesota. The General Psychology course is taught using a modified PSI model that utilizes computer-assisted instruction (Brothen & Wambach, 2000). The students in the SI course were especially high-risk students who were required to take the SI course if they enrolled in psychology. The first purpose of this
study was to determine if students who were required to enroll in an SI course demonstrated academic performance comparable to their lower-risk classmates and if they exceeded the performance of high-risk peers who completed the course previously without benefit of SI. The second purpose was to determine which of the several typical SI interventions we used worked best for these high-risk students.

Method

Participants
This study took place in the General College of the University of Minnesota. GC provides a lower division curriculum for about 900 students admitted each year who have graduated in the bottom two-thirds of their high school classes. About 40% are students of color and over half are first generation college students. About 55% of students admitted eventually transfer to a baccalaureate program in the university and about 30% earn bachelor’s degrees within 6 years. The primary mission of the General College is to find ways to help underprepared students become more successful. Among the new students, 150 who are either from the lowest quartile in high school rank or completed high school through a General Educational Development (GED) program, and have other risk markers such as first generation college student or low-income status, are invited to participate in TRIO Student Support Services, a national program funded under Title IV of the Higher Education Act of 1965. The purpose of the TRIO program is to help low-income students enter college, graduate, and become productive and contributing American citizens. GC uses its TRIO grant resources to provide students with SI courses attached to GC freshman liberal arts courses. The model provides students with a community of learners in their courses as well as academic support.

A total of 12 TRIO students elected to enroll in General Psychology fall 2002 and thus were also assigned to a newly established SI course exclusively for TRIO students. Four of the TRIO students in this study completed the SI class, but did not complete the General Psychology course. Eight students completed both courses by taking the final exams in them—they constituted the experimental group in this study. Two of them were African American males, two were Asian American males, three were African American females, and one was a Caucasian female.

The Psychology Course
The General Psychology course enrolled about 280 students and was taught with a computer-assisted modified version of PSI (Keller, 1968) that covered the content of a standard introductory psychology course (Brothen & Wambach, 2000). Students read an 18-chapter textbook, answered questions in a study guide, and completed computer exercises, quizzes, and a final exam. The study guide provided the students with a detailed outline of the chapter, an organized system for note taking on key concepts and issues, and also purposeful chunking of the content for more efficient reading and review. Students completed two computer exercises and one computerized quiz for each chapter. The computer exercises encouraged review and rehearsal of the information and feedback on progress towards mastery. The class met in a computer equipped classroom staffed by graduate and undergraduate teaching assistants. The assistants graded study guides and answered students’ questions about the course content and procedures. Students could complete some of the practice activities outside of the classroom via the Internet.

On the first two days of classes, we oriented the psychology students to course procedures. After this point, we allowed them to work at their own pace and attendance was not mandatory. Study question assignments were due each week and students received additional points for meeting the deadlines. All assignments, exercises, and quizzes had to be completed by the last day of classes. The final exam was the last course activity.

Supplemental Instruction Course
Students in the SI course met early mornings, twice a week for 90 minutes and engaged in several typical SI activities. There were a total of 25 sessions of mandatory attendance. From the outset, the course had six major objectives. The first objective was to teach the students to use the text as a primary resource. Building vocabulary and comprehension were major components of this goal, so we required several exercises of students. Vocabulary self-selection exercises required students to choose three words that stood out in each chapter. Students chose one concept that they found interesting, one that they found difficult to understand, and one that they believed everyone should know. In addition, students applied one concept from the chapter to their daily life or world events. Conceptual tools aimed at building comprehension included visual strategies such as knowledge maps and organizational strategies such as making lists and diagramming. Students also kept a journal in order to monitor their mastery of the textbook material. In addition, students identified and took note of difficult passages in their texts.

The second objective was to build critical thinking skills. Major avenues for achieving this objective included class discussion, students’ creation of quiz questions, and students’ participation in a regularly scheduled “Quiz Bowl.” Moreover, we provided students with information regarding levels of learning and asked them to apply this knowledge as they formulated multiple-choice quiz questions.

The third objective of the course centered on self-regulation, self-monitoring, meta-cognitive awareness, concentration, and peer support. We fostered self-regulation with a semester planner and encouraged self-monitoring by having students complete journals that discussed their progress and mastery of material for every two chapters. This fostered meta-cognitive awareness as they wrote about their strengths, weaknesses, and study strategies. We also asked students to monitor their motivation and concentration with emphasis on what helped or hampered their focus.
The fourth objective of the course was to develop peer support for learning. We emphasized peers as major resources by distributing a class list in which students provided their contact information. Students engaged in a variety of group activities that allowed them to get to know each other. Also, as a cooperative learning activity, each small group worked together to prepare and teach one chapter of the text to the class.

The fifth course objective focused on final exam preparation. The SI course aimed to help students prepare for the final exam by helping them anticipate final exam questions. Therefore, throughout the semester each student wrote one multiple-choice question for each chapter. Before writing these questions, students received explicit instruction on how to write them. They also worked in groups to critique and revise each other’s questions. We included these questions in students’ quizzes during each SI class period in which they had the first five minutes to take quizzes individually, and an additional five minutes to take the quiz as a small group. At the end of the semester, we compiled students’ questions into a final exam study guide. In addition, the SI course utilized a final exam preparation mechanism imbedded in the General Psychology course, a practice final exam that the computer software generated from a large item pool and that students could take as many times as they liked. A practice final exam served as the actual final exam for the SI course.

A sixth objective included providing explicit instruction and exercises geared toward helping students understand the nature and structure of the psychology course. This included a presentation on its grading system and point structure. In addition, the SI instructor led classroom exercises to demonstrate strategies for setting short-term objectives to reach long-term goals in the psychology course. For example, a student would state a desired final grade for psychology and the instructor would help the class determine the average number of points needed from each remaining chapter to achieve that grade.

Data Collection
We collected data on students’ cumulative total points in General Psychology at three points during the semester. The first two data collection periods came after the sixth and tenth weeks in the semester during which the college required instructors to calculate current grades and send them to students and their advisers. Students were to have completed about one third and two thirds of their assignments at these points. The last data collected were end of semester point totals that determined psychology course grades. In addition, the SI instructor, who is this study's second author, closely observed and interacted with her students to determine which activities were most useful to them.

Quasi-Experimental Design
To assess the SI students, we compared their performance to that of the rest of the students in class. In addition we established two control groups. The first group consisted of seven students in the General Psychology class who completed the course and were matched on ACT composite scores with the SI group. Both experimental and first control groups had an average ACT composite score of 14.5. The second control group consisted of 13 TRIO students who completed the General Psychology class the previous year, but were not involved in an SI class. Their average ACT composite score was 13.7. All students in the class had signed informed consent forms allowing us to collect the ACT scores from the University records office and to record and report their performance anonymously.

Results

The first analysis compared the grades of the SI students to those of other students in the class. The average grade for all students in the General Psychology class was B-, which was equivalent to 6 on a 0 (F) to 10 (A) scale. The average grade for the SI participants was 5.5, which is between C+ and B-. The average grades for the ACT control group and the TRIO control group were both 2.5, which is between D+ and C-.

Because the TRIO control group class from the previous fall semester did not have exactly the same number of points possible, we converted each of the students’ point totals in all three groups at the three grading intervals in the semester to standard (z) scores. That is, we subtracted the class mean total score from each student’s total and divided by the mean for that class. We then computed oneway analysis of variance (ANOVA) with Scheffe posthoc contrasts to determine if there were differences between groups. We also computed the percent of points completed at each grading interval.

The SI students’ point totals exceeded those of the control groups at all three data collection points (see Table 1). However, the three groups’ scores on the 6-week and 10-week grade reports did not differ by tests of significance. On total points at the end of the semester, the three groups showed the same basic pattern as in weeks 6 and 10 and these differences were statistically significant. The overall ANOVA revealed F(2, 29) = 6.53, p < .01 and the Scheffe contrasts showed the SI students differed significantly from the TRIO controls (p < .01).

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Week 6</th>
<th>Week 10</th>
<th>Final Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Control (7)</td>
<td>-.43</td>
<td>-.20</td>
<td>-.32</td>
</tr>
<tr>
<td>TRIO Control (15)</td>
<td>-.05</td>
<td>-.29</td>
<td>-.67</td>
</tr>
<tr>
<td>SI Students (8)</td>
<td>+.35</td>
<td>+.74</td>
<td>+.50</td>
</tr>
</tbody>
</table>

Table 1
Z-scores of students at three points in the semester
The SI instructor’s anecdotal assessment of her class was clear and compelling. Whereas her students may have benefited from the many development tasks constituting the course activities, they responded enthusiastically only to what fostered their understanding of the psychology course structure and gave them opportunities to engage it. Thus, once the instructor had responded to students’ stated need for clarity about how psychology course activities fit together and how they translated to grades, they viewed other SI course assignments as burdens and asked, for example, to spend SI class time in the computer lab working on psychology course exercises together.

Discussion

The purpose of PSI is to respond to differences between students by giving them opportunities to learn course material at their own pace to attain a high level of achievement. It is difficult for students socialized in the typical educational environment to understand the mastery concept and to recognize what is required of them. For a variety of reasons, this is particularly true of high-risk underprepared students. Our quasi-experimental achievement data suggest that SI works well for this group of students. The anecdotal assessment by the SI instructor suggests why it works well.

PSI is a highly individualistic course structure that focuses on self-pacing and work toward individual mastery of course material. We believe that the SI course emphasis on promoting academic community through peer resource groups added an important dimension to the psychology course. Participation in the group encouraged the students to support each other’s learning goals and helped them recognize what successful student behaviors were and how to avoid pitfalls. The SI students’ group activities also helped them understand the psychology course’s structure and assignments and reinforced their engagement of them. One important effect of this increased understanding was that they spent more time on task, as their desire to spend SI class time working on psychology course exercises illustrated.

Our experience shows that SI can be an academic assistance model with high generalizability to a nontraditional course structure by focusing on individual student behaviors. Conversely, SI sections attached to target courses that stress group work may function better if they also emphasize the individual responsibilities and skills needed for the target course. SI could well provide a structured learning experience for students who need more time on task preparation to take full advantage of the group activities they encounter in the target course. Future research on this issue is necessary to answer this question. For now, we are convinced of the usefulness of attaching an SI section to our General Psychology course for those students who are at highest risk for academic failure.

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**The Physical Environment of Learning Support Centers**

William G. White, Jr.
Grambling State University

**Abstract**

This article reports the findings of a survey of learning support centers (LSC) regarding their facilities, furnishings, and equipment. Directors of 273 LSCs in the United States and Canada were surveyed with a response rate of 32%. The study addresses a number of LSC characteristics: location, prominence of location, exterior and interior qualities, construction and renovation history, furnishings and equipment inventories and selection, and educational adequacy. Findings reveal a number of positive changes in the physical environments of LSCs during the past two decades, but may also reveal some differences between centralized and organizationally or physically decentralized LSCs.

In spring 2001 I was asked to make a presentation on the state of learning support center (LSC) facilities, equipment, and furnishings at the Winter Institute for Learning Assistance Professionals to be held in Tucson in January 2002. Along with three colleagues, I had done some work in the area of LSC facilities a decade earlier. Taking the advice of the famous American architect, Louis Sullivan, that form should follow function, our work began with a survey of the literature in search of all of the various functions, activities, and programs that were taking place in LSCs (White & Schnuth, 1990). Based on those findings regarding program functions and a review of the literature on LSCs and educational facility planning, we described how the planning process for LSC facilities should take place, discussed various design considerations, and presented specifications for various areas within an LSC (White, Kyzar, & Lane, 1990b, 1993, 1994/1990a).

Our work in the early 1990s presented what various authorities and writers thought should be true. It might be helpful to comment briefly on the major findings of that research. The first is probably obvious based on the approach we took: the design, furnishings, and equipment of LSC facilities should be based on the LSC’s mission and goals and the functions and activities that take place in the facilities. Second, planning for the LSC facility should be broad based and include not only professional planners (e.g., the project architect, the campus architect and engineer, an educational facility planner).

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but also the users of the facilities: the director and professional and support staff. Including a few carefully selected students in the planning process is also desirable. Third, the types of services, programs, and activities that take place in the LSC are usually best served by a facility with an open design and flexible spaces that can be reconfigured with relative ease to accommodate varying group sizes and varying activities, including new, unanticipated services and activities. Regardless of openness and flexibility, LSC facilities must be large enough to accommodate the number of students that need to be served. Even the most carefully designed facilities cannot accommodate unlimited numbers of users. Finally, if the LSC desires to attract students, its facilities should be centrally located, easily accessible, aesthetically pleasing, and comfortable. Attractive and comfortable facilities are the result of carefully controlled thermal environments, adequate lighting, comfortable furnishings, appropriate floor coverings, use of color, and acoustic control. So, that is briefly what should be. To prepare for the presentation at the Winter Institute, I conducted a study that attempted to determine what is.

Method

During the summer of 2001 I developed a questionnaire, and, with the help of a graduate assistant, selected a proportional, random sample of 200 two- and four-year institutions in the United States. However, after thinking about the variety of names used by LSCs, as well as their varied organizational and physical locations on campuses, I feared that many of the questionnaires would never reach the LSC directors for whom they were intended. I opted instead for a purposeful sample that might bring better results. Using the College Reading and Learning Association (CRLA) and Learning Support Centers in Higher Education (LSCHE) Web sites and the membership directory of the National College Learning Center Association (NCLCA), I developed a list of 273 LSC programs in the United States and Canada.

Response Rate

In October I mailed a questionnaire and a postage-paid return envelope to the director of each LSC in the sample. Eighty-seven usable questionnaires were returned, yielding a 32% response rate. Responses were received from program administrators in 31 states and Canadian provinces and from a variety of two- and four-year, public, and private institutions. Follow-up mailings were not attempted because of the prohibitive cost of postage.

The low response rate was probably attributable to several factors. The questionnaire was long and called for a considerable amount of technical information about facilities (e.g., dates of construction and renovation, design process, size, finish surfaces, lighting, thermal environment) and furnishings and equipment (e.g., number, type, selection process). Some LSC directors may not have easy access to some of this basic information about their facilities, equipment, and furnishings, and some do not have a feel for physical or spatial features. Many respondents did not know when the building in which their center was located had been built or last renovated.

Some had difficulty in measuring or estimating square footages and occupant capacities for spaces.

Another factor contributing to the low response rate may have been organizationally decentralized LSCs: which program directors received the questionnaire and were they able or willing to collect the needed information from directors of other learning support services and programs on campus? Even the directors of organizationally centralized but physically decentralized LSCs may have found it too time consuming to gather needed information about multiple sites. The design of the questionnaire also made responses from such program directors difficult. For example, how can the director of a physically decentralized program describe his or her facility as facilitating or inhibiting the accomplishment of the program’s mission and goals when the program occupies spaces in two, three, or even four different buildings on campus?

These challenges for directors of organizationally or physically decentralized programs probably explain why the vast majority (84%) of respondents directed programs that were centralized in one location on their respective campuses. It is certainly possible, and probably quite likely, that 84% of all LSCs in the United States and Canada are not centralized. It may also be that centralized LSCs are more likely to have Web sites linked to the CRLA and LSCHE Web sites. Or, it is possible that directors of centralized LSCs tend to be more professionally involved in professional associations such as NCLCA and CRLA. These are interesting questions worthy of further research.

Results for Centralized Learning Support Centers

Because of difficulties encountered by directors of decentralized programs in responding to several items in the questionnaire, the discussion that follows will focus on the findings of the study related to centralized programs. Then I will address briefly the findings for decentralized programs and compare some of the findings of the two groups.

Location of Centers on Campus

It has long been accepted that a prominent location for an LSC is desirable because students can find it more easily. A prominent location might also indicate that the campus culture sees the LSC as an important service. Of the 73 directors of centralized programs, 69% reported that their centers were prominently located. During the last 20 years it seems that LSCs have become much more prominently located on campus. In the late 1970s and early 1980s, there were many published reports of LSCs tending to be located in basements of residence halls and in trailers on the edge of campuses. That situation has apparently changed for the better.

Another long-standing concern about the location of LSCs is their centrality on campus, because centrality of location invites greater student use. More
than two thirds (71%) of centralized LSCs in this study were centrally located. An even larger majority (85%) of centralized LSCs were reported as being easily found by students.

The Physical Environment

Once students find the LSC, what will the physical environment be like? First, only a few LSCs (7%) in this study are the exclusive occupants of the buildings in which they are housed; most are housed in buildings with a variety of other academic or student affairs units. A very large majority (90.4%) of the centralized LSCs are described as being housed in buildings with exteriors that are attractive and inviting. Similarly impressive majorities described the LSCs' interiors as attractive (85%), comfortable (96%), and encouraging student use (91.8%).

Open, flexible designs for LSCs have been advocated for more than 20 years. A centralized center that houses a number of varied activities can be better served by open, flexible spaces. Apparently, as new LSC facilities have been built or existing facilities have been renovated, this design feature has been incorporated. An impressive majority (88%) of centralized LSCs were reported to have large, open, flexible spaces.

The age of centralized LSC facilities and the purposes for which those facilities were originally designed were surprising but welcome. The average age of the facilities was only 8.7 years (n = 32), and more than three fourths of them (77% of 35 respondents) had been originally designed for the LSC and had LSC staff involved in the planning process. These findings must be viewed cautiously because of the low response rates on some of these items: fewer than half of the directors responded to them. Only 34 of the respondents reported the number of years since their centers had major renovations. The average was only 5.5 years. The seemingly low response rate on this item may not be a cause for concern because many facilities have probably never had major renovations. It is encouraging to learn that in most cases (93% of 43 respondents) the renovations were done specifically for the LSC, and that in 84% (n = 43) of the renovations professional staff participated in planning for those renovations.

Survey participants were asked for a great deal of information about the characteristics of the spaces their LSCs occupy—probably too much information. Many did not respond or did so in ways that made calculation of the results quite difficult. In terms of finished surfaces, a large majority of those responding reported that their spaces had floors that were carpeted, walls made of dry-wall, and ceilings covered with acoustic tiles. A large majority also reported satisfactory environmental conditions. Electrical supply and lighting problems were infrequently reported. There were a number of reports, however, of problems with thermal and acoustic conditions in some areas of the LSCs. These environmental conditions are important; students who are too hot or too cold and who are distracted by noise find it more difficult to concentrate on learning.

Table 1

<table>
<thead>
<tr>
<th>Type</th>
<th>Purchased for LSC</th>
<th>LSC Staff Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnishings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bookcases, shelving, storage units</td>
<td>49 (61.2)</td>
<td>49 (61.2)</td>
</tr>
<tr>
<td>Carrels</td>
<td>18 (77.8)</td>
<td>18 (72.2)</td>
</tr>
<tr>
<td>Chairs</td>
<td>63 (76.2)</td>
<td>64 (68.8)</td>
</tr>
<tr>
<td>Commons/lounge furniture</td>
<td>12 (83.3)</td>
<td>12 (75)</td>
</tr>
<tr>
<td>Office furniture, file cabinets</td>
<td>58 (60.3)</td>
<td>58 (55.2)</td>
</tr>
<tr>
<td>Student desks</td>
<td>6 (16.7)</td>
<td>6 (16.7)</td>
</tr>
<tr>
<td>Tables, computer tables</td>
<td>61 (68.9)</td>
<td>61 (65.6)</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV</td>
<td>38 (92.1)</td>
<td>38 (89.5)</td>
</tr>
<tr>
<td>Commons/lounge equipments</td>
<td>14 (100)</td>
<td>14 (100)</td>
</tr>
<tr>
<td>Computer equipment: PC</td>
<td>62 (75.8)</td>
<td>60 (63.3)</td>
</tr>
<tr>
<td>Computer equipment: Mac</td>
<td>15 (67.7)</td>
<td>15 (60)</td>
</tr>
<tr>
<td>Photocopier</td>
<td>26 (84.6)</td>
<td>26 (69.2)</td>
</tr>
</tbody>
</table>
specifically for them and LSC staff were involved in the selection process. Institutional practices such as standardization of furnishings, public bid laws, state contracts, and bookstore and purchasing department monopolies make this a complicated issue, especially in public institutions. In some cases departments have few choices.

In most of the cases reported, equipment was purchased specifically for the LSC with staff involvement in the selection process. However, for some important items, staff did not always participate in the selection of the items purchased specifically for the LSC. For example, 48 respondents reported that chairs were purchased for the LSC, but only 44 reported that LSC staff participated in the selection process. The most troubling aspect of equipment selection concerns computer equipment. In at least a quarter of the cases, computer equipment was not purchased specifically for the LSC, and in a third or more of the cases it was selected without LSC staff involvement. It is unfortunate that learning assistance staff members so often are not involved in selecting the most important learning technology in the LSC.

**Educational Adequacy**

The survey instrument asked for information about the size and student capacities of the various spaces or areas in the LSCs. Many respondents failed to provide this information or provided information of questionable accuracy. Most directors did not have floor plans drawn to scale at their disposal. After examining the data, I came to the conclusion that the specifics of size and capacity are not really important. What is important is whether or not the spaces are adequate for the number of students served and whether the spaces contribute to the accomplishment of the LSC's mission.

Nearly two thirds (63%) of centralized LSCs were reported as adequate for present usage, and 6% were deemed adequate for both present and future usage. Almost one third (32%) were reported as inadequate for present usage. Space—or rather the lack of it—is clearly a problem for many LSCs, and with only 6% being adequate for anticipated future usage, the situation could become worse.

The degree to which an LSC facility contributes to or facilitates the accomplishment of the LSC's mission and goals is, perhaps, the most important measure of adequacy. More than three quarters (78%) of the directors of centralized centers reported that their facilities contributed to accomplishing program mission and goals. Only 7% of the centers were reported to actually inhibit the accomplishment of mission and goals; 15% were reported to neither facilitate nor inhibit their accomplishment.

**Results for Decentralized Learning Support Centers**

As noted earlier, only 14 of the 87 respondents in this study reported that their LSCs were physically, and perhaps organizationally, decentralized. It was also acknowledged that many of the questionnaire items were difficult for those respondents to answer, and the data they provided proved difficult to analyze. So, with a caveat emptor, I will briefly compare responses for centralized and decentralized LSCs, spending a bit more time on a few findings that might be a cause for concern.

**Location**

About the same percentage of decentralized and centralized LSCs were reported to be prominently located. Decentralized LSC sites are often found in major academic buildings adjacent to academic departments or in a student center or campus library. The reported prominence of decentralized LSC facilities may be open to some interpretation. It may be that respondents, when asked to indicate if the LSC was or was not prominently located, may have concluded that if one or more of the sites were prominent they should answer that the LSC was prominently located even though some of the sites might not have been.

Although more than two thirds of decentralized centers were reported to be prominently located, only 43% of 14 respondents reported that all of their facilities were centrally located, considerably fewer than the 71% of 73 centralized centers. This item was difficult for directors of physically decentralized centers to answer. The fact that half of them reported at least one of their facilities to be located on the periphery of the campus is probably not cause for concern in light that more than two thirds of them regarded their centers as being prominently located. That conclusion is reinforced by the fact that 71% of directors of 14 decentralized LSCs reported that all of their facilities were easy for students to find. However, even more (85%) of the 73 directors of centralized centers said their facilities were easily found by students. It would be expected that a single, centralized LSC would be easier to find than multiple sites where decentralized LSC services are provided. The concern is that students who have difficulty finding the location of a center may well give up and go without the academic support services they need.

**Physical Environment**

Although more than 90% of directors of centralized LSCs characterized the exteriors of their facilities as attractive and inviting, only 57% of directors of decentralized centers described all of their facilities in that way. Not surprisingly, more than one third of decentralized LSCs were described as occupying some buildings that were attractive and inviting and some that were not.

Although most respondents described their facilities as attractive (80%), comfortable (92%) and encouraging student use (85%), centralized centers were more often described that way, especially in terms of attractiveness and encouraging use. The findings for the decentralized centers are probably better than they appear when one considers that substantial majorities of those directors said that all of their facilities had interiors that were attractive (57%), were comfortable (79%) and encouraged use (57%). In some cases it may have been only one of the facilities used by their centers that was unattractive or uncomfortable or that did not encourage use. In any case,
the LSC facilities would seem to be significantly improved over those often reported and complained about 20 to 30 years ago.

A comparison of the openness of the interior design of centralized and decentralized facilities is also problematic. Substantially fewer directors of decentralized centers (i.e., 64%, as contrasted with 88% of centralized LSCs) could report that all of their facilities had large, open, flexible spaces, but it would be expected that such would be the case. Decentralized LSCs often have multiple sites with fewer activities or services per site, many of which can be accommodated in smaller, less flexible spaces. Centralized programs, on the other hand, need a single space that is large, open and flexible.

The differences in interior space arrangements were apparently related to the age of the facilities occupied by LSCs in this study and the original purposes for which the facilities were built or renovated. In responding to these questions, directors of decentralized LSCs were able to report information for each facility occupied by their centers. The differences reported between centralized and decentralized centers were unexpected. The mean age of buildings housing centralized LSCs was 8.7 years compared to 22.4 years for decentralized centers. More than three quarters of the centralized LSCs occupied spaces that originally had been designed for them with LSC staff participation. The same could be said of less than one quarter of the decentralized LSC facilities.

Decentralized LSCs fared considerably better in regard to renovated facilities but still lagged far behind centralized LSCs. Of those facilities that had been renovated, centralized ones had been done an average of 5.5 years before the survey compared to 9.9 years for decentralized facilities. The overwhelming majority (93%; n = 43) of centralized LSC facilities that had been renovated had been renovated expressly for the LSC and 84% (n = 43) had involvement of LSC staff in the planning process. The same was true for less than two-thirds (62%; n = 21) of the decentralized facilities. There appears to be a relationship among exterior aesthetics, interior design and aesthetics, building age, time since the last renovation, and involvement of LSC staff in planning new buildings and renovations.

Furnishings and Equipment

There were no major differences between centralized and decentralized LSCs in terms of whether furnishings and equipment had been purchased specifically for them and whether LSC staff had been involved in selecting those items. Similar to 63% of their centralized counterparts, only 54% of directors of decentralized LSCs reported that staff members involved in selection of personal computers for their centers. Staff participated in selecting tables and computer tables or work stations in fewer than half of the decentralized LSCs.

As seen in Table 2, there appeared to be major differences between centralized and decentralized LSCs in terms of adequacy for the number of students served. Directors of decentralized centers were again faced with the difficulty of selecting a single description of the adequacy of two or more facilities. Nevertheless, only 21% of respondents described decentralized centers as adequate for present and future usage compared to 69% of

<table>
<thead>
<tr>
<th>Centralized</th>
<th>Decentralized</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 73</td>
<td>n = 14</td>
<td>N = 87</td>
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<table>
<thead>
<tr>
<th>Prominence</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Prominent</td>
<td>50</td>
<td>68.5</td>
<td>11</td>
<td>78.6</td>
<td>61</td>
<td>70.1</td>
</tr>
<tr>
<td>Not prominent</td>
<td>23</td>
<td>31.5</td>
<td>3</td>
<td>21.4</td>
<td>26</td>
<td>29.9</td>
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</table>

<table>
<thead>
<tr>
<th>Centrality</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center of campus</td>
<td>52</td>
<td>71.2</td>
<td>6</td>
<td>42.8</td>
<td>58</td>
<td>66.7</td>
</tr>
<tr>
<td>Away from center</td>
<td>15</td>
<td>20.5</td>
<td>1</td>
<td>7.1</td>
<td>16</td>
<td>18.4</td>
</tr>
<tr>
<td>Periphery</td>
<td>6</td>
<td>8.2</td>
<td>7</td>
<td>50</td>
<td>13</td>
<td>14.9</td>
</tr>
<tr>
<td>Easy to find</td>
<td>62</td>
<td>84.9</td>
<td>10</td>
<td>71.4</td>
<td>72</td>
<td>82.8</td>
</tr>
<tr>
<td>Difficult to find</td>
<td>11</td>
<td>15.1</td>
<td>4</td>
<td>28.6</td>
<td>15</td>
<td>17.2</td>
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<table>
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<tr>
<th>Exterior Aesthetics</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive and inviting</td>
<td>66</td>
<td>90.4</td>
<td>8</td>
<td>57.1</td>
<td>74</td>
<td>85</td>
</tr>
<tr>
<td>Some attractive and inviting / some not attractive and inviting</td>
<td>NA</td>
<td>NA</td>
<td>5</td>
<td>35.7</td>
<td>5</td>
<td>5.7</td>
</tr>
<tr>
<td>Unattractive and uninviting</td>
<td>7</td>
<td>9.6</td>
<td>1</td>
<td>7.1</td>
<td>8</td>
<td>9.2</td>
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</table>

<table>
<thead>
<tr>
<th>Interior Aesthetics</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive</td>
<td>62</td>
<td>84.9</td>
<td>8</td>
<td>57.1</td>
<td>70</td>
<td>79.5</td>
</tr>
<tr>
<td>Comfortable</td>
<td>70</td>
<td>95.9</td>
<td>11</td>
<td>78.6</td>
<td>81</td>
<td>92</td>
</tr>
<tr>
<td>Encourages use</td>
<td>67</td>
<td>91.8</td>
<td>8</td>
<td>57.1</td>
<td>75</td>
<td>85.2</td>
</tr>
<tr>
<td>Large, open, flexible space(s)</td>
<td>64</td>
<td>87.7</td>
<td>9</td>
<td>64.3</td>
<td>73</td>
<td>83.9</td>
</tr>
<tr>
<td>Smaller, inflexible space(s)</td>
<td>9</td>
<td>12.3</td>
<td>5</td>
<td>35.7</td>
<td>14</td>
<td>16.1</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Adequacy</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate for present usage</td>
<td>23</td>
<td>31.5</td>
<td>11</td>
<td>78.6</td>
<td>34</td>
<td>39.1</td>
</tr>
<tr>
<td>Adequate for present usage</td>
<td>46</td>
<td>63</td>
<td>2</td>
<td>14.3</td>
<td>48</td>
<td>55.2</td>
</tr>
<tr>
<td>Adequate for present and future usage</td>
<td>4</td>
<td>5.5</td>
<td>1</td>
<td>7.1</td>
<td>5</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Facilitation of Program Missions and Goals

<table>
<thead>
<tr>
<th>Facilitates</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitates</td>
<td>57</td>
<td>78.1</td>
<td>3</td>
<td>21.4</td>
<td>60</td>
<td>69</td>
</tr>
<tr>
<td>Neither facilitates nor inhibits</td>
<td>11</td>
<td>15.1</td>
<td>4</td>
<td>28.6</td>
<td>15</td>
<td>17.2</td>
</tr>
<tr>
<td>Inhibits</td>
<td>5</td>
<td>6.8</td>
<td>7</td>
<td>50.5</td>
<td>12</td>
<td>13.8</td>
</tr>
</tbody>
</table>
centralized facilities. In any case, lack of space is a problem for many LSCs currently and may grow worse in the future.

**Educational Adequacy**

On the important measure of how well the LSC facilitates the accomplishment of the mission and goals of the program, responses were markedly different for centralized and decentralized centers (see Table 2). Fewer than one fourth of the directors of decentralized centers—compared to more than three fourths of directors of centralized programs—said their facilities contributed to accomplishing the mission and goals. Even more alarming was that 50% of the directors described one or more of their facilities as actually inhibiting mission and goal accomplishment. Even allowing for problems in capturing these data in the survey instrument, these findings suggest that many of the facilities occupied by physically decentralized LSCs are fundamentally inadequate. To borrow the economic concept of negative growth, we could describe such facilities as *negatively adequate*: they hurt the programs they house.

**Conclusions**

LSC facilities have improved over the past two decades. Taken as a whole, facilities in this study were reported by their directors to be prominently located near the center of campus and were easily located by students. Building exteriors were considered attractive and inviting; interiors generally were perceived to be attractive and comfortable, encouraged use, and were characterized as open and flexible. Buildings housing LSCs were reasonably new, and those that had been renovated had been done recently. In most cases equipment and furnishings had been purchased specifically for the LSC and with the participation of LSC staff. Most facilities were reported as adequate for present usage and as contributing to the accomplishment of program mission and goals. However, there appeared to be substantial differences between the facilities of centralized and physically decentralized LSCs in terms of interior design attractiveness, comfort and encouragement of use; adequacy; and the degree to which they facilitate the accomplishment of the centers' missions and goals. These are important areas worthy of more serious study.

**References**


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Abstract

Student underpreparedness, as well as poor mathematics mental health, may contribute to high failure rates in mathematics courses in college. The K-P Model addresses students' mathematics affective and relational issues, as well as their academic issues. The K-P Model involves the faculty member teaching the mathematics course, a class-linked tutor, a mathematics relational counselor, and the learning center in assisting mathematics students. The collaborative approach provides a high level of mathematics support while maximizing the effective use of learning center resources. Student exemplars illustrate the application of the K-P Model.

Mathematics and statistics phobias have long been apparent in academic settings (Mathematical Sciences Education Board, 1989; Tobias, 1993; Zaslavsky, 1994). Teaching and assisting students in these subjects poses distinct challenges. Most colleges in the United States require students to take at least one college level mathematics course to meet bachelor degree requirements. Some majors call for students to take additional courses in statistics. For many students, even our best, the thought of taking a mathematics or statistics course evokes acute anxiety or other negative affective responses that directly inhibit that student's chances for success.

Almost all students need mathematics and or statistics to achieve their academic goals. The proportion of students who are confident and well prepared in these subjects as they arrive at college is limited. Studies show that up to 50% of students, inadequately or indifferently prepared, either fail or withdraw in their first attempt at a college mathematics course (Dembner, 1996; Mau, 1995; Nolting, 1990). These failure rates pose tremendous challenges for teachers, learning center personnel, and students.

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The consequences of such high failure rates in a society dependent on numerical literacy are potentially profound.

At our campus, a commuter college serving approximately 1150 part-time and full-time students with a high proportion of nontraditional students, mathematics phobia and statistical fear abound. All students must take mathematics or logic courses as part of their general education requirement. Students majoring in psychology, nursing, or biological sciences are also required to take a statistics course to complete their program requirements. Failure rates for students taking statistics in psychology at our campus averaged 26.6% between 1995 and 2000 (Potter & Johnstone, 2001). Similar failure rates confront students taking other introductory-level mathematics courses at our institution. Learning centers are presented with the challenge of reducing these rates coupled with the reality of limited resources.

Affective problems expressed in counterproductive motivations, self beliefs, and emotions have been found to be significant factors in undermining student success and result in these high attrition and failure rates (Dweck, 1986; Ferguson, 1986; 1998; Ma, 1999; Richardson & Suinn, 1972). Tobias (1993) defines this phenomenon as the student's poor mathematics mental health or lack of "willingness to learn the mathematics he [sic] needs when he [sic] needs it" (p. 12). Knowles (2004), however, hypothesized that students' previous experiences with mathematics education lead to unconscious forces conflicting with conscious motivations and entrenched patterns of thought and behavior that are likely to shape their strategies when they approach mathematics classes at college. Their affective problems then are symptoms of these underlying root causes rather than the students' core issue. Knowles proposed that some students, who have had particularly negative mathematics experiences, may develop what might be conceivably classified as mathematics "psychopathologies," such as mathematics-specific phobias, posttraumatic stress disorder, and depression. Poor mathematics mental health, manifested in reluctance, fears, and self-doubt, or more serious pathologies around mathematical learning, invariably impedes a student's mathematical progress.

In 2000, Knowles conducted a dissertation project to explore her proposal that diagnosing and treating students' core relational conflict between unconscious and conscious motivations would lead to an effective alternative method of assisting mathematics students. Knowles piloted a relational counseling approach to assisting students in Paglia's Statistics for Psychology class with their mathematics cognitive and affective symptoms and resolving their core mathematics relational conflict. The findings of Knowles' (2004) dissertation study and the realization of its limitations led to the development of the K-P Model of Collaborative Mathematics Support, discussed in this article.

Relational Conflict Theory

The initial research hypothesis was that poor functioning in mathematics might be related to past experiences that have led to conflicting and counterproductive conscious and unconscious patterns of thought and behavior regarding mathematics. To address these issues, the original conceptualization of the K-P Model focused on brief mathematics counseling to assist students in understanding themselves and their mathematics thoughts and behaviors, an approach adapted from Mitchell's (1988) relational conflict theory of psychotherapy to the mathematics academic support setting. Self-psychology, object relations, and interpersonal psychology are the three major strands of relational therapy derived from Freud's (1938) psychoanalytic theory. Whereas Freudian theory emphasizes unconscious drives as the motivator, these theory derivations emphasize that individuals are motivated by the desire for human relationships. Mitchell (1988) integrates these three strands into his Relational Conflict Theory. Knowles considers mathematics learning motivation to be consistent with Mitchell's theory and interprets Mitchell's dimensions as the following.

Mathematics Self or Selves

Knowles defines a student's mathematics self (Kohut, 1977) as based in mathematics self-esteem that has developed as mathematics teachers recognize the student's existing mathematics ability and nurture it, while providing challenges that force the student not only to develop competence but also to acquire a realistic sense of that competence. If teachers fail to recognize the student's existing mathematics ability or if they fail to provide developmentally-appropriate challenges that push the student to grow, the student's mathematics self will be underestimated or damaged and self-esteem—the sense of one's own ability to struggle with and learn mathematics, with the support of mathematically knowledgeable teachers—will remain low or be undermined; the student is likely to develop mathematics overconfidence or underconfidence rather than realistic self-confidence.

Internalized Mathematics Presences or Objects

According to object relations theory (Fairbairn, 1952), early significant others (termed objects), in this case typically mathematics teachers, become internalized in various healthy and unhealthy ways as internalized presences that influence how the person relates subsequently to others.

Interpersonal Mathematical Relational Interaction or Attachment Patterns

Students develop secure mathematics and mathematics teacher attachments (Bowlby, 1982) if the teacher establishes mathematics and herself as a secure base, reliably available but allowing student exploration and error as vehicles of growth. Students may develop anxious and dependent or detached independent attachment patterns if they experience a teacher or teachers as unavailable or ambivalent.
Knowles proposed that mathematics affect and behaviors traditionally linked with poor mathematics functioning, such as external locus of control, (Nolting, 1990), performance achievement motivation, learned helplessness (Dweck, 1986; Dweck & Wortman, 1982), testing or mathematics anxiety (Ma, 1999; McLeod, 1992; Tobias, 1983) were symptoms rather than root underlying relational causes. Such underlying roots include neglect or injury of the developing mathematics self; negative experiences with a teacher or parent whom the student has internalized, which affects how the student relates with subsequent teachers; and or damaged attachments to mathematics teachers or to mathematics itself.

The Preliminary Model and Study: Mathematics Relational Counseling

For the preliminary model and study, the researcher, Knowles, who served as the institution’s learning center mathematics specialist, also served as a mathematics counselor and class-linked tutor. Ideally, a class-link tutor is one who has successfully completed the course with that instructor, attends every class meeting, and assists students during in-class problem-working sessions under the supervision of the instructor. The class-linked tutor typically offers individual and group support outside of class time (Lowenstein, Gannett, Rondeau, Olzewski, Pobywajlo, & Zipke, 1988; Petress, 1999). Knowles worked with volunteer individual counseling participants (n = 10 of a class of 12) to develop appropriate interventions. Given the design of the original study, the faculty member was not involved in data collection and remained blind to the hypothesis and experimental methods. A limitation of the first study was that the instructor was not able to benefit from the assessments and observations of the mathematics counselor and class-linked tutor. In the second pilot study with a class of 22, this limitation was redressed, a peer class-link tutor was included, and Knowles took the role of counselor and learning center manager of the study. Consent was obtained from all students.

The majority of those enrolled in the classes were psychology, biology, or nursing majors; a few students were taking the course to fulfill their general education quantitative reasoning requirement. The classes approximately mirrored the ethnic diversity of the campus, which parallels that of the greater metropolitan area, approximately 6% students of color with almost 15% non-native English speakers. Quantitative and qualitative data were collected, although this article focuses on the qualitative data. Qualitative instruments used included the JMK Mathematics Affect Scales (Knowles, 2004; see Figure 1 at the end of this article) and the Mathematics Learning Metaphor Survey (Knowles; see Figure 2 at the end of this article), both of which were designed to be used relationally with the student in conjunction with exam scores and behavioral observations. Knowles continues to develop the protocols for the use and interpretation of Mathematics Learning Metaphor Survey but pilot use indicates that, appropriately interpreted and triangulated with observation, class assessments, the Affect Scales, and other belief and affect responses, it yields reliable insight into student’s underlying affect and relationships with mathematics, self, and others. The JMK Mathematics Affect Scales (Knowles) are in the preliminary stages of application. They are designed to be used at each counseling session with an individual student who can thus monitor his or her class progress in relation to changes in behaviors and beliefs revealed on the scales. Knowles suggests that persistent unrealistic negativity on the scales in relation to achievement may be an indicator of an underlying mathematics depression (see Karen in student exemplars). Currently these scales have been utilized at one campus with limited sample sizes. Pilot correlational studies with developmental algebra classes have yielded some high correlations between an exam grade and a positivity score on the JMK Affect Scales responded to immediately before taking the exam (e.g., n = 13, r = .875, p < .0379). Overall reliability and validity of the scales are still being determined. These scales are intended primarily for relational use in counseling and for classroom workshop use with the permission of the author.

A quantitative instrument used in this study was The Algebra Test (Brown, Hart, & Kuchemann, 1985; Sokolowski, 1997), which yields diagnostic data and levels of development of the algebraic variable. The Algebra Test is Sokolowski’s U.S. adaptation of the British Chelsea Diagnostic Algebra Test, which was normed with 2,820 British high school students over 3 years, with reliable results. Four Piaget-based developmental levels were determined by calculating the homogeneity coefficient (phi) and Loewinger coefficient H for every pair of items. Scalability of groups of items forming levels was tested using Guttman Scalogram Analysis. This analysis showed that 99% of students who were categorized at a particular level of understanding (1 through 4) had succeeded in all previous levels (Brown, Hart, & Kuchemann, 1985; Piaget, 1969).

The initial research focused on the role mathematics counseling plays in restoring students’ mathematics mental health. Piloting the model in the classroom, however, led to the realization that strategically a holistic approach could not be achieved by learning center personnel alone. Collaboration between the faculty person and the class tutors is essential. Subsequent implementation and evaluation of the collaborative model in this course suggested that the team approach better serves the students, while maximizing the effective use of learning center resources.

Working on Skills in Isolation: The Need for a Holistic Approach and Collaboration

Faculty and learning center personnel recognize that from initial impressions it is difficult, if not impossible, to forecast who will succeed and who will not. Some students appearing to have adequate mathematical ability and background withdraw from or fail mathematics courses. Other students, whose skills seem inadequate or their last mathematics course too distant, nevertheless succeed. We have found that academic proficiency
alone is an insufficient indicator of a student's success or failure, but
students' learning histories and affective issues do appear to be important
determinants. Because of the general urgency of student needs and the
incidental nature of contact, we have found that learning centers and
mathematics learning specialists tend to focus on mathematical concepts and
skills, rather than on affective issues students bring with them. Furthermore,
students who do utilize the learning center frequently meet with student
or professional tutors, who may have limited, if any, experience with
the particular faculty member. These circumstances limit the possibilities
of identifying affective issues that may influence patterns of mathematics
thoughts and behaviors in the classroom.

College statistics and mathematics instructors at our campus struggle to
find ways to help more of their students succeed. Their curricula may
be constrained by departmental requirements and require covering large
amounts of material in a short period. One consequence is that when students
come to office hours or additional meetings with the instructor, the focus
again is generally on current course content. As a result, we find that faculty
members are even less likely than learning center personnel to attend to
students' mathematics affective difficulties, even though the faculty members
observing the student in class may be in a position to recognize the students'
patterns of behavior towards mathematics on a more regular basis.

The Revised Model: The K-P Model of
Collaborative Mathematics Support

The desire to understand and effectively intervene with complex student
interactions between their mathematics affect and cognition led us to develop
a model that relies on an active partnership between faculty and learning
center personnel and includes elements from outside the narrow boundaries
of the field of mathematics academic support. The field of counseling
psychology, specifically relational psychotherapy, provided perceptive ways to
understand the effects of students' mathematics learning histories on their
current learning challenges. To address these various patterns of mathematics
behavior, a collaborative, holistic approach to the student's mathematics
functioning was developed that minimizes the possibility of missing factors
key to understanding students' mathematics challenges. The collection of
quantitative and qualitative data continues and these data are used in order
to intervene and help students taking the course, as well as to investigate the
effectiveness of the model.

The K-P Model attempts to address the three major problems that learning
center professionals and faculty typically encounter:

1. When learning center personnel assist a student only with current
mathematics concepts and skills, crucial aspects of students' mathematics
functioning are likely to be ignored.

2. When faculty members and learning center personnel separately
support students (or with minimal connection through a class-linked
tutor), what we each know about those who seek our help is limited
to our respective spheres and is thus fragmented, and generally not
shared.

3. Numbers of vulnerable students do not access help either from the
faculty person or the learning center and a lack of faculty and
learning center coordination limits the awareness of who is not seeking
assistance.

Key Personnel

The personnel required for the K-P Model include learning center
personnel, the mathematics relational counselor, a peer or professional
class-linked tutor present in the classroom, and the faculty person. The
learning center is responsible for overseeing the collaborative process. Some
students will require the assistance of all of these personnel, while others
will not.

The learning center personnel. To begin, a representative from the learning
center and a participating faculty member inform the academic community
about the K-P Model and its availability. Once key personnel are in place, the
learning center assists in customizing the K-P Model for each course in which
it is implemented. The learning center schedules and facilitates collaborative
meetings; it also arranges for any necessary resources, such as financial
compensation for the class-linked tutor, space for individualized counseling
and tutoring, resources describing intervention strategies, and photocopying
for the course-linked tutor and the mathematics relational counselor.

The mathematics relational counselor. The mathematics relational
counselor conducts in-class workshops that target students' attitudes and
feelings toward mathematics, assesses students' mathematics relational
issues, offers individualized assistance, and develops in-class and out-of-class
interventions for the students. Such interventions, which include paradoxical
intention and counseling assignments to change behaviors in class, are
described later in this article with specific student examples. The mathematics
relational counselor evaluates the student assessments and presents aggregate
results to the class and distributes individualized results to the students. The
mathematics relational counselor also distributes individual sign-up forms for
students who are interested in going over their results privately and begins
to develop intervention strategies related to students' mathematics mental
health.

The mathematics relational counselor distributes several questionnaires to
the students to assess their mathematics cognition and their mathematics
patterns of behavior. For a quick gauge of students' immediate view of their
mathematics selves, world, and future, around which pronounced negativity
might indicate mathematics depression underlying learned helplessness, we
suggest that the **JMK Mathematics Affect Scales** be administered several times over the semester (Knowles, 2004). Low scores or sudden dips alert the student and other personnel to the necessity of interventions. The use of mathematics metaphors, especially when interpreted in mathematics counseling in conjunction with the **JMK Affect Scale**, helps students get in touch with underlying attitudes and approaches to mathematics. The students generate metaphors representing their mathematics experiences, which may provide a key to the central relational conflict (Luborsky & Luborsky, 1995) that is preventing the student from reaching optimal success in the course. The **Algebra Test** (Brown, Hart, & Kucherman, 1985; Sokolowski, 1997) is used if students' affective issues such as abstraction anxiety (Ferguson, 1998) are suspected to be related to their mathematics cognitive development of their understanding of the uses of the algebraic variable. To investigate these affective issues Knowles revised Ferguson's **Phobus**, which used items from the Mathematics Anxiety Rating Scale (MARS; Richardson & Suinn, 1972) found in Rounds and Hendel's (1980) factor analysis to measure two factors: number and testing anxiety. Ferguson added abstraction anxiety items and found them to constitute yet another factor of mathematics anxiety.

At our campus, the mathematics relational counselor is a staff member at the learning center. The mathematics relational counselor may also be a faculty member, a professional tutor, or an academic or psychological counselor. Importantly, the mathematics relational counselor must have a strong mathematics background and an understanding of relational counseling psychotherapies. Although the mathematics relational counselor may not have formal counseling credentials, he or she should be trained in cognitive and relational counseling theories and approaches and should be under the supervision of someone who is a licensed counselor. The mathematics counselor's supervisor can assist in understanding the implications of metaphors and other assessments and can help the mathematics relational counselor become aware of issues that may not be obvious, including student relational pressures on the counselor and possible reactions to the student as the relationship with the student develops. In psychotherapeutic terms this is transference: students relate with mathematics counselors as if they were tutors or teachers from the past; and countertransference: the counselors react to the transference and relate to the students out of their own experience with students they perceive to be like them (Fairbairn, 1952; Freud, 1938; Kohut, 1977; Mitchell, 1988). Awareness of this dynamic gives important clues to the students' relational blocks to an effective learning relationship with the instructor and or tutor. If a student's difficulties are determined to be beyond mathematics situational affect and dysfunction, it may be necessary to refer the student to a licensed counselor. Additionally, the collaboration of the mathematics relational counselor and someone knowledgeable in counseling practices may enhance the development of counseling interventions and limits the possibility of misinterpretation of the subjectively experienced data. The mathematics counselor, in turn, supervises the class-linked tutor, helping the tutor become aware of issues—cognitive, affective, and relational—regarding interactions with the students. In the revised model, students refer themselves using a form handed to them in class or are referred by the instructor and or class-link tutor for mathematics counseling. The high ratio of counselees from the initial study, 10 out of 12 students, is unlikely to be replicated or necessary, because of the instructor's more active involvement and the class-link tutor's support in subsequent pilots.

**The class-linked tutor.** The class-linked tutor provides academic assistance in and out of the classroom. Class-linked tutors have successfully mastered the course, preferably with the same faculty member in which they are class-linked. At our campus the class-linked tutor takes a two- or four-credit tutor development course provided by the learning center prior to and during the tutoring process. During the semester the class-linked tutor is responsible for attending the class, leading a weekly study group for the students enrolled in the class, and providing up to one hour of individualized tutoring per student per week. In addition to providing academic support in and out of the classroom, the class-linked tutor serves as a liaison between the faculty member and the students and refers students whose difficulties lie beyond the class-linked tutor role to the mathematics counselor. Typically, the class-linked tutor attends all classes (i.e., three hours per week) runs a one-hour study group, and provides individual tutoring one to four hours per week, totaling five to eight hours per week, in addition to attending tutor development classes.

**The faculty person.** At the beginning of the course the faculty member informs the students about the K-P Model and emphasizes student success stories that legitimize the reality, even expectation, of student struggle. The faculty member introduces the class-linked tutor and the mathematics relational counselor and briefly describes their roles with respect to the course. The faculty member then allows the mathematics relational counselor and the class-linked tutors to further introduce themselves and share their experiences.

Ideally, to be fully integrated into the K-P Model, the faculty member goes beyond the traditional role of instructor. Based on this model, the primary responsibility of the faculty member is to create a safe learning environment that enhances students' likelihood of seeking help from the mathematics relational counselor and the class-linked tutor. It is important that the faculty member recognize the potential impact that poor mathematics mental health can have on a students' academic achievement. The model is most effective when the faculty member is committed to establishing a positive emotional and mathematical climate in the classroom. Research suggests that faculty-related factors in the mitigation of students' previously developed mathematics negativity fall into two broad categories: (a) creation of a positive relational environment that enhances students' sense of mathematics self, that provides an antidote to their destructive internalized presences, and that repairs and develops secure interpersonal mathematics attachments;
and (b) creation of a positive mathematics learning environment where students’ ability to do the mathematics is respected and expected (Jackson & Leffingwell, 1999; Knowles, 2004; Skemp, 1987). This approach is designed to ensure that instructors, at the very least, do not contribute further to student distress, but instead that they contribute to the students’ positive mathematics affect. Additionally, a positive emotional climate may prompt otherwise diffident students to seek assistance with mathematics relational issues and or mathematics skills.

How mathematics is taught is as important in creating a positive emotional climate as the relational aspect. Paglia, the faculty person, teaches using lecture and discussion methods, followed by in-class problem-solving sessions. During these sessions, students work individually or in pairs with the use of non-directive problem worksheets and the text, while the faculty member and the class-linked tutor rove and assist the students in mastering the procedures. This in-class problem-solving approach is pedagogically sound and leads to considerably better mastery of the material than does a transmission approach with the instructor demonstrating on the board (Schoenfeld, 1992). Students, however, often have not experienced this approach. Underconfident students tend to react with anxiety, even anger. When this happens, the class-linked tutor and mathematics counselor are well placed to help students see this heightened emotion as normal and that, rather than resisting and blaming the instructor for their discomfort, students, with support, should and can work through negative emotions to discover that this approach actually facilitates mastery.

The students. Throughout the semester, students complete a variety of assessments designed to evaluate mathematical reasoning and mathematical mental health. Given the individualized and aggregate results of the assessments, the students come to recognize their strengths, opportunities, and potential challenges. Students need to take responsibility for getting the help they need when they need it, whether it is with mathematics relational issues or with mathematics skills. Some students’ past experiences or personalities make it difficult for them, initially, to assume this responsibility. Faculty and the class-linked tutor are well positioned to notice such students and collaborate with the mathematics counselor to design practical interventions that might assist them in accessing the support they need.

Collaboration

The K-P Model maximizes the expertise of all parties, allowing for efficient use of personnel while providing specialized assistance for the students. Although all personnel involved have their distinct responsibilities, frequent collaboration is essential. The level of collaboration varies, depending on the consent that the student gives for sharing information. If full consent is provided, collaboration meetings include discussion of assessment results, classroom behaviors, performance on evaluated work, and data from meetings with the relational counselor. This level of disclosure allows for the development of interventions, which may be applied in class, in tutoring sessions, in the study groups, and or with the mathematics relational counselor. The collaboration meetings allow for discussion of pedagogical and relational issues that are designed to enhance the faculty member’s and the class-linked tutor’s effectiveness in the classroom.

Application of the Model: Student Exemplars

The student exemplars were selected from the two semesters of implementation of the K-P Model. For the purpose of anonymity, all student names have been changed.

Erica. Erica was a quiet student, easily lost in a classroom setting. During the in-class problem-solving sessions, she appeared to withdraw further. Erica sat alone in a corner and seemed to prefer working alone, although she was not mastering the material. Her affective assessment results initially revealed that she was not very confident in her own mathematics ability. In collaborative meetings, we linked her negative JMK Mathematics Affect Scales results with her poor exam scores, quickly realizing that Erica needed some additional assistance, but was unlikely to ask for help. The class-linked tutor responded to this need. During the problem-solving sessions, the class-linked tutor began to assist her, intentionally but unobtrusively. Erica responded to this assistance and began to talk to the faculty person, arrange individualized tutoring, and attend some of the weekly study group. By the end of the semester, Erica’s grades were among the highest in the class, and her responses on the JMK Mathematics Affect Scales revealed that her confidence and satisfaction in her mathematical achievements had improved.

Karen. In the classroom, Karen displayed frustration with the subject matter and seemed to be defensively distancing herself from everyone. Although she showed no interest in working with the instructor, she did sign up for mathematics counseling. In mathematics counseling, she revealed that as a person repeating the course, she expected this course to be the same as it was a previous semester with a different instructor, and she resented how uncertain she felt because this class was different. She was quite negative about her ability to do mathematics: Her metaphor was “cloudy”... “mostly math is my worst subject... always been hard to understand,” and her JMK Mathematics Affect Scales scores were low. In fact, her arithmetic was poor, and she had a tentative sense of the algebraic variable leading to the assessment that she had an underdeveloped mathematics self. This seemed to make her feel helpless and depressed. She handled this by blaming external factors—the course, the instructor, her feeling unwell—because she had no sense of being able to take control of the situation and make appropriate changes.

A two-pronged approach to helping Karen involved (a) using exam analysis to show that she could change and learn to master the material by taking responsibility to study strategically and practice, and (b) assisting her in recognizing the positive emotional climate in the class. At each session Karen
was asked “How are you doing things differently from last time you did this
course?” to assist her in seeing the connections between her study or lack
thereof to her successes and failures. The faculty person stated, “There will
be no surprises on the exam. What I cover in class is what will be
tested.” Karen had not initially trusted this and used ineffective approaches
for exam preparation. The mathematics counselor needed to help Karen
appreciate the pedagogical significance of the in-class problem-solving
sessions, something new to Karen that initially resulted in anxiety and
frustration; she helped Karen realize that this was a safe emotional climate
to attempt the calculations. Karen began to tackle each problem and realize
that she could master the material. As Karen’s confidence and proficiency
increased, she was able to take more responsibility for her own learning. She
began to set aside time to practice the problems independently, she performed
much better on the exams, and her mathematics depression began to abate,
although not to the extent the counselor expected given the significant
improvement in her achievement; mathematics depression seemed to remain
a problem for her and would need to be addressed in future mathematics
learning situations.

Jodie. From the beginning, Jodie clearly expressed anxiety about the class.
A simple announcement by the instructor of the topic for the class, “Today
we are going to discuss Chi-square analysis” sent her into a panic. Her
metaphor survey responses revealed her excessive expectations of herself that
led to cognitive shutdown. Her negativity on the IMK Mathematics Affect
Scales was extreme; she expressed feelings of hopelessness, shame, and
discouragement. Jodie instantly attached herself to the class-linked tutor: “I
need you!” expecting her to stay with her, regardless of the needs of the
other students, as she worked problems in class and in study group and made
frequent individual appointments. The faculty person initially suggested to
Jodie that she review material before the class to try to allay her anxiety in
class, but this led to increased anxiety and dependency on the class-linked
tutor. A new, more successful intervention involved the faculty person
sitting with Jodie at the beginning of problem-solving sessions to talk her
through step-by-step procedures for approaching a problem, first translating
the words into the required symbols; this gave her tools for handling her
anxiety and proceeding without having to understand the whole problem
at the beginning. The class-linked tutor could then work with her, but not
exclusively. Jodie found herself gradually improving her test scores.

Mulder. Mulder revealed in his metaphor that he saw himself as Fox
Mulder pursuing aliens from television’s X-files. His metaphor illustrated his
puzzlement at how he was in some way hindering his own progress in
mathematics and suggested that mathematics was in some sense alien to
him. He had sound arithmetic skills but a low level of understanding of
the algebraic variable, and despite an outgoing social learning style, he had
difficulty with auditory processing, which made the lectures that focused on
statistical concepts difficult for him. He handled these difficulties by focusing
only on the mathematical procedures and by resisting attempts to master the
conceptual challenges of the course. Mulder’s outgoing social learning style
and his overconfident bravado at first prevented the mathematics counselor
and the instructor from recognizing the underlying poor sense of mathematics
self that he was masking, even from himself, with his resistance. Mulder
seemed to want to succeed in this class, but his resistance to its conceptual
demands was preventing his success. The mathematics counselor tried
paradoxical intention, the deliberate practice of a thought or behavior in order
to get rid of it. In an individualized counseling session, the mathematics
counselor had Mulder intentionally resist doing the conceptual portion of a
practice test to break through his resistance. And it did, but not before the
mathematics counselor recognized that she was exacerbating his resistance
with her nagging, so she needed to withdraw herself from the battle to
persuade Mulder to stop resisting. He then could reason with himself and
allow his desire to do well to win the battle. In response to this counseling
intervention, Mulder overcame his resistance. His performance on the exam
later that day was a marked improvement; he improved his score on the
conceptual portion he had been resisting from a 59% correct on Exam #3 to
82.6% correct on Exam #4. This was the first time Mulder had earned above
a D on this section of the exams.

Jamie. Jamie kept her eyes lowered and did not engage with anyone in
class. Although she signed up for mathematics counseling because she was
repeating the class, she did not approach the mathematics counselor to set up
an appointment, so the counselor pursued her. Jamie’s mathematics metaphor
was a storm. When asked what she would do in a storm, her response was
that she would “stay inside.” This hiding was effectively what she was doing
in the statistics class and she was not getting the help she needed. Her
fears of receiving too much attention in class were related to her shy
personality, but focused particularly on an elementary teacher who had a
“bad temper” and “yelled” so Jamie had learned to “stay inside” in order
in order to be safe. Jamie needed assistance in accurately perceiving the
current professor and classroom as safe for her. She had been experiencing this class
as a frightened, shy 5th grader. When Jamie recognized that as a young adult
she could judge the safety of the classroom and the teacher for herself and
come out of hiding when it was safe, she was able to follow through on a
counseling assignment to ask a question in class, and make an appointment
with the mathematics counselor or professor for extra help if needed. She
realized that her problems with mathematics were not primarily cognitive but
rather relational and emotional—Knowles used the Algebra Test and exam
analysis to show her that she had a sound understanding of the algebraic
variable and mathematics mastery. By the end of the semester, her metaphor
was a partly sunny day that she could go out in, although she would still
“take my umbrella.” She earned a B+ in the class.

Conclusion

Although the immediate positive impact of the model on individual
students was self-evident, the ongoing impact of the K-P model on the
cohort's mathematical patterns of thoughts and behaviors is more difficult to assess because, for most students, this course is their last required mathematics course. Nevertheless, anecdotal evidence of the impact of the model has been observed among several of these students in additional mathematics-related courses. The impact of the model can be seen in students' readiness to access the services of the learning center and the strengthened relationship with the faculty member. For example, Karen took another mathematics course and began the semester with a high level of negativity, although unlike her previous mathematics courses she sought immediate assistance from Knowles at the learning center and quickly began to develop effective study strategies and a positive outlook on the course. Erica took another course taught by Paglia in which statistics was a prerequisite. In that course Erica exhibited confidence and demonstrated high statistical competence. Moreover her classroom persona had changed; her willingness to frequently contribute to class discussions indicated a comfort level with the professor and the material. On an institutional level, this model has spread to other mathematics courses with the hopes of implementing variations of this model in other academic areas, such as writing.

We continue to develop the K-P Model, and its expression changes with changes in personnel. While developing the K-P Model, different personnel took on different roles, but both the faculty person, Paglia, and the mathematics counselor, Knowles, remained the same across semesters. During the initial research, the same individual served as the researcher, the mathematics relational counselor, and the class-linked tutor. During subsequent semesters, an undergraduate student served as the class-linked tutor, and the learning center representative also served as the mathematics relational counselor. Since fewer students took advantage of the mathematics relational counselor in the second semester, we will be incorporating counseling and implementation of interventions, faculty-created positive mental health in benefiting from the workshops and see the relevance of these factors to their success.

Implementing the K-P model entails a considerable amount of pre-planning, although the actual implementation of the model is comparable to traditional methods of academic support. This model brings the services of the learning center into the classroom, incorporates the professor, and provides a more integrated approach to learning assistance. Additionally, this model addresses factors that traditional models may ignore, such as classroom dynamics, and student affective issues. The model's effectiveness is based on the class-linked tutoring presence in the classroom, referral and relational counseling and implementation of interventions, faculty-created positive relational and mathematics emotional classroom climate, and learning center and faculty collaboration in identifying and assisting struggling students to overcome their obstacles and succeed. When it is not possible to have all elements of the model in place, implementing one or some of the elements can still be helpful.

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Figure 1. The JMK Mathematics Affect Scales used at each counseling session as a qualitative measure of students' mathematics positivity/negativity.

**JMK MATHEMATICS AFFECT SCALES**

Name __________________________ Date __________________________

On this questionnaire is a group of scales. Please read each scale carefully. Then indicate the part of each scale which best describes the way you have been feeling while doing mathematics during the PAST WEEK, INCLUDING TODAY. If an interval on the scale better describes your range of feelings rather than point, indicate that range with a line. If the words on the scale do not accurately describe your feelings, supply your own.

1. When I think about **doing** mathematics,
   I tend to put work off:
   - never
   - a lot
   - sometimes

2. If I think about how I **experience** my problems with mathematics,
   I tend to feel discouraged:
   - never very much
   - sometimes

3. When I think about my mathematics **future**:
   I feel:
   - confident
   - hopeless/nothing can improve

4. When I think about the mathematics course I am taking now,
   I:
   - like it
   - would withdraw if I could

5. When I think about **how** I do mathematics,
   I:
   - feel pride in how I do it
   - feel ashamed all the time

6. When I think of my **mathematical achievements**, 
   I:
   - feel satisfied
   - feel like a complete failure

7. While I am doing mathematics,
   I can:
   - make mathematical decisions on my own
   - not make mathematical decisions on my own
   I get confused

8. When I **compare myself** with others in my mathematics class,
   I am:
   - better at mathematics than most of them
   - much worse at mathematics than most of them
   I am about the same level as them

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Figure 2. The Mathematics Learning Metaphor Survey used as a qualitative measure of student's mathematical relational issues.

MATHEMATICS LEARNING METAPHOR SURVEY

Name __________________________ Date __________

1. Make a list of metaphors that show how you FEEL about MATHEMATICS/YOURSELF DOING MATHEMATICS. For example, if it were a color what color would it be? If it were weather or an animal or a fictional character or ... what would it be?

2. Now choose one of the metaphors from 1. that most closely describes your relationship with MATHEMATICS and write more about why this metaphor describes your relationship with MATHEMATICS.

3. As you reread your metaphors, what do they tell you about your attitudes as you do MATHEMATICS? your expectations of yourself doing MATHEMATICS? your predictions about your success in MATHEMATICS?

I do/do not give my permission for my metaphors to be discussed in the class/group. (circle your choice) Signed ___________


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Book Review

College reading research and practice: Articles From The Journal of College Literacy and Learning


Reviewed by Jodi Patrick Holschuh, Assistant Professor, Division of Academic Enhancement, University of Georgia

College Reading Research and Practice is a collected volume of articles from the Journal of College Literacy and Learning (formerly Forum for Reading), edited by the current editors of the journal. The book contains 27 articles spanning 1983 to 2001. In the introduction, the editors state that their purpose was to compile and collect significant articles from the past 30 years to make them accessible to a wider audience. In this way, the editors hope to create a "corporate memory," that is, a reminder of what has been accomplished and about best practices in the field of college reading and studying so there is no need to reinvent the wheel. The editors also hope the volume can serve as a good introduction for someone new to the field of college reading and study strategy research. This is a noble goal, because lately it appears that research in college reading has fallen out of vogue. Journals and conferences that were once dominated by college reading research are now largely focused on issues such as teacher education or emergent literacy. However, in a climate where many colleges and universities are scaling back or cutting developmental or academic assistance programs, the concerns faced by college reading researchers and instructors as addressed in this collection of articles remain critical.

The book is divided into three sections: theoretical issues, research, and program and strategy descriptions. Perhaps the strongest section is the first. The five articles contained in the theoretical issues section present diverse and timely issues for reading educators to consider. First is a succinct but noteworthy article by Albert Kingston (1990) on the history of college reading. Kingston traces the types of reading programs and the changes that have occurred from the end of World War II, when programs used tachistoscopes and special films designed to increase reading speed, to the 1980s, when many programs are in place to serve nontraditional or "at-risk" students.

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Although Kingston declares at the end of his article that, “Academicians who argued that students should only learn to read in the primary grades are rarely heard today” (p. 11), this assertion does not hold true.

In fact, the next article in *College Reading Research and Practice* is titled “In Defense of College Developmental Reading Education.” Clearly, Zheng recognized that even in 2001 many developmental reading programs continued to be attacked by both policymakers and other academics who believe that these programs do not belong in postsecondary institutions. Zheng has several creative recommendations for developmental educators, including involving mainstream faculty in aiding students in need of academic assistance. This would not only help by gaining expertise from a variety of disciplines, but also would serve to educate a wider college audience about what developmental programs encompass.

The remainder of the articles in the theoretical section deal with current assumptions about reading and writing that may need to be challenged. For example, Fishman (1997) discusses the cultural nature of reading and writing by presenting the Amish view. She describes how cultural background can and will impact schooling and student preparation of reading and writing at the college level. In this article, she presents a wonderful example of how cultural beliefs impact students’ understanding of what does and does not count as plagiarism. These theoretical pieces aid our understanding about the complexity of postsecondary literacy learning.

The second section presents research articles. This section is the longest, and perhaps the weakest piece of *College Reading Research and Practice*. The section begins broadly with two literature reviews. It then divides out the qualitative and quantitative pieces, presenting each in turn. It may be that it seems weak because many of these articles appear dated. Some are missing seminal pieces of literature in their reviews; others are addressing issues that are no longer critical to contemporary developmental studies programs. The section opens with Eanet and Camperell’s (1989) article, which offers a broad overview of the research on student conceptions of learning and serves as a good introduction to the topic. Then Bartel (1993) reviews the literature on text marking strategies, but this review seems to be missing some of the most influential pieces on this subject from the time. Later in the research section, Guenter and Anderson (1987) describe why the “Survey, Question, Read, Recite, Review (SQ3R)” strategy may not be useful in all situations. Although this may have been news in the late 1980s, most current developmental studies programs have moved toward more authentic, flexible strategies and thus, it is no longer an issue.

The final section presents active strategies and program descriptions used in the college classroom. The goal of this section is to present a wide variety of pedagogical and programmatic issues with plans for implementation at the college level. This is once where the *Forum for Reading* and now the *Journal of College Literacy and Learning* excels. I found myself wishing that this section was longer because there were so many good ideas here. For example, “Strategies for Considerate and Inconsiderate Text Instruction” by Schumm, Leavell, and Haager (1990) can be a great help to novice and veteran alike. The authors present a useful resource for helping students determine and compensate for text considerateness. In addition, Hiller Spires’ (1992) article on text engagement provides a step-by-step procedure to help instructors teach this difficult, yet important strategy for textbook reading at the college level. The strategies section offers many “take home” lessons and strategies that would be useful in college reading classrooms today. In fact, this section should be required reading for newcomers to the field.

In the afterward, Shirley Biggs discusses future trends for college reading educators, which include (a) increasing acknowledgement of the contributions of various disciplines to college reading, (b) creating a closer relationship between research and practice through combined qualitative and quantitative research methods, (c) exploring the broader use of technology, and (d) rethinking the purpose of higher education in light of the impact of new technologies.

I concur with this assessment of future trends, but would add that learning assistance professionals need to address the political nature of policies relating to academic assistance programs. In an era in which some states are charging students increased tuition for developmental coursework or are considering charging high schools a financial penalty for the cost of their graduates’ developmental courses, and when even the President of the United States calls for an end to these programs, it seems a top priority for researchers and instructors to understand and address the political issues involved in our field.

In summary, this book presents a wide range of issues affecting college reading and research. It represents the best of the *Journal of College Literacy and Learning* and *Forum for Reading*. In the introduction, the editors point out that *College Reading Research and Practice* is the only volume of peer-reviewed articles related to college reading in print. That being the case, I would wish to see another volume expand this topic. It would be extremely valuable to have a book that incorporates articles relating to college reading and learning issues from all of our reading journals (such as *Reading Research Quarterly*, *Journal of Literacy Research*, and *Journal of Adolescent and Adult Literacy*). The result could produce a volume with many seminal articles that impacted our field, which would serve to create a “corporate memory” for our profession.
Call for Manuscripts: The Learning Assistance Review

Statement of purpose
As an official publication of the National College Learning Center Association (NCLCA), The Learning Assistance Review seeks to foster communication among learning center professionals. Its audience includes learning center administrators, teaching staff, and tutors, as well as other faculty members and administrators who are interested in improving the learning skills of postsecondary students. The Learning Assistance Review is available free of charge to all NCLCA members. The library or institutional subscription rate is $25.00.

The Learning Assistance Review aims to publish scholarly articles and reviews that address issues of interest to a broad range of academic professionals. 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.

The journal is published twice a year, in the spring and fall. The co-editors are issuing this call for manuscripts to all learning professionals who are interested in contributing to the field through the publication of relevant, scholarly articles. All submissions are subject to a masked review process.

Manuscripts will be forwarded to the editorial board for masked peer review. Authors will then be notified regarding the status of their articles and will receive recommendations and feedback in a timely manner.

Refer to the following guidelines for authors for further information related to manuscript submission. This information is also available online at http://www.nclca.org/nclcajou.htm

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Guidelines For Authors: The Learning Assistance Review

A publication of The National College Learning Center Association

To be considered for publication, manuscripts must comply with the following guidelines:

1. Manuscripts and reference style must be in accordance with the Publication Manual of the American Psychological Association (5th ed.). Submissions that do not comply with APA style will be returned to the author(s).

2. Manuscripts must be typewritten, double-spaced, minimum one-inch margins, regular type face/font, preferably 12 point, no right justification. Do not use boldface type or special fonts. Italicics are used instead of underlining for titles and emphasis, including subheadings and in the reference list (see APA manual, 5th edition, pp. 100-103).

3. The subject matter must be relevant to the journal’s audience.

4. Manuscripts must not duplicate previously published works or articles under consideration for publication elsewhere. All authors will be required to sign a non-duplication agreement.

5. 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, if available. All correspondence will be with the lead author, who is responsible for all communication with any additional author(s).

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NCLCA Membership Information

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 $40.00. 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
- Opportunities to apply for professional development grants
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