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The Learning Assistance Review

The Journal of the National College Learning Center Association

TABLE OF CONTENTS

Letter From the Editors
Jeanne L. Higbee, Irene M. Duranczyk, and Emily Goff 3

Articles

Assessment of a Study Skills Course Using Academic Performance and Self Efficacy
Guy A. Boysen and Sharon McGuire 5

Academic Behaviors and Performances of Generation 1.5 Students who Succeed in College Science Courses
Randy Moore and Laurene Christiansen 17

Learning About the Learning Center: Program Evaluation for Learning Assistance Programs
Jack Trammell 31

Join the Conversation

Dealing With Student Errors: A Postexamination Report on Student Learning
Barry D. Biddlecomb 41

Book Reviews

The Pedagogy of Possibilities: Developmental Education, College-Level Studies, and Learning Communities by G. Malnarich and others
Reviewed by Julianne Scibetta 53

Challenging and Supporting the First-Year Student: A Handbook for Improving the First Year of College
Reviewed by Norman Stahl 57

Publication Guidelines 65

NCLCA Membership Information 67

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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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Letter from the Editors

Before introducing the articles featured in this issue, we would like to take this opportunity to thank David V. Taylor for his generous support of *The Learning Assistance Review* (*TLAR*) over the past 2 years. Dr. Taylor, who had led General College since 1989, has now left to become Provost and Senior Vice President of Academic Affairs at Morehouse College in Atlanta. We wish David well in his future endeavors

It is hard to believe that we will only be editing *The Learning Assistance Review* for two more issues! We look forward to working with the future editors to ensure that there is a smooth transition between teams. Please contact Jeanne Higbee at higbe002@umn.edu if you are interested in applying for this exciting and rewarding position. The *TLAR* editors will forward names of interested parties to the NCLCA Board. Also, please contact Emily Goff at goff0009@umn.edu if you are interested in serving as a reviewer for the journal.

In this issue of *TLAR* the lead article by Guy Boysen discusses the importance of self-efficacy in student success. His study reports the long-term effect of a study skills course on participants' grade point averages (GPAs) and academic self-efficacy. This article suggests that study skills courses can play an important role in positively impacting students' academic self-efficacy. In "Academic Behaviors and Performances of Generation 1.5 Students Who Succeed in College Science Courses," Randy Moore and Laurene Christiansen look at factors impacting the successful completion of an introductory biology course for students for whom English is not their first language. Moore and Christiansen found that although difficulties with the English language can be a challenge for some students, programmatic support paired with high rates of participation in class can help students to overcome these difficulties and do as well—or better—than students whose native language is English. In his article, "Learning About the Learning Center: Program Evaluations for Learning Assistance Programs," Jack Trammell provides an overview of program evaluation theory and relates it directly to the activities and challenges of the Learning Center. His article provides a detailed blueprint for learning center evaluation, which should be useful for many readers.

We invite readers to "Join the Conversation" sparked by Barry Biddlecomb in his article, "Uniting Mathematical Modeling and Statistics: Data Analysis in the College Classroom." Biddlecomb describes the creation of a course that helps students develop the concepts and knowledge required to be successful in mathematical modeling as well as to develop a good understanding of statistics. He also offers valuable suggestions for learning center professionals who might want to offer this type of course within their learning centers.

We are featuring two book reviews in this issue. Julianne Scibetta reviews *The Pedagogy of Possibilities: Developmental Education, College-level Studies, and Learning Communities*, a timely book published by the National Learning Communities Project Monograph Series. *Challenging & Supporting the First-Year Student: A Handbook for Improving the First Year of*

College is given a comprehensive and thoughtful review by Norm Stahl.

We have been consistently impressed with the contributions of our authors as well as the helpful feedback from our editorial board that make the publication of this journal such an enjoyable process. With this issue we are also pleased to announce that we are now indexed online through Education Abstracts, which means that libraries holding a subscription to this service across the nation will now have access to our articles and book reviews. We hope that you enjoy *The Learning Assistance Review* and, as always, we welcome your comments and suggestions.

Jeanne, Irene, and Emily

Assessment of a Study Skills Course Using Academic Performance and Self-Efficacy

Guy A. Boysen
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Abstract

This article reports on research that examined the effects of a study skills course on students' grade point averages and academic self-efficacy. Results indicated that students enrolled in a study skills course did not exhibit increases in grade point average compared to a matched control group. However, students did significantly increase academic self-efficacy. Self-efficacy is discussed as a valuable concept that deserves more attention in order to promote student success.

Colleges and universities have been offering seminars and courses to assist students in improving their academic abilities since 1911 (Gordon & Grites, 1984). Examples of common seminar topics include college orientation, pre-major or academic discipline preparation, and study skills (Tobolowsky, Cox, & Wagner, 2005). Study skills courses are the focus of this study. Although the structure and content of study skills classes vary from institution to institution, a national survey of colleges and universities offering first-year seminars reported that the most common objectives in study skills courses were developing academic skills, campus orientation, and personal development (Tobolowsky, 2005). More specifically, *Your College Experience* (Gardner & Jewler, 2004), a typical first-year experience textbook, covers content areas including reading, active studying, note taking, testing strategies, adjustment to college, and sexuality and relationships. Courses are offered for one to three credits, usually meet for one academic term, and may use letter or pass-fail grades (Tobolowsky). Regardless of the class format, the main purpose of study skills courses is to improve students' ability to handle the rigors of collegiate academics. An ongoing topic of research, however, is how successful the courses are in terms of assisting students in improving their college outcomes (Bednar & Weinberg, 1970; Entwisle, 1960; House, 2005; Kirschenbaum & Perri, 1982; Sparks; 2005; Tuckman, 2003).

Grades as an Outcome Measure

An obvious measure of the benefits of study skills courses is grade point average (GPA). Unfortunately, the long history of empirical outcome research on study skills interventions indicates an inconsistent relation to increases in GPA (Bednar & Weinberg, 1970; Entwisle, 1960; Kirschenbaum & Perri, 1982; Mitchell &

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Piatowska, 1974). For example, in the most recent review of the empirical literature Kirschenbaum and Perri found that only 30% of studies examining the GPA of students participating in a study skills intervention showed immediate increases in GPA. Since that review, only a few studies published in peer-reviewed journals have indicated that study skills courses directly benefit students' GPA (Polansky, Horan, & Hanish, 1993; Tuckman, 2003). Furthermore, national surveys of academic officials responsible for administering skills courses illustrate similar inconsistency. For example, in the most recent survey conducted by the National Resource Center for The First-Year Experience and Students in Transition, only 7 of 13 institutions offering study skills seminars reported increased GPA as a course outcome identified through formal program evaluation (Tobolowsky, 2005). Although it is difficult to interpret this survey data with precision, it is generally consistent with the empirical work cited previously because it does not indicate that GPA is consistently increased by enrollment in study skills courses. Increased GPA may stand out as the most logical and valid measure of study skills course success but it has been difficult to establish this outcome reliably.

Two factors may have prevented past researchers from consistently showing the effects of study skills courses on GPA. First, there has been a tendency for researchers to examine only one group of students at a time. Examining outcomes of several groups of students participating in a course during different years would better ensure that random variation in enrollment does not affect the outcome. Second, GPAs tend to be only measured the semester the students are enrolled in the study skills course and, more rarely, the semester following enrollment. Ideally, GPA should be examined for a longer period of time to ensure that benefits emerging later in college are not being missed. Both of these issues are addressed in the present study in order to determine the effect, if any, of study skills courses on GPA.

Self-Efficacy as an Outcome Measure

Although study skills courses are occasionally found to result in direct improvement of GPA (Polansky et al., 1993; Tuckman, 2003), most researchers have avoided using changes in actual GPA to evaluate skills courses. Instead, the outcome measures of choice have largely been self-reported attitudes only indirectly related to GPA (Annis, 1986; Cone & Owens, 1991; Howard & Jones, 2000). Unlike direct assessments of GPA, these attitudinal measures show unilateral improvement after enrollment in a study skills course. Despite the variety of attitudinal outcome measures used to assess skills courses, past research has overlooked possibly the most pertinent variable for students seeking academic help: self-efficacy. Self-efficacy was defined by Bandura (1986) as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Academic self-efficacy is typically studied by asking students how successful they expect to be in specific domains. For instance, engineering students' self-efficacy for fulfilling engineering's academic requirements predicts their academic achievement (Hackett, Betz, Casas, & Rocha-Singh, 1992) and college students' math self-efficacy predicts grades in math courses (Lent, Lopez, & Bieschke, 1993). Students who enroll in study skills courses are looking for ways to improve their academic abilities, or, in other words, they are looking to boost their academic self-efficacy. Therefore, determining if increases in academic self-efficacy actually occur is a logical topic of research.

Improving self-efficacy through enrollment in a study skills course is a worthy goal because studies have repeatedly demonstrated the importance of self-efficacy in academics. In a meta-analysis of various psychosocial and study skills factors, self-efficacy was the best predictor of GPA among them with a correlation of .496 (Robbins, Lauver, Le, Davis, & Langley, 2004). In addition, the relationship may be especially important for the struggling students who can make up a large proportion of those enrolled in study skills courses. Another meta-analysis found that the effect size of self-efficacy on academic performance for low-functioning students was .56 compared to .33 for normal-functioning students (Multon, Brown, & Lent, 1991). With research indicating the relevance of self-efficacy to academic achievement, measuring the influence of study skills courses on self-efficacy would be a key gauge of their effectiveness.

The Current Study

The purpose of this study was to make two improvements over past research on the effectiveness of study skills courses. To improve the measurement of GPA, students enrolled in three separate semesters of a study skills course were sampled and their GPAs were measured over three semesters following their enrollment. Additionally, because of self-efficacy's relation to academic performance, it stands out as an untapped potential measure of study skills courses' effectiveness. Therefore, another improvement was to measure self-efficacy as an outcome of enrollment in one semester of a study skills course.

Four research questions were examined in this study:

1. How do the first three semesters of college GPA and precollege academic characteristics of students enrolled in a study skills course compare to students not enrolled in the course?

2. How do the first three semesters of college GPA of students enrolled in a study skills course compare to students not enrolled in the course when the two groups are matched on precollege academic characteristics?

3. How does the academic self-efficacy of students enrolled in a study skills course and students not enrolled in the course change from the beginning to the end of the semester the course is offered?

4. How does the academic self-efficacy of students enrolled in a study skills course compare to students not enrolled in the course at the start and end of the semester the course is offered?

Method

Academic Learning Skills is a one-credit course that is offered through the Psychology Department for a pass or fail grade. The course meets for 50 minutes twice a week for an entire 15-week semester. Graduate assistants from the Department of Psychology are the primary instructors for the course. Evaluation of student performance results from papers, journals, presentations, and projects. In a nonrandom sample of 33 students 81% reported that they spent between 2 and 5 hours on these activities and attending class in an average week.

Although instructors are allowed to vary the course's emphasis to fit their and the students' needs and abilities, there are common textbooks (e.g. Gardner & Jewler, 2004), topics, and assignments. Academic areas of emphasis include time management, study habits, writing, note taking, reading, critical thinking, and test taking. Personal development areas of focus include diversity, alcohol and other drugs, campus resources, relationships, and mental and physical health. A variety of teaching modalities are utilized in the course including lecture, large and small group discussion, student presentations, guest speakers, videos, and outside learning assignments.

Sample

Two samples were used in this study. The first sample, used for research questions one and two, consisted of 1,484 first-year students who completed at least their first three semesters at a large public research university in the Midwest. The sample was 52% male and 48% female. The racial breakdown of the sample was approximately 88% Caucasian, 3% African American, 2 % Asian or Pacific Islander, 2% Latino or Hispanic, and 5% of other races, mixed race, or undesignated race. The second sample was used to answer research questions three and four. The sample consisted of 189 first-year students including 141 students enrolled in a study skills course and 47 students not enrolled in the study skills course. The students not enrolled in the study skills course were also incoming first-year students. Demographic characteristics for the second sample were similar to the first sample. Both samples were typical of the undergraduate population at the university such that a majority (51%) of undergraduates are less than 21 years of age and are in-state residents (77%). Thus, the results are most applicable to traditional-age Midwestern university students.

Dependent Measures

Several academic measures were used for research questions one and two. The primary analysis examined students' GPA from their first three semesters of college. ACT scores and high school ranks were also analyzed.

Two measures of self-efficacy were used to answer research questions three and four. First, Silver, Smith, and Greene's (2001) Study Skills Self-Efficacy Scale (SSSES) is a 33-item measure of students' self-efficacy for using self-regulatory study strategies. Respondents rate their confidence in scholastic behaviors on a scale from 1 (*very little*) to 5 (*quite a lot*). Typical behaviors include "Understanding what I read in a text book" and "Completing assignments on time." Internal consistency for the measure was excellent in the present study was represented by a coefficient alpha score of .91. Initial validity for the measure was provided by its' ability to differentiate C and D students from A and B students (Silver et al.). Second, a general academic self-efficacy measure (GASE) was created for the present study. Although one other study has examined general academic self-efficacy (Chemers, Hu, & Garcia, 2001), it did not include a validated measure. Thus, the GASE was created. The five-item

scale assesses students' confidence in graduating from college, obtaining good grades, being accepted into a major, and balancing social and academic life. Respondents rate their confidence in scholastic behaviors on a scale from 1 (*very little*) to 5 (*quite a lot*). Internal consistency for the measure was .71.

Procedure

For research questions one and two an archived data set consisting of precollege academic characteristics and college GPAs of students from three consecutive fall semesters was used. The archival set was obtained from official Registrar's Office institutional data and included all the students enrolled in the study skills course and a random sample of students not enrolled in the course. For research question number two, matched pair samples were created from the same archived data set by selecting a random sample of 50 students enrolled in the study skills course from each of the three semesters and then matching them to nonenrolled students on gender, race, ACT score, and high school rank with the exception of one year where race data was omitted in the data set.

For the third and fourth research questions all students enrolled in a fall semester of the study skills course were given the dependent measures in class by their instructors during the first and last week of the semester. No inducements were used to encourage participation. A comparison sample of students was recruited through an orientation program. They were given the pretest in the first week of major orientation courses and then were e-mailed the survey at the end of the semester. Thus, the comparison group was self-selected rather than randomly selected. Participants in the comparison sample who returned the survey at the end of the semester were entered in a drawing for a gift certificate from the college bookstore.

Results

The first analysis compared the ACT scores, high school ranks, and college GPAs of the entire population of study skills students and a group of students not enrolled in the course to determine if significant differences existed. Results of a 2 x 3 between subjects analysis of variance (ANOVA; Group: Skills vs. Non-skills; Year: Year 1 vs. Year 2 vs. Year 3) indicated that there were significant differences for ACT, high school rank, and GPAs by group but not by year (see Table 2 for ANOVA results). Students enrolled in the study skills course were significantly lower in every category (see Table 1 for means and standard deviations). No interpretable interactions were found. These results indicate that students enrolling in study skills courses come to college with significantly worse academic characteristics than the average student and continue to perform at a significantly lower level in college.

The second analysis compared college GPAs of study skills students and students not enrolled in a study skills course who were matched for gender, race, ACT, and high school rank to determine if significant differences existed. Results of a 2 x 3 ANOVA (Group: Skills vs. Non-skills; Year: Year 1 vs. Year 2 vs. Year 3) indicated that there were no significant differences by group or year (see Tables 1 and 2). Thus, the study skills students and students not enrolled in the study skills course had similar GPAs. No interpretable interactions were found. Interestingly, these results suggest that even with extra academic assistance students enrolling in a study skills course do not show an advantage in GPA over students of similar precollege academic characteristics who did not enroll in the course.

Table 1

Means and Standard Deviations of Academic Performance Measures for Enrolled and Non-Enrolled Students.

Group	Mean	SD	Mean	SD
	Non-matched		Matched	
ACT				
Study Skills	20.72	5.29	20.79	4.91
Non-Skills	23.2	7.45	20.75	5.15
High School Rank				
Study Skills	63.59	19.32	64.81	18.04
Non-Skills	75.6	20	68.25	16.77
GPA Year 1 Semester 1				
Study Skills	2.51	0.69	2.57	0.6
Non-Skills	2.76	0.82	2.51	0.73
GPA Year 1 Semester 2				
Study Skills	2.44	0.76	2.51	0.71
Non-Skills	2.75	0.8	2.64	0.77
GPA Year 2 Semester 1				
Study Skills	2.45	0.85	2.56	0.73
Non-Skills	2.69	0.92	2.46	0.93
Cumulative GPA				
Study Skills	2.47	0.66	2.55	0.58
Non-Skills	2.73	0.69	2.54	0.66

Note: Study Skills n = 539. Non-Skills n = 944.

Repeated measure analyses were conducted to determine if significant changes in self-efficacy occurred over the semester among study skills students and among students not enrolled in the course. Analyses indicated that students enrolled in the study skills course did not exhibit change in general academic self-efficacy, $F(1, 139) = .070$, $p =$ .792. However, students not enrolled in the course had a significant decrease in general academic self efficacy, $F(1, 44) = 5.303$, $p = .026$ (see Table 3 for means and standard deviations). For study skills self-efficacy the students enrolled in the study skills course showed a significant increase in scores on the SSSES, $F(1, 128) = 10.43$, $p = .002$, and students not enrolled in the course showed no significant change, $F(1, 43) = 2.76$, $p =$ .104. These results provide some evidence that academic self-efficacy is maintained and increased by enrollment in a study skills course.

Table 2

ANOVA Results for Measures Between Enrolled and Non-Enrolled Students

Academic Measure	df	F	p <
Non-matched Groups (n = 1484)			
ACT	1	40.93	0.001
High School Rank	1	122.82	0.001
GPA 1	1	34.43	0.001
GPA 2	1	45.18	0.001
GPA 3	1	20.41	0.001
Cumulative GPA	1	46.48	0.001
Matched Groups (n = 300)			
ACT	1	0.005	0.945
High School Rank	1	2.95	0.087
GPA 1	1	0.66	0.423
GPA 2	1	2.62	0.107
GPA 3	1	1.07	0.301
Cumulative GPA	1	0.015	0.902

The final analyses were conducted to determine how study skills students and students not enrolled in a study skills course compared in self-efficacy at the beginning and end of a semester. Independent samples *t*-tests were used to compare the groups' pre- and post-semester study skills and general academic self-efficacy. Because of the numerous *t*-tests performed, a Bonferroni adjustment was conducted ($p = .05 / 4$ tests) to reduce Type I error and the new significance level was set at .01. Quite tellingly, analysis showed the same pattern of significant differences for both types of self-efficacy. The students enrolled in the study skills course had a pre-semester general academic self-efficacy that was significantly lower than those not enrolled, $t(186) = -2.84$, $p = .006$, while there were no significant differences post-semester, $t(184) = -.77$, $p = .443$ (see Table 3 for means and standard deviations). Similarly, students enrolled in the study skills course had pre-semester study skills self-efficacy scores that were significantly lower than those not enrolled, $t(179) = -3.10$, $p = .004$, whereas there were no significant differences post-semester, $t(179) = -1.71$, $p = .092$. This pattern of results suggests that students enrolled in the study skills course started the semester with significant deficits in self-efficacy compared to other students; however, by the end of the semester students in the study skills course had become similar in self-efficacy to students not enrolled in the course.

Table 3

Means and Standard Deviations of Pre- and Post-Semester Self-Efficacy Measures

Group	*n*	Mean	SD	*n*	Mean	SD
		Pre-Test			Post-Test	
GASE						
Study Skills	141	17.43_a	3.07	141	17.35	3.16
Non-Skills	47	$18.72_{a,b}$	2.59	45	17.78_b	3.22
SSSES						
Study Skills	135	$102.04_{a,b}$	14.64	136	106.65_b	15.81
Non-Skills	46	109.50_a	14.48	45	111.8	18.03

Note: GASE = General Academic Self-Efficacy. SSSES = Study Skills Self-Efficacy. Subscript $_a$ = $p < .01$ for between groups differences. Subscript $_b$ = $p < .05$ for within group pre-post differences. The means and standard deviations in Table 3 represent those used in between groups analyses.

Discussion

In the current study we investigated the academic effects associated with enrollment in a study skill course. Students enrolling in an academic skills course entered college with significantly lower academic qualifications and continued to perform significantly lower than average students over their first three semesters of college. Additionally, when the students enrolled in a study skills course were compared to students not in the course who had similar academic characteristics, their performance in college was similar despite the extra support obtained by the study skills students. These results uphold past research indicating that GPA is inconsistently affected by study skills interventions (Kirschenbaum & Perri, 1982). In contrast, enrollment in the study skills course was related to maintenance and increase of academic self-efficacy. Study skills students maintained general academic self-efficacy and increased their study skills self-efficacy over the semester they were enrolled in a skills course while the general academic self-

efficacy of students not in the course declined slightly and there was no change in their study skills self-efficacy. Furthermore, although students entered the study skills courses with significant deficits in self-efficacy related to academics compared to students not in the course, those deficits were not found at the end of the semester. In summary, rather than causing huge leaps in GPA or self-efficacy, enrollment in skills courses seems to have been a self-efficacy stabilizer and equalizer for students in our sample.

Implications

Study skills students did not exhibit significant improvements in GPA in this study and improvement of GPA does not seem to be a typical effect of study skills courses overall (Kirschenbaum & Perri, 1982; Tobolowsky, 2005). If GPA is largely unaffected by study skills courses, study skills interventions should not be promoted to students as grade boosters. Rather, they may be more accurately portrayed as opportunities to become more adept at academic skills and to improve academic attitudes such as self-efficacy. To those involved in assisting student learning, improving attitudes may not seem important because retention and GPA are considered the gold standards of success. Research indicates that attitudes can be important too, however. Attitudes about academics have a significant relationship to both GPA and retention (Robbins et al., 2004). Educators should realize that interventions may focus on self-efficacy, academic goals, academic skills, and motivation and still be indirectly helping GPA and retention. Focusing on academic attitudes is simply an example of influencing the most desired outcomes through appropriate mediators. A realistic outlook on the ability to affect GPA must be maintained, however. High estimates indicate that self-efficacy explains about 33% of the variance in academic performance (Multon et al., 1991). Thus, there is a host of other factors working together to determine students' academic performance and increasing any one, such as self-efficacy, may not invariably lead to higher GPA .

Even though GPA is affected by a multitude of variables, if academic attitudes are the focus, self-efficacy should be among the first to be taken into consideration. Knowing that study skills courses may be related to significant academic self-efficacy improvement and that self-efficacy is a factor in academic performance (Multon et al., 1991), interventions designed to improve students' GPAs could be more intentional in infusing experiences intended to increase self-efficacy. Bandura (1986) stated that self-efficacy can be influenced by practicing skills, by vicarious experiences, through verbal persuasion from others, and through maintaining calm, low-anxiety physiological states while taking action. With all these factors available, finding ways to increase academic self-efficacy is limited only by the imagination of those attempting to assist students.

Note taking is a topic that is common to many study skills courses. Although there are many effective ways to teach note taking, the topic also provides a straightforward example of how self-efficacy can be intentionally implemented within a study skills course. Instructors could first teach students a new way of taking notes in class, such as the Cornell method (Pauk, 2001). Then, to increase self-efficacy for that new note taking style, a brief lecture covering general topics not to be tested could be given so that students can practice note taking. Because there will be no test over the material covered in the lecture, students will not feel pressure or stress and can focus on becoming skilled at the new note taking style. Once the task is finished students could go over the notes they took in small groups. The main task of the groups would be to pick out the positive aspects of each student's notes, thus giving them encouragement. Finally, the instructor could select a particularly good set of student notes to illustrate an ideal performance. The purpose of this illustration is not to suggest that there is one teaching method that leads to increased self-efficacy. On the contrary, the purpose is to demonstrate that the essential elements of practicing an academic skill, ensuring practice occurs in a positive emotional state, providing verbal persuasion from others, and allowing students vicarious experiences of success can be readily applied to increase self-efficacy for many academic skills.

Limitations and Future Research

Future research should maintain focus on self-efficacy in interventions to improve academic skills. However, eliminating the limitations of the current study, such as the validity of the self-efficacy control group and measure of general academic self-efficacy, possible demand characteristics in the administration of measures, and unbalanced design, should be a primary goal. Also, there is no way to eliminate the possibility that the study skills intervention was simply not intensive enough or administered skillfully enough to lead to changes in GPA. Furthermore, generalizations stemming from this study should be limited until it is replicated at other institutions and experimental designs are utilized. Nonetheless, if self-efficacy is consistently shown to increase among study skills students, the long-term stability of these attitudes should be examined. Students assessing benefits from a study skills course may overestimate their improvement at the end of the semester (Conway & Ross, 1984); therefore, it is important to determine if changes in self-efficacy are temporary or if they are stable over time. For example, longitudinal research could explore if self-efficacy increases resulting from study skills courses are related to increased retention and graduation. In addition, it will be important to determine what critical classroom interventions are responsible for increases in self-efficacy. In conclusion, there is much work to be done in determining how study skills courses affect academic outcomes, but this article provides some evidence that self-efficacy is positively related to enrollment in a study skills course and we argue that it should be an area of focus for both instructors and researchers.

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Academic Behaviors and Performances of Generation 1.5 Students Who Succeed in College Science Courses

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Abstract

In an introductory biology course, successful students in a Commanding English (CE) program had academic behaviors that were similar to those of successful native English-speaking students. CE students who failed the course had academic behaviors typical of native English-speaking students who failed the course. These results indicate that (a) programs designed to support Generation 1.5 students cannot succeed if students in the programs have low levels of academic participation, and (b) if given proper support and curriculum, Generation 1.5 students can produce academic records that meet or exceed those of their native English-speaking classmates.

The number of high school graduates in the United States for whom English is not a native language has been growing for decades, and now these students are the fastest growing population of students in the United States (Short, 2000). This increase in the number of English language learners is occurring throughout the United States. For example, almost half of first-year students in the City University of New York system were born abroad, 29% of students in Houston's schools have limited English skills, and more than 30% of students in nine high schools in Minneapolis and Saint Paul are English language learners (Minnesota Department of Education, 2003; Murie & Thomson, 2001; Spencer, 2005).

Students who are immigrants who were born outside of the U.S., but who have completed all or part of their schooling in the U.S., comprise a growing segment of students at U.S. colleges and universities. These so-called "Generation 1.5" students (Harklau, Losey, & Siegel, 1999; Rumbaut & Ima, 1988) often face significant obstacles that are not faced by majority students in higher education (Collins, 1999). Indeed, their difficulties with reading, speaking, writing, and understanding English usually put them at risk in college, where language skills (e.g., writing, reading, listening) are critical to success. These difficulties are especially formidable in science courses in which textbooks and lectures contain much difficult information and many unfamiliar words. Further compounding the problem are the facts that (a) in addition to their difficulties with English, many Generation 1.5 students are academically underprepared for college; (b) the academic English skills necessary for success in college take many years to develop (Collins, 1999; Cummins, 1981); (c) interruptions in many immigrants'

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educations upon arrival in the United States often produce gaps in the cultural and academic knowledge expected of college students that can take several years to remedy (Spack, 2004); and (d) although most English learners do not speak English in their homes, they must obtain "insider knowledge of the rhetorical communities [they] wish to enter" at school (Soter, 1992, p.31). This knowledge is implicit and culturally based, and therefore is less accessible to English language learners than to native English speakers (Curie, 1993). Taken together, these academic and language-related barriers often put Generation 1.5 students at risk in higher education.

Several colleges and universities have developed programs to help non-native speakers of English. Most of these programs are English as a Second Language (ESL) programs, which are noncredit programs that help international students new to the United States develop precollege language skills. Although ESL students can develop oral fluency in English rather quickly, this oral fluency often hides difficulties with academic English (Ruiz-de-Velasco & Fix, 2000). Moreover, these stand-alone ESL classes teach language in discreet lessons that emphasize functional literacy (i.e., reading and writing) rather than the critical literacy (i.e., understanding the social and political implications of written knowledge) that is needed for success in college (Swanson, 2004). Although ESL programs have exhibited varying degrees of success, Generation 1.5 students are often tracked in ways that hinder their academic preparation for college (Roberge, 2002; Smoke, 2001) and "feel strongly that they should not be placed differently from other U. S. high school graduates" (Blanton, 1999, p. 123).

The Commanding English Program

An alternative and especially effective approach to helping Generation 1.5 students succeed in college resides in a specialized language program, housed in the General College (GC) at the University of Minnesota. There, despite the fact that many first-year classes are large, competitive, and impersonal, the Commanding English (CE) program uses principles of developmental education and content-based English Speakers of Other Languages (ESOL) pedagogy to help Generation 1.5 students learn the academic vocabulary, reading skills, and writing skills needed to succeed in college. Unlike traditional ESL programs, CE builds language support and academic orientations into an entire credit-bearing first-year curriculum so that students can obtain a more contextualized use and understanding of academic English. This approach is more effective than stand-alone ESL courses because language is learned best in the context of content-area knowledge (Krashen, 1982; Zamel, 2004), and the linkage of language acquisition with knowledge acquisition is mutually facilitative (Lantolf & Appel, 1994; Lantolf & Pavlenko, 1995; McCafferty, 1994).

The CE program has been remarkably successful. For example, CE retained 97% of its 2001 cohort of CE students (N = 37) after 1 year, and 87% of these students after 2 years. For comparison, GC retains approximately 79% of non-CE students after 1 year and 45% of non-CE students after 2 years. Similarly, an average of 71% of CE students transfer to a degree-granting college of the University in their third year of college, compared with only 53% of non-CE students in GC. These performances of CE students are significantly higher than those of native English speaking students (Christensen, Fitzpatrick, Murie, & Zhang, 2005).

CE is a 1-year sequence of credit-bearing courses offered to first-year students for whom English is not the native language. CE is required of U.S. resident students at the University of Minnesota who have been in the U.S. educational system for 8 or fewer years, whose home language is not English, and whose test scores document a need for English support. Students who receive ACT Reading or English scores less than 18 must take the Michigan English Language Assessment Battery (MELAB), a measure of proficiency in writing, reading, speaking, and listening to English, or the Test of English as a Foreign Language (TOEFL), a measure of ability to use college-level English. Students who score between 65 and 79 on the MELAB, or between 145 and 207 on the TOEFL, are placed in CE for their first year of college. Most students in CE have been in the U.S. for 2 to 8 years and have graduated from U.S. high schools. CE students come from countries that include Bosnia, Cambodia, China, Egypt, Eritrea, Ethiopia, India, Iran, Korea, Laos, Mexico, Russia, Somalia, Sudan, Tibet, Ukraine, and Vietnam, among others.

CE students enroll as a cohort in courses (e.g., speech, literature, composition) that are typical courses taken by most first-year students at the University and are supported by adjunct reading courses, tutors, and advisors. The normal credit load for CE students is typically 14 semester hours in the fall semester and 13 to 15 semester hours in the spring semester. A typical CE student then would take a basic writing lab, biology, a biology reading adjunct course, a grammar course, and speech in the fall semester. In the spring semester, the same student would likely enroll in a research writing course, anthropology, a reading adjunct for anthropology, immigration literature, and a math course. After successful completion of this 1-year sequence, the student plans a transfer program, in consultation with a CE advisor, to the student's desired major.

Unlike many courses in ESL programs, all of the courses in which CE students enroll are credit-bearing courses that fulfill requirements for graduation or count as elective credits. Many courses enroll CE and non-CE students; the only courses that enroll only CE students are the supplementary reading courses, supplementary grammar courses, and special sections of basic writing reserved for CE students only. All of the courses offer what Zamel (2004) called "multiple opportunities to use language and write-to-learn . . . classroom exchanges and assignments that promote the acquisition of unfamiliar language, concepts and approaches to inquiry" (p. 14). Additional information about the CE program and its supplemental reading courses is presented elsewhere (*About the Commanding English Program*, 2004; Christensen, Fitzpatrick, Murie, & Zhang, 2005); here, we focus on the biology reading adjunct course.

The biology reading adjunct course, GC 1041, is offered in the fall semester of the CE program; students enroll in the course concurrently with GC 1131: Principles of Biological Science. GC 1041 is a two-credit course that meets 2 days per week, usually the hour before the biology lecture course. The programmatic goal of GC 1041 is to build the students' content-based reading and study skills; therefore, the first third of the semester focuses on developing note-taking skills, learning vocabulary, enhancing textbook reading strategies, and studying for the first exam. In GC 1041, students read the same textbook that is required in the biology course, and learn vocabulary most relevant to the biology course lectures. In the second third of the semester, students in the reading adjunct course examine supplemental materials directly connected to the biology course. For example, in the biology course students study evolution. Students in the reading course read supplemental materials about whale and primate evolution and they develop additional academic skills by making presentations of these supplemental materials for each other. In the final third of the course, students study the rhetorical conventions of scientific writing and journalistic writing by further researching one topic from the biology course. Working in pairs, students find articles on their chosen topic in both scientific journals and popular media; they then compare the content and form of the two articles. Finally, students hold a poster fair in which they share their research with other members of the class and other CE instructors. The final week of the reading adjunct course focuses on learning how to study for comprehensive finals. In this week, students define for themselves what they think are the key concepts of the course as they articulate their mastery of reading and study skills.

While the biology reading adjunct course is generally structured to build more independent learning by students during the semester, time is devoted throughout the course to questions and concerns as they arise. For example, each week students review their notes with each other, with questions and clarifications coming up as needed. When questions do arise, students either answer them for each other or are directed to ask the biology instructor for further explanation. Similarly, other academic skills questions, such as how to write lab reports, may be addressed in the reading adjunct course as a topic of academic literacy, or students may ask for help with lab report writing from the Academic Resource Center. CE students enrolled in the biology course and accompanying adjunct may also use the Academic Resource Center to get assistance reading the biology textbook or to research appropriate articles for their final reading project.

Given the successes of students in the CE program, we wondered if the same traits that help produce academic success for native speakers are also typical of successful students who are English learners. Although details of the CE program and its successes have been presented elsewhere (*About the Commanding English Program*, 2004; Christensen et al., 2005), there have been no studies of the academic behaviors that characterize the Generation 1.5 students who succeed in the program (Christensen et al.). To try to understand why CE students are so successful, we compared the academic performances and behaviors of successful and unsuccessful CE students with those of non-CE students. We wanted to answer this question: What about CE students helps them be so much more successful than their native English-speaking classmates?

Method

This study was conducted for 2 years (2003 and 2004) in several large sections of a four-credit introductory biology course for first-year developmental education students in the General College at the Twin Cities campus of the University of Minnesota. GC provides access to the university for students from diverse cultural, educational, and socio-economic backgrounds who do not meet all of the admissions requirements of the University's other colleges. GC prepares students to transfer to one of the University's degree-granting colleges. Students in GC are considered to be at risk because they have lower grades, ACT scores, and high school graduation percentiles than most other students at the University. Courses in GC are content-rich, credit-bearing, transferable

courses that count fully toward graduation from the University. Additional information about GC, its mission, its focus on intrusive advising, and its students can be found elsewhere (Higbee, Lundell, & Arendale, 2005).

The introductory biology course in this study covered topics typical of a traditional introductory biology course for nonmajors. Lectures occurred twice per week for 75 minutes per meeting, and labs (enrollment < 12 students) met once per week. All sections of the course met near mid-day and were taught by the same instructor in the same classroom in the same way (e.g., the same syllabus, textbook, sequence of topics, grading policy, exams, and pedagogical techniques). The course syllabus included the following statement about the importance of attendance for academic success: "I expect you to prepare for and attend every class. This is important because class attendance is usually a strong indicator of course performance." We also discussed these statements and the importance of class attendance on the first day of class in all sections. The biology course enrolled an average of 17 CE students and 340 non-CE students per semester. Our study included a total of 67 CE students and 1358 non-CE students. Additional information about this course is presented elsewhere (Moore, 2003a, 2003b).

All students (i.e., CE as well as non-CE) were in the same class, took the same exams, attended the same lab, and had the same grading criteria. We recorded the following academic performances and behaviors of all CE and non-CE students in the course:

1. Grades: We tracked the grades of CE students and non-CE students on lecture exams, a comprehensive final, and in lab.

2. Attendance at lectures: We measured class attendance every day with short in-class writing assignments. Students were told that class attendance is associated with academic success, but students received no points for attending class. Students' assignments were occasionally graded, but these assignments accounted for less than 1% of students' grades.

3. Attendance in lab and at optional help sessions: These data were recorded by teaching assistants who were leading the labs and help sessions. The help sessions were held before each exam and were conducted by teaching assistants who had no knowledge of or input regarding any of the exams. No points were given for attending the help sessions, and students who attended the help sessions received no points or "inside information" about upcoming exams.

4. Visits during office hours: The instructor in GC 1131 kept records of students who talked with him about content-related information during office hours and before or after class. Students received no points for coming to office hours or for asking questions before, during, or after class.

5. Submission of extra-credit work: Opportunities to earn extra-credit (one-third of the points that they had missed on the lecture exams) required that students write a one-page answer for each of the questions that they missed on an exam. Students had 4 weeks to write and submit these essays. The extra-credit points were guaranteed for any reasonable effort.

Finally, we used institutional records to obtain students' Academic Aptitude Ratings (AAR), which are composed of the student's ACT composite score plus two times their high-school graduation percentile rank. AAR scores were available for 69% of the 67 CE students, and were available for 83% of the 1,358 non-CE students. We used a survey on the first day of classes to determine (a) whether students had taken a biology course in high school, (b) whether students believed they would do extra-credit assignments if given the opportunity to do so, and (c) the percentage of classes the students planned to attend. We analyzed the differences between performances of CE and non-CE students with Student's *t* test (Sokol & Rohlf, 1969). Differences between means having probability levels greater than 5% were considered insignificant.

Results

The AAR scores of CE students averaged 97, whereas those of non-CE students averaged 94. These averages were not significantly different. The first-day-of-classes survey indicated that 96% of CE students and 97% of non-CE students had taken a biology course in high school. These percentages were not significantly different. On the survey, 83% of CE students and 85% of non-CE students claimed that they would submit extra-credit work if given the opportunity to do so. These percentages were not significantly different. CE students claimed that they would attend an average of 90% of classes and non-CE students claimed that they would attend an average of 91% of classes during the semester. These averages were not significantly different.

The academic behaviors and performances of CE and non-CE students are summarized in Table l. Except for the similar percentages of Bs earned by CE and non-CE students (i.e., 26% versus 27%, respectively), all of the differences in the table are significantly different ($p < 0.01$). CE students attended significantly more lectures, labs, optional help sessions, and office hours than their non-CE classmates. These differences in academic behaviors were associated with CE students having significantly higher academic performances than non-CE students (Table 1).

CE students outperformed non-CE students in every aspect of the course in every semester of this study. Indeed, CE students scored significantly higher on lecture exams, comprehensive finals, and lab grades than non-CE students. These differences in academic performances corresponded to final course grades that were on average 1.2 letter grades higher than those of non-CE students. CE students earned four-times more As, and almost two-thirds fewer Ds and Fs than non-CE students (as illustrated in Table 1).

The AAR scores of the CE and non-CE students in this study were not significantly different. These results suggest that the academic preparation of CE and non-CE students, as measured by their AAR scores, was not the basis for the differing performances of the two groups of students in this study. Indeed, there were no significant differences in the average AAR scores of CE and non-CE students in this study. Similarly, because virtually all of the students—CE as well as non-CE—had taken a biology course in high school, their differing performances in the biology course were not due to differences in their precollege exposure to biology-related content.

Table 1
The Academic Performances and Behaviors of CE Students and Non-CE Students in an Introductory Biology Course

	CE (n = 67)	Non-CE (n = 1358)
Academic Behaviors		
Mean attendance at lectures, %	90	69
Mean number of labs missed per semester per student	0.3	0.6
% of students who attended help sessions	62	27
Mean number office hours visits per student per semester	0.4	0.1
% of students who did extra credit work	63	16
Academic Performance		
Mean lecture exams grade, %	78	64
Mean laboratory grade, %	84	72
Mean final exam grade, %	81	68
Mean course grade, %	81	68
Course grade distribution, %		
A	43	11
B	26	27
C	18	28
D	0	14
F	13	20

Note: Except for the similar percentages of Bs earned by CE and non-CE students (i.e., 26% versus 27%, respectively), all of the differences in the table are significantly different ($p < 0.01$).

Table 2 compares the academic behaviors and performances of CE students who passed the course (n = 54) with those of CE students who failed the course (n = 13). All of the differences in the table are significantly different ($p < 0.01$). CE students who passed the course submitted extra-credit work and attended labs, lectures, and optional help sessions more often than CE students who failed the course.

Table 2

A Comparison of the Academic Behaviors and Performances of CE Students who Passed an Introductory Biology Course (n = 54) With Those who Failed (n = 13)

	Passed (n = 54)	Failed (n = 13)
Academic Behaviors		
Mean attendance at lectures, %	95	43
Mean number of labs missed per semester per student	0.1	1.8
% of students who attended help sessions	74	0
Mean number of visits to office hours per student per semester	0.6	0
% of students who did extra credit work	78	0
Academic Performance		
Mean lecture exam grade, %	83	46
Mean laboratory grade, %	91	52
Mean final exam grade, %	89	43
Mean course grade, %	88	48

Note: All of the means in this table are significantly different ($p < 0.01$).

On the first day of classes, large majorities of CE and non-CE students were confident that they would attend class regularly and take advantage of opportunities for extra credit in the course. On average, CE students' rates of class attendance (i.e., 90%) matched their first-day-of-classes claims (i.e., 91%), and their claims about doing extra-credit work (i.e., that 83% of the CE students would do such work) were closer to the actual percentage who did the work (i.e., 63%). However, non-CE students' confidence about attendance and doing extra-credit work was not justified; for example, they claimed that they would attend 90% of classes, but actually attended on average only 69% of classes. Similarly, 85% of non-CE students claimed that the would do extra-credit work, but only 16% actually did the work, even though many of these students were doing poorly in the course and needed the extra points to pass. These results are consistent with reports that (a) many developmental education students have behaviors (e.g., skipping class, ignoring advice) that are inconsistent with academic success (Grisé & Kenney, 2003; Yaworski, Weber, & Ibrahim, 2000), and (b) many developmental education students have a difficult time following through on their academic intentions (Pintrich & Garcia, 1994).

Our data indicate that the differing academic performances of CE and non-CE students are strongly associated with students' differing levels of academic participation. Although academic motivation can be expressed in a variety of ways, two explicit and easily measured expressions of this motivation are class attendance and participation in course-related opportunities for enhanced learning and extra credit. Indeed, these behaviors require a consistent and ongoing effort that relates directly to students' academic success. On average, (a) CE students' rates of class attendance (i.e., 90%) were significantly higher than those of non-CE students (i.e., 69%), (b) CE students missed 50% fewer labs than non-CE students, (c) CE students came to office hours four-times more often than non-CE students, and (d) CE students were more than twice as likely to attend optional help sessions. These differences in behavior between CE and non-CE students occurred every semester in this study, despite the fact that CE students received no points for any of these activities. When given a chance to earn extra credit, the differences in behaviors of CE students and non-CE students were even more dramatic; indeed, CE students were four-times more likely to take advantage of opportunities for extra credit. The successful CE students also exhibited other behaviors that distinguished them from most of their classmates. For example, most CE students introduced themselves to the instructor during the first 2 weeks of the course, sat in the first two rows of the classroom, were seldom late for class, never left class early, and often asked questions before, during, and after class.

Taken together, these data support the earlier claim that the most successful developmental education students—CE or non-CE—are the most highly motivated students. Motivation is important because it affects students' willingness to approach academic tasks, invest the required time and energy, and maintain enough effort to complete academic tasks successfully (Ray, Garavalia, & Murdock, 2003). Successful students, regardless of whether they are English learners or native English speakers, have multidimensional strategies for making good grades in college. That is, they do not just go to class regularly or attend help sessions; instead, they invest in and excel at a variety of academic behaviors that optimize their chance of academic success, as demonstrated in Tables 1 and 2.

CE Students Who Fail

Although 69% of CE students earned an A or B in the course, compared with only 38% of non-CE students who earned the same grades, enrollment in the CE program does not guarantee academic success. Although no CE student has ever made a D in the course, an average of 13% of CE students have failed the course. These students had academic behaviors that were significantly different from those of academically successful CE students (see Table 2). Indeed, CE students who failed came to many fewer lectures and labs than their more successful counterparts. In the years that we have tracked the grades and academic behaviors of students in introductory biology, no CE student who has failed the course has ever attended a help session, visited with the instructor during office hours, or submitted an extra-credit assignment.

The behaviors of CE students who failed the course were different from those of CE students who passed the course, but were strikingly similar to those of non-CE students who earned a D or F (Moore, 2003a, 2003b). Fewer than 5% of students who were failing the course responded to an e-mail requesting that they meet with the instructor to discuss their grade. Despite repeated efforts to keep students engaged in the course (e.g., with the supplemental reading course and ongoing reminders about the importance of attendance, exams, and assignments), some students disengaged themselves from the course and chose behaviors that they knew were associated with poor academic performance (e.g., skipping lots of classes). Indeed, the high rates of absenteeism and lack of academic engagement that characterize students who failed the course make it exceedingly difficult, if not impossible, for instructors, advisors, or others to help these students succeed. As Thomas and Higbee (2000) have noted, "The best . . . teacher, no matter how intellectually stimulating, no matter how clear in providing explanations and examples, may not be able to reach the high risk freshman who has no real interest in learning . . . and will certainly not be successful with the student who fails to show up for class" (p. 231).

Of course, high rates of academic engagement do not necessarily guarantee academic success; some students do well despite the fact that they attend relatively few classes, and other students come to class regularly yet earn relatively low grades. Although students' academic performances are strongly associated with their rates of academic engagement (Table 1), such an association does not necessarily imply causation. Causality might go either way; high rates of engagement might help students earn better grades, or students' desire to make better grades might underlie their high rates of academic engagement, or both. Nevertheless, the message here is unmistakable: the highest grades are usually earned by students who exhibit the highest levels of academic participation. Similar associations of academic motivation and course performance have been reported previously by others (e.g., Street, 1975; Thomas & Higbee, 2000; Wiley, 1992).

Conclusions

Data presented here have two important implications for colleges and universities wanting to improve the academic success of Generation 1.5 students.

1. Although non-CE students (i.e., students for whom English is the native language) would seemingly have a tremendous academic advantage over CE students, highly engaged CE students can produce academic records that meet or exceed those of their non-CE classmates.

2. A critical requirement of developmental education students for academic success—CE and non-CE alike—is academic engagement. Students who are motivated enough to attend class and lab regularly, and participate in course-related opportunities (e.g., office hours, help sessions, extra-credit opportunities) will usually learn more and make significantly higher grades than students who skip classes and ignore course-related opportunities. In college and elsewhere, engagement and the work ethic that accompanies it can overcome many obstacles. Differences in academic motivation also help explain why many seemingly bright students often do not do as well in college as other seemingly average students. Academic engagement, which students express as hard work, persistence, and simply showing up, usually produces success; innate intelligence often does not. It is usually the most motivated students, and not necessarily those with the highest scores on standardized tests, who succeed in college. The most successful students understand Woody Allen's truism that "Eighty percent of success is showing up" (Moncur, 2004).

Generation 1.5 students face many language-related challenges in higher education; participation and work ethic, as expressed by high rates of class attendance and engagement, can help them overcome these obstacles and produce academic success. Learning center staff members, tutors, university instructors, admissions officers, and academic advisors should emphasize to these and other students the importance of academic engagement for academic success. Difficulties with language may put students at risk, but these risks can often be overcome by high expectations, contextualized learning, and a strong work ethic that engages students with, and thereby enables students to take control of their education. Difficulties with language, and the resulting at risk label that often accompanies students having such difficulties, are not destiny.

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Learning About the Learning Center: Program Evaluation for Learning Assistance Programs

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Abstract

From tutoring to disability support, college and university learning centers are being called upon to deliver a wider range of services than ever before. With fewer budgetary resources and greater accountability requirements, learning center administrators increasingly find themselves needing to become the evaluation experts in their offices. Fortunately, the broader field of evaluation provides structures that with minimal adaptations can assist learning center administrators in refining their program evaluation tactics and gathering more effective feedback. This article suggests a basic blueprint for learning center evaluation, drawing on general evaluation theory, with specific strategies and activities to utilize.

From the outset of the learning assistance movement in the 1970s, it was readily apparent that a new kind of evaluation would be necessary to determine the effectiveness of learning centers (Boylan, Bonham, White, & George, 2000; Stahl & King, 2000). Learning centers provided instruction and resources outside of the traditional classroom setting (e. g., Supplemental Instruction), and were often established without clear mechanisms for assessing student learning or measuring program effectiveness (e. g., tracking the number of sessions attended, but not investigating the impact). For these reasons, efforts to design or discuss program evaluation have often failed to generalize to the wider learning assistance movement (Chapel, 1994; Clarke & Learning Resources Association, 2002; Johnston, 1994; Lauridsen, 1980; Walvekar, 1981).

By the 1980s, however, systemization of learning centers had progressed, and issues of evaluation briefly came to the forefront. A short burst of literature on learning center organization and future direction appeared momentarily, and then disappeared into the wider debates over study strategies, developmental education, and college reading (Stahl & King, 2000). In the mid-1980s, program evaluation for learning centers began to develop into a science of its own, particularly in the work of developmental educators like Nancy Spivey (1981). Spivey wrote about the Goal Attainment Scaling method of assessment, which assumed a problem-solving based approach to evaluating learning centers (Spivey; Terwilliger, 1985). Still, learning centers remained somewhat insulated endeavors that often had no clear mechanisms for accountability to students or faculty. In addition, the diversity of assistance programs across the country made uniform program evaluation impossible and generalizability problematic.

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In the 1990s, in conjunction with the accountability movement in education, a variety of powerful forces began to drive evaluation for learning centers. These forces included the rising involvement of the federal government in postsecondary education, increased legislative demand on the state level for accountability, recognition by colleges and universities that learning centers were key retention tools, and the growing ease of using technology to gather and process data on program effectiveness (Boylan et al., 2000; McNamara, 2003). Learning centers are still evolving in the midst of these trends.

Currently, thorough and respected evaluation research comes from Stufflebeam, Madaus, and Kellaghan (2000). They characterized the early history of evaluation as "informal and impressionistic" (p. 4) and confirmed in their survey of educational evaluation the identity crisis that learning assistance programs have persistently combated since their inception. In the first chapter of their book, they spent a great deal of time looking at evolving paradigms, beginning with Ralph W. Tyler's comparative model in the 1930s, which address intended outcomes versus actual outcomes, and ending with the current accountability movement that stresses outcome evaluation even more heavily (Smith & Tyler, 1942). They were quick to warn, however, that the lessons of history are not necessarily the outline for current learning assistance evaluation: "The value of program evaluation must be judged in terms of its actual and potential contributions to improving learning, teaching, and administration" (Stufflebeam et al., p. 18).

Similarly, in the preface of the *Handbook of College Reading and Study Strategy Research*, Flippo and Caverly (2000) acknowledged the historical need for structured evaluation, and also made the plea to examine learning assistance programs in the context of a larger postsecondary clash of values. There are many individuals in higher education who not only question the need for learning assistance, but also question the efficacy of such programs: "Decisions to eliminate remedial courses indicate an undervaluing of these courses and of the programs that offer them" (p. xiv). Along this line of reasoning, evaluation must not only gauge outcomes, but must also be an ongoing justification for the program to exist.

In the present-day college or university learning center, the need for effective program evaluation has never been more pronounced (Boylan et al., 2000). With resources scarce, the possibility of hiring an expensive outside consultant to conduct a yearly evaluation is not realistic for many schools (Bamberger, Rugh, Church, & Fort, 2004). Instead, administrators must rely on the tools that are already available, and the fact that learning assistance programs inherently generate massive amounts of potentially valuable data. The remaining focus of this article will build on general evaluation theory and suggest a basic evaluation structure, based on workshops conducted at institutions such as Towson University and the University of Maryland, Baltimore County, that can serve as a focal point for most learning assistance programs (Trammell, 2004).

Fitting Learning Centers Into Evaluation Methodology

College or university learning assistance programs were initially created to help students succeed academically (Flippo & Caverly, 2000). Beyond that broad shared mission, however, many individual programs and program goals vary widely from institution to institution. In fact, some programs co-exist less than peacefully (e.g., competing tutoring programs based within disciplines) and often compete for scarce resources or administrative attention. Within this context of conflicting interests, a balanced and eclectic approach to learning assistance evaluation becomes paramount.

Balance can be elusive, however, in the field of evaluation, where at least 22 major models exist (Stufflebeam et al., 2000). The factors an individual evaluation must balance include but are not limited to: the merit and worth of the program, issues of accountability, program growth, and program improvement. Choosing one evaluation model over another will minimize or maximize different areas. The overarching concept of evaluation, however, may stay the same. Evaluation, in the words of Stufflebeam (2000), is "A study designed and conducted to assist some audience to assess an object's merit and worth" (p. 35).

Stufflebeam (2000) organized the 22 major evaluation methods into four categories: pseudoevaluations, methods-oriented, accountability, and advocacy, and then discussed their relative merits. For learning centers, the most powerful evaluation comes when techniques are borrowed from the three best categories: methods-oriented, accountability, and advocacy (Trammell, 2004). This technique of evaluation is also called mixed-methods. "The basic purposes of the mixed-method approach are to provide direction for improving programs as they evolve and to assess their effectiveness after they have had time to produce results" (Stufflebeam, p. 59).

For learning center administrators, this means both proactive (i.e., improvement) and retroactive (i.e., performance) judgments. Evaluation requires interaction with stakeholders, use of surveys and other data collection tools including case studies, implementation of cost benefit analysis, establishment of cooperative efforts across school departments or offices, and application of both summative and formative thinking. It requires a continuous and systematic approach (McNamara, 2003; Stufflebeam et al., 2000). It requires that utility always be in the forefront.

Five Steps to Successful Learning Center Evaluation

Evaluation, even when allowing for myriad methods, can be considered to have five major steps that are consistently included: focusing, collecting, organizing, analyzing, and reporting (Fitzpatrick, Sanders, & Worthen, 2004). To focus, an evaluation must return to the overall mission and program objectives. Step one in all evaluations is the identification of objectives. When beginning the process of a learning center evaluation, the logical starting point is the mission statement.

Step 1: Focusing

Building on the experience of the business community, where mission statements first came into popular use, learning centers can easily focus an evaluation by formulating and organizing around their own mission statements. A typical mission statement may be up to several hundred words in length, but should generally be as parsimonious as possible. It should focus clearly on the organizational philosophy, goals, expectations, and relationships, and recognize all of the major stakeholders either explicitly or implicitly (Shapiro & Levine, 1999). The following is an example of a learning center mission statement:

The Patrick John Higgins Academic Center

Named in memory of Patrick John Higgins, a 1990 alumnus of Randolph-Macon College, the Higgins Academic Center was officially dedicated on October 14, 1995. Because of Patrick's struggle with dyslexia during college, family and friends agreed to support academic services through the Patrick John Higgins Memorial Fund, which provides services for students registered with the office of Disability Support Services. The Higgins Academic Center facilitates community acceptance and understanding of individuals with disabilities, and promotes individualized attention to student learning styles. Tutoring and mentoring services are offered to promote academic excellence and provide academic support to all students at the College. As a center for teaching and learning, and advised by the Higgins Fellows, the Higgins Academic Center serves as a repository, clearinghouse, and sponsor for resources and programming on professional teaching techniques, academic strategies, and other research-based educational resources. Support to students and faculty is available in all areas of Instruction, as well as in Writing across the Curriculum, Speaking across the Curriculum, and Instructional Technology.

For any learning center examining a program evaluation structure, crafting or revisiting a mission statement is perhaps the highest evaluation priority. Corporations and private organizations have long found that mission statements can be guiding lights for all of their activities, and especially for evaluation (Cardani, 2000). Some organizations choose to have a program description instead, which is typically longer than a mission statement (Fitzpatrick et al., 2004).

The second half of focusing is asking the "big questions." Building on the mission statement or stated goals of the learning support center, the evaluation process must also establish its own separate rationale and structure. Evaluation for evaluation's sake is wasted energy. This second step is perhaps where many evaluations are the weakest. At this stage administrators must decide on the purpose of the evaluation. Is it primarily informational? Is it to raise awareness of a particular issue? Is it to stimulate dialogue among stakeholders? Is it to improve public relations? Or is it to measure the outcomes of specific objectives? All of these are legitimate reasons to evaluate, though not all of them are appropriate for specific learning assistance program reviews (Fitzpatrick et al., 2004).

Step 2: Organizing

This decision-making process or rationalizing is primarily internal, and also involves making choices about the methods to be employed in the evaluation. It involves an examination of the administrative philosophy that underpins the work of the center, and demands answers to the big questions in learning assistance. For example, is the evaluation of the center to be more of a celebration of the production, which can be characterized primarily as public relations or managing the outside perceptions of the center's work, or more a detailed examination of the final product, which is characterized by statistical analyses, measurements of objective completion, and so on? Is the primary mission student-oriented, as in the 1970s model, or more of a teaching and learning center model in step with current trends? Such questions, while broad and possibly esoteric, none the less organize the evaluation process and lead to important methodological decisions (McNamara, 2003; Trammell, 2004).

Step 3: Collecting

With a mission statement carefully examined, and a rationale articulated, a structure or methodology often falls into place naturally determining how data is collected. Limiting the methodological approach to a specific model, however, can be very problematic, given the unique missions of college learning centers. In fact, blindly choosing a narrow methodological approach is often evidence that the aforementioned processes have been passed over. For example, the number of tutoring sessions conducted very seldom provides a complete picture of the quality of the tutoring provided. Choosing an evaluation format that is purely statistical in nature does not provide a balanced picture of learning center operations. To complicate matters, evaluation methods have proliferated in recent years, with some researchers reporting dozens of distinct types (Stufflebeam et al., 2000).

As learning center administrators begin collecting data the methodological structure will continue to evolve naturally. Business and nonprofit organizations, for example, often categorize their evaluations as goals-based, process-based (i.e., formative), or outcomes-based (i.e., summative), though the final results of the evaluation often reflect both types of evaluative activity (McNamara, 2003). The type of data gathered in an evaluation is always steered by the primary methodological approach. With college learning assistance centers, however, a mixture of data collection methods is necessary for practical reasons as well as for philosophical reasons—no single type of evaluative activity completely captures the essence of why and how the center operates. In accordance with this, Stufflebeam (2000) reminded administrators that "It is almost always appropriate to consider using a mixed-methods approach" (p. 60).

Mixed- method evaluations. A mixed-method approach involves both quantitative and qualitative data collection and analysis. Data collection can be further broken down into formative data collection that is gathered routinely throughout the year or general time frame, such as tutor satisfaction surveys given out after individual or group sessions throughout the year, and summative data collection that is gathered at the end of the year or at fixed intervals, such as faculty surveys at the end of the year rating the Supplemental Instruction services (Parker, Shaw, & McGuire, 2003).

The toolbox for data collection can and should include many types of activities, which commonly can consist of surveys, questionnaires, checklists, interviews, narratives, case studies, computer program generated databases such as AccuTrak, observations, document analyses, focus groups, and other locally-generated databases (McNamara, 2003; Parker et al., 2003). Many types of data useful to evaluation are already collected as part of learning center daily operating routine (e.g., logs of tutoring sessions) and can easily be incorporated into an evaluation (Parker et al.). Evaluators should consider utilizing sampling strategies when too much data exists, and give appropriate consideration to the quality of data sources as well (Fitzpatrick et al., 2004).

Data collection and program improvement. Collecting data is also an opportunity for creating logic models, or a framework for examining how various programs and the data generated from them interact with each other (Patton, 2004). Data collection may essentially continue actions already undertaken in step two, organizing. In keeping with the utilization-focused evaluation theory, data collection can become part of an ongoing evolution of services that has the stated purpose of using evaluation to affect programming "from beginning to end" (Patton, p. 15). In a similar fashion, administrators can choose to engage in active research as part of their program evaluation. This involves the use of experimental, quasi-experimental, or descriptive research designs that revisit the rationale discussions undertaken in step two as data is actually collected and analyzed (Fitzpatrick et al., 2004). The results of such studies should be reported within the final program evaluation report.

Step 4: Analysis

For quantitative data analysis, descriptive and inferential statistics can be employed (Fitzpatrick et al., 2004). Descriptive statistics consist of numbers that describe program elements. Common descriptive techniques include calculating sum totals or frequencies, means, ranges, standard deviations, and so on. Descriptive statistics are the most commonly employed statistical technique in program evaluation, and can usually be computed by hand or with simple calculations. For learning centers, this might include total tutoring sessions by subject, the average number of times a certain type of student accesses tutoring, the mean rating for a specific tutor or for tutoring in a particular academic discipline, or the demographics of the typical students who seek out or attend tutoring sessions.

Inferential statistics involve an additional layer of generalization. Common tests include analysis of variance (ANOVA), linear regression, correlation, and t-tests. These techniques involve making inferences about a larger population from a limited sample. When testing to see whether females perceive more benefit from tutoring than males, for example, the researcher cannot sample all students on campus. Depending on the population and the test chosen, a sample of 30 to 60 students may be sufficient to generalize to the entire population. A basic familiarity with statistical software such as the (SPSS; Statistical Package for the Social Sciences, 2001), is helpful.

Qualitative data are studied in order to identify trends, themes, and patterns (Fitzpatrick et al., 2004) and attempt to construct a view of the program based on individual perceptions. These perceptions eventually can be coded and categorized to create a more complete picture of how a program is serving the stakeholders or clients (Bogdan & Biklen, 2003; Eisner, 1998; Guba & Lincoln, 1991).

It is important to note that data analysis involves more than simply running tests or establishing coding categories. The data must tell a compelling story, and the art of the program evaluator is to use the data to tell a story that places the program in its proper perspective. The story will affect people as individuals, as members of departments or small groups, and as a collective institution (Fitzpatrick et al., 2004). The story may not always be popular; data analysis can also be used to scale back programming. Growth for growth's sake is a poor rationale to ask for increased funding. The data analysis phase can provide evidence for which programs deserve additional resources, and which may operate just as efficiently on a reduced budget.

Step 5: Reporting

The fifth and final step is to create a mechanism for reporting on the evaluation. The culmination of a program evaluation may consist of any combination of the following: a final written report, a presentation to a governing body, a public presentation or press release, a briefing to a superior, a single issue report, or a continuing program document (Fitzpatrick et al., 2004). A suggested outline for a final report includes an introduction, a statement of goals, a description of the data collection methods, a focused analysis of the data, a discussion of the results, and finally a conclusion (Fitzpatrick et al.).

Blueprint for Learning Assistance Center Evaluation

I. Mission Statement/Objectives

- Review or create mission statement
- Articulate specific objectives for specific programs, making certain to link them back to the mission statement whenever possible
- Create or update basic descriptions of individual programs within the learning center

II. Rationale

- An internal discussion of why evaluation is conducted
- Asks the "big" questions
- Primary purpose? Should be evident in all aspects of the program

III. Data Collection

- Data should be gathered both qualitatively and quantitatively
- Formative: gathered throughout the program interval
- Summative: gathered at the end of the program interval

IV. Data Analysis

- Quantitative/descriptive techniques: sums, means, ranges, etc.
- Quantitative/inferential techniques: ANOVA, regression, t-tests, etc.
- Qualitative techniques: coding, identifying trends, etc.
- Use the data to tell a compelling story

V. Final Product

- Format: written report, presentation, briefing, website, etc.
- Introduction, goals, data collection, data analysis, results, conclusion
- Who will the evaluation be shared with?
- What will be done with the evaluation to improve programming?

Figure 1. A blueprint for learning support center evaluation

Program evaluation also creates other positive activities within an organization. For example, evaluation may create leadership opportunities for staff and administrators (Parker et al., 2003). Program evaluation may also create avoidance accounting, where administrators can show through cost analysis what will be saved by implementing a program. This is particularly helpful when connecting learning assistance programs to larger institutional retention efforts. Most importantly, however, program evaluation creates the power to influence (Boylan et al., 2000; Fitzpatrick et al., 2004). For learning center administrators anxious to secure funding and institutional support, an effective program evaluation may be the single most important tool available to them. A suggested blueprint for effective evaluation appears in Figure 1.

Conclusion

The majority of college learning assistance programs already engage in some type of minimal program evaluation. Many have not, however, developed a formalized structure for evaluation, and specifically one that incorporates mixed-methods summative reporting with a simultaneous plan for ongoing improvement of service delivery. Most learning centers cannot afford to pay for an expensive outside evaluation, and outside evaluators cannot hope to know a program as intimately as the actual administrators can. It is absolutely essential that college learning centers adapt their own more formalized evaluation structures in the current atmosphere of accountability.

Inevitably, organizational politics will be part of any serious program evaluation. The most powerful way to offset the sometimes negative effect of organizational politics is to use meaningful and powerful evaluation techniques (Smith, 1995; Stufflebeam et al., 2000). At the same time, learning center administrators should always consider the varied audiences that their services cater to, and remember that no matter what the politics, the evaluation must contribute to program improvement (Patton, 2004).

It is also important to remember that although scientific methods and statistical analysis techniques can enhance evaluation, the field of evaluation is relatively new and still in the process of evolving. In fact, some would argue that program evaluation is neither science nor theory, and is instead completely philosophical and preferential in nature (Fitzpatrick et al., 2004). In the current climate of accountability, however, philosophy is always stronger when it is backed by a compelling, data-driven story. Rising to the challenges of program evaluation can only serve to further professionalize college learning assistance programs, and benefit the very students the programs were created to benefit (Boylan et al., 2000). The precedent will be one that results in positive outcomes.

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Join the Conversation

Uniting Mathematical Modeling and Statistics: Data Analysis in the College Classroom

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Abstract

The purpose of this article is to describe the development of a preparatory course in mathematical modeling. With the spread of mathematical modeling courses through public universities in the United States and the decline in the availability of developmental studies courses across the nation, such preparatory courses are important for students who are insufficiently prepared for mathematical modeling courses. I describe considerations that went into the development of a course uniting statistics and mathematical modeling, including the theoretical framework. Finally, I provide general suggestions for learning centers that might want to implement such a preparatory course.

The traditional track of mathematics courses has been designed to prepare students for calculus. Typically, this has involved the study of algebra and trigonometry in high school with further study of algebra (i.e., college algebra) and trigonometry in college. In some cases, college algebra and trigonometry are united into a single course called precalculus. College algebra and precalculus typically form the focus of the mathematics requirements in a core or common curriculum at colleges and universities. Often these requirements are to be completed within the first 2 years of a student's entry into the postsecondary institution. Some well-prepared students are able to take calculus immediately upon entering college, but many find it necessary to take precalculus.

More recently, some institutions have begun to offer courses such as statistics or mathematical modeling that can also satisfy the mathematical requirements of a core curriculum instead of replacing college algebra and precalculus. In some cases, the particular mathematics course that students take is determined by their major. Mathematical modeling courses ask the students to construct mathematical models that allow students to make predictions and to gain a better understanding of the data.

The development of a core curriculum mathematics modeling course at the University of Georgia prompted the subsequent development of a course to help prepare students for the mathematics modeling course. The decision was made to repurpose a course that was designed to prepare students for introductory statistics so that it would prepare students for mathematical modeling as well as statistics. The course was located within the Division of Academic Enhancement, a division whose mission is to support

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