Unleashing the
–**P**-**O**-**W**-**E**-**R**–
of Your Learning Center

NCLCA
CONFERENCE

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The Learning Assistance Review

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NATIONAL
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ASSOCIATION

NCLCA

About *The Learning Assistance Review*

The Learning Assistance Review is an official publication of the National College Learning Center Association (NCLCA). NCLCA serves faculty, staff, and 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.

NCLCA's Definition of a Learning Center
The National College Learning Center Association defines a learning center at institutions of higher education as interactive academic spaces which exist to reinforce and extend student learning in physical and/or virtual environments. A variety of comprehensive support services and programs are offered in these environments to enhance student academic success, retention, and completion rates by applying best practices, student learning theory, and addressing student-learning needs from multiple pedagogical perspectives. Staffed by professionals, paraprofessionals, faculty, and/or trained student educators, learning centers are designed to reinforce the holistic academic growth of students by fostering critical thinking, metacognitive development, and academic and personal success.

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Letter from the Editor

It was an honor to serve as a mentor for this year's NCLCA Institute. Pat Maher, our immediate past president and Institute organizer, assigned each mentor with a specific style of leadership. She tasked me with "change leadership." Change leadership is the innate ability to influence and enthuse others through personal advocacy and vision while accessing the resources necessary to build a solid platform for change (Higgs & Rowland, 2000).

"Why change leadership for me?" I thought it was a simple question. I assumed she'd say something like, "Your theatre training makes this a good fit for you." Instead, she said, "You're an innovator."

I never thought of myself as an innovator. Of course, I never saw myself working in the field of learning assistance, either. She's correct, of course. Innovation is the only way I've been able to sustain a career in higher education, but I never thought of innovation as a leadership trait. During my fifth year as a lecturer in the Collegiate Reading and Learning Program where I taught freshman experience, the English and theatre capstones, and reading and study skills courses, my Dean told me the university was planning to end the program. He saw something in me, so he asked me to apply for three jobs. All were director positions. I chose to apply for the campus Writing Center because that role sounded interesting and seemed closest to my skill set.

The chair of the Search Committee, a tall, bearded, red-haired man dressed in a crisp white shirt, blue pinstriped suit, and shiny black Nike running shoes, leaned forward, obviously enjoying the sound of his bass voice in the small, empty classroom that served as the campus Writing Center. "What would you change if you were named director?" He sat back, laid his pen down, and smiled broadly, obviously proud of his question. The two committee members at his sides mimicked his body language perfectly.

It was, of course, a trick question. The Center at Missouri State University sat fallow the year prior after the director, a popular professor in the English department, stepped down to focus on research (or as it was called, "retreat to faculty," an interesting distinction). Under her leadership, the Center had thrived for twelve years.

I paused, even though I expected such a question and had carefully constructed my answer in the days leading to the interview. My brainstorming scenarios ran the gamut from tearing the entire concept of a Writing Center down and starting over to make it my own, which seemed self-serving, or to simply follow my predecessor's example, building on the strong foundation she'd cultivated. Her Ph.D. in Writing Center Theory made her shoes a bit too big to fill. I decided on a fast, simple answer, one that would be both honest and give me leeway in the future. After all, does anyone, as a child, dream of being the director of a Writing Center or a Learning Commons? As a kid, I wanted to be Luke Skywalker. But I was here, sitting in this hard plastic chair in a characterless classroom.

"I don't know if I would change anything." I ran my fingers through my hair in mock surprise. "I would like to see it in action before I answer that question. Too many changes too fast could impact the Center's reputation. I'm not a fan of the saying, 'If it ain't broke, don't fix it,' because that sounds like I'm simply resting on my laurels, but I'd like to look at it from the inside first." Then, I sat quietly.

The chairman's eyebrows arched upward, waiting for more from me. When nothing came, he whispered to his fellow committee members. "Thank you. You will be notified in writing about our decision in the next week."

A few weeks later, I was back in that room. The 800 square foot space was a blank slate to do with as I pleased. Seven writing tutors and three receptionists had already been hired. The file cabinets were empty. I had no website, no marketing materials, and no information on training or history of the Center. All demographic information, as well as assessment, was compiled using triplicate forms, which clients filled out after their visits. That first academic year, we saw almost 1300 students. I set my five-year goal to reach 10% of the student population of roughly 18,000.

A two-pronged approach to molding perception became important in establishing the Writing Center's pedagogical identity. First, the Center had to be marketed as both tied to faculty expectations and student achievement. Second, the Center had to be perceived as a service for advanced writers as well as beginners. Of course, the perceptions created by this marketing must also match the work of the writing consultants and vice versa. In those early days, I adopted the look of the search committee chair and, dressed in suit, tie, and requisite Nikes, trekked to campus offices, crashed department meetings, and cornered faculty members in copy rooms, conference rooms, gymnasiums, and stadiums, asking them one simple question while my pen hovered above my notebook:

"What can your campus Writing Center do for you?"

If they responded with an answer, my follow-up question was, "Would you be willing to lend your expertise in this endeavor?" Few did, but the perception that we're here for everyone is important. It worked.

Four years later, we saw almost 6,000 students. I soon became a victim of my own success as increased traffic and attention meant scrutiny of my Center by faculty and administration. That was good because I was laboring under the same budget – I was just good at pinching pennies and finding space to hold consultations. I often felt alone and that I was making it up. I now realize that "making it up" is when innovation happens.

I tell you this because I am now in my twelfth year as a Director. The Center has exploded, become the lynchpin for the Bear CLAW (Center for Learning and Writing). My title changed along with my duties, forcing me to give up my summers. Although I'm not teaching – in the classical sense – as much as I'd like, I have the privilege of shepherding some of the university's best and brightest students. I'm humble enough to know that I can be replaced, and experience has taught me that leaders have a shelf life. New blood can inject a renewed sense of purpose, fuel the learning commons with vigor, and add a robust energy to our efforts.

This is the way I look at my time as president of NCLCA. The three-year commitment is a daunting one, and just as I am beginning to understand my role, it's time for me to go. But the turnover is

necessary to keep the organization's direction fresh. As I write this, I am in the final days as president as I'll step down during our annual conference in Niagara Falls. I look forward to Martin Golson, current vice president, smiling and saying, "I'm reporting for duty as your relief." My response will be simple.

"I am relieved."

I'll be organizing next year's Institute, so I really won't be gone. And TLAR? I'm not going anywhere as I've never had a job more fulfilling than serving as editor.

The writers contributing to this issue, all leaders, sustain my creative energy. Enjoy the work of Ryan Korstange, James D. Breslin, Maryann H. Kope, Joannah L. O'Hatnick, Anna G. Sharpe, Heather Sturman, Alan Craig, Elaine Richardson, Jacqueline Harris, Robin Angotti, Karen Rosenberg, Martin V. Bonsangue, David E. Drew, and Malinda W. Gilmore.

And when you see Martin Golson in Niagara Falls? Shake his hand and wish him well.

Best,
Michael Frizell
Soon-To-Be Immediate Past President
Editor

The Impact of a Supportive Community Experience on African-American Students in Chemistry and Chemical Engineering

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Abstract

The paucity of African-Americans earning advanced degrees in STEM fields is well-documented. The disparity between African-Americans and other populations earning PhDs in chemistry is especially pronounced, with fewer than 5 percent of Ph.D. degrees going to African-Americans and more than 75% going to white non-Hispanics. In an effort to encourage more black students to pursue higher levels of education in chemistry, professional national conferences have been established for this purpose. This study examined the background, academic self-perceptions, and experiences of a predominantly African-American group of students attending a national chemistry conference. Participants indicated an extremely high level of satisfaction with their conference experience. Written comments indicated that the most useful aspect of the conference was the opportunity to network with vendors, potential employers, and graduate school representatives. Overall, there was evidence of a strong sense of support among the participants as individuals who were both persons of color and emerging scientists. The study found that the organization that held the conference, the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), effectively provided professional and personal support for these aspiring African-American scientists. Moreover, the findings here suggest that the same types of experiences that influence undergraduate minority students to enter a STEM field may have a direct impact on these same students' transitions into professional and academic career choices in science.

Background

Numerous national reports and studies have documented the need for the United States to increase its scientific and technological workforce and to close the achievement gap between majority and underrepresented minority students (see, for example, National Academy of Sciences, 2007 and Bohrnstedt et al, 2015). Successful strategies to confront these problems have included Supplemental Instruction programs (Treisman, 1985; Bonsangue & Drew, 1995). One study of a highly successful program to scaffold STEM achievement by undergraduate students of color highlighted four key strategies: recruitment, mentoring, peer academic support groups (i.e., Supplemental Instruction) and effective articulation with community colleges. In this program, a consortium of colleges and universities in the Houston area were funded by the Louis Stokes Alliance for Minority Participation, a National Science Foundation program. The Alliance virtually doubled the number of underrepresented minority students earning STEM bachelor's degrees in only five years (Bonsangue & Drew, 2016).

Each of these key strategies (recruitment, mentoring, peer support, and community college involvement) is intrinsic to the activities and work of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE). The mission of NOBCChE is to build an eminent cadre of successful diverse global leaders in STEM and advance their professional endeavors by adding value to their academic, development, leadership, and philanthropic endeavors throughout the life-cycle of their careers. As part of this effort, NOBCChE has held a national conference each year since 1974 in cities across the country, including New Orleans; Washington DC; Houston; San Diego; and most recently, Minneapolis. Since the initial conference, the NOBCChE conference has been bringing together, in one meeting, underrepresented minority-serving institutions, key federal agencies, and industries committed to the increase of diverse persons in STEM fields. The 44th Annual NOBCChE National Conference was held from October 30 through November 4, 2017, in downtown Minneapolis. The theme of the conference was "Community, Leadership, Partnerships."

Approximately 270 students were registered for the conference representing more than fifty institutions nationally (http://www. nobcche.org/conference). The NOBCChE National Conference provided student professional development programs along with numerous technical sessions. The goal of this study was to explore whether and how participation in the NOBCChE national conference advanced their career goals. A questionnaire was distributed to student participants about issues that have been highlighted in the literature about higher education as described in the next section.

Theoretical Framework
Background Research Focusing on Students of Color

Forty years ago, U. C. Berkeley sociologist Lucy Sells (1978) identified mathematics as the "critical filter" of students wishing to pursue careers in science, technology, engineering, and mathematics (STEM) disciplines. Several years later, Uri Treisman (1985) identified factors preventing African-American students from achieving success in first-year calculus courses. Specifically, he found that African-American students tended to study in isolation, while other, more successful groups of students, tended to study in groups. By applying strategies of group learning to the African-American students by means of Academic Excellence Workshop (AEW) groups, Treisman showed that these students could achieve at the same level as their non-black counterparts. Treisman received a MacArthur "genius" fellowship award for this ground-breaking work.

In talking with the students, Treisman found that there was a personal as well as an academic need that was addressed by participating in AEW groups. This finding has resonated in the literature on schools and learning. Students of color, often isolated in higher education, seek one another out for encouragement and role models as well as for academic assistance. This socio-academic connection has been documented to be a strong force in the success of students who have been traditionally marginalized in college, particularly in STEM disciplines (Bandura, 1997; Bonsangue & Drew, 1995; Drew, 2011; Pajares, 1996; Pascarella & Terenzini, 1991, 2005; Tobias, 1990). While the context for the present study was a national conference rather than study groups, the literature suggests that

the same principles apply. That is, how does being part of a larger group of ethnic peers in a STEM field impact the way students see themselves?

A special issue of the *Economics of Education Review* (2010) identified several factors that may be especially impactful for African-American STEM students. Price (2010) found that African-American students were more likely to persist in a STEM major if their STEM courses were taught by African-American instructors. However, both Price (2010) and Griffith (2010) reported that having women instructors had no significant correlation with persistence among women students of color, including African-American students. Ost (2010) further posited that women students were more likely to drop out based on poor grades: "In the physical sciences, females are found to be more responsive to grades than males, consistent with psychological theories of stereotype vulnerability" (p. 923). However, in universities where there was a strong African-American presence of students in higher level and graduate courses, women students thrived (Ost, 2010).

Several studies have reported similar findings for African-American students majoring in engineering disciplines. Lent et al (2005) found that social cognitive career theory was useful in predicting engineering interest and career goals at Historically Black Universities. This finding has been supported by recent studies as well. Micari et al (2016) described the importance that peer groups and professorial role models can have in their aptly-titled article, "Among friends: The role of academic-preparedness diversity in individual performance within a small-group STEM learning environment" (p. 19). However, programs that can produce positive outcomes remain relatively rare in the academic landscape. For this reason, Newman (2017) described minority engineering programs as being "at a crossroads" (p. 217).

Current Research Focusing on African-American Students in Chemistry

The disparity between underrepresented minority populations and non-underrepresented minority populations in higher education has been well-documented for the past twenty-five years. In 1992, Science (1992) ran an op-ed piece, "Math education: Multiplying the

meager numbers," stating that "a school like Rice University can get recognized for producing the most minority Ph.D.s in the country- by graduating fewer than two per year" (p. 1200). In STEM fields, the differences are even starker. In 2007, PBS Nova reported that from 1976-2006, African-Americans comprised about 12% of the population of the US, yet were awarded fewer than 8% of chemistry bachelor's degrees and fewer than 3% of chemistry Ph.D. degrees (Nelson, 2007). Data from 2001-2016 showed that fewer than 2% of college and university chemistry faculty – including those at HBCUs – were African-Americans. More recently, Chemical and Engineering News (Widener, 2017) reported that in 2014, African Americans comprised 1.6 % of chemistry professors at the top fifty US universities, compared to 80.3% for white/nonhispanic (Figure 1).
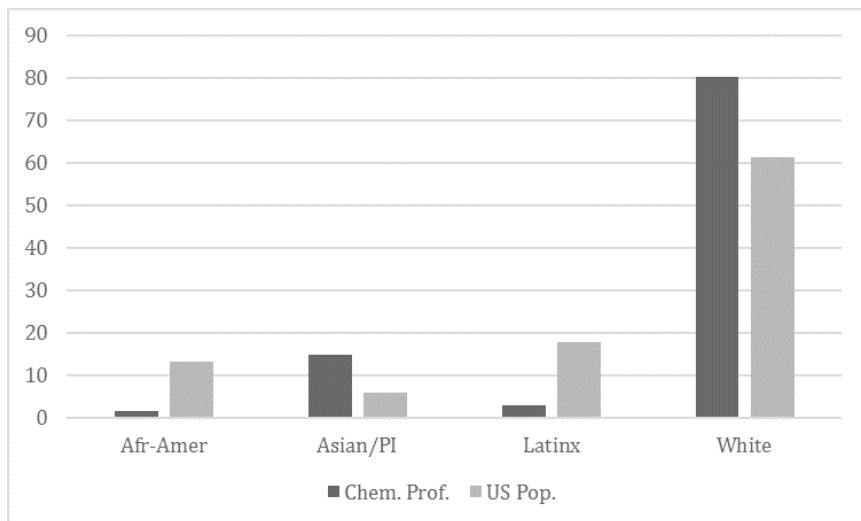
Figure 1. Percentage of Under. Min. Chem. Faculty at Top 50 Schools Identified by the National Science Foundation

New Scientist (Blair, 2012), in the article, "Where are all the black women in science?" noted this:

Tasha Inniss, a mathematics professor at Spelman, recalls 'trying not to come across as too smart' in high school, although that changed in college. Some never meet a scientist, much less one who looks like them, and some can't afford to go to college. Many black women suffer

> from low self-confidence, have gaps in their knowledge
> from attending schools where science wasn't taught
> well or are influenced by stereotypes such as 'only men
> do hard sciences' or 'people of color are not as smart.'
> 'If you buy into those, it's hard to do well because it
> becomes a self-fulfilling prophecy,' says Inniss. (p. 19)

Blair goes on to describe the experience of black women in graduate school engineering classes – given lesser tasks to work on and difficulty finding study partners. Alexander Astin's Higher Education Research Study (1997) bears this out, reporting that "42% of minority women in scientific disciplines reported subtle discrimination – far more than their white or male counterparts did" (Blair, 2012, p. 2).

Summary

Based on limited sample sizes and sampling opportunities, research documenting factors affecting the academic outcomes students of color is usually centered around mechanical and electrical engineering disciplines and often reports aggregated data for African-American, Latinx, and other underrepresented students in the STEM fields. The present study helps to fill a void in the literature by studying a group of primarily African American students majoring in chemistry or chemical engineering. Although the venue for this study was at a national conference rather than a school site, there was evidence that the same factors impacting students' early persistence and success were present for these students who were rising into graduate school and professional careers.

Method

The present study sought to draw out aspects of the conference experience that might impact students' self-efficacy as a STEM student - in this case, as a chemist or chemical engineer - based on interactions with peers and mentors of the same ethnic background. The survey was comprised of both Likert-scale items and free response questions. Likert-scale items included specific variables related to critical student academic and social self-concepts identified in the literature. Specifically, the survey was based on

Astin's (1997) long-running Higher Education Research Study. Specifically, students were asked about their academic background, including if they were the first in their family to attend a four-year college or university. Students were asked to self-report information such as academic achievement, financial aid status, and work commitments. They were also asked to identify those individuals that had had a meaningful impact on their academic lives. The final portion of the survey asked for a self-analysis on a number of qualities specifically related to success in science-based disciplines. The full survey is given in Appendix A.

Results

Sample

Based on conference records, a total of 268 graduate and undergraduate students were registered for the conference. Of these, 122 students (45.5%) completed survey forms that were used in the data analysis. Analyses were done using statistical calculations on a standard spreadsheet; missing data were handled using pairwise deletion.

Background Variables

Women comprised more than half of the sample (56.5%), with men comprising 43.5% (Table1). Two-thirds (66.4%) of the respondents were graduate-level students, with undergraduates accounting for one-third (33.6%) of the sample. Six of the graduate students self-identified their status as "post-graduate." Women outnumbered men in both graduate/postdoc and undergraduate levels, comprising more than half (53.1%) of the graduate sample and more than three-fifths (63.4%) of the undergraduate sample. More than four-fifths (82.8%) of the respondents self-identified their ethnic affiliation as African-American, with this proportion the same for both men and women respondents. Although respondents could check more than one ethnicity, none opted to do so, while five students declined to give their ethnic affiliation.

Table 1

Ethnic Identification and Academic Level by Gender

	Ethnic Identification			Academic Level		
	African-American	All other ethnicities	Total	Undergrad.	Graduate	Total
Men	41 (82%)	9 (18%)	50 (42%)	15 (34%)	38 (46%)	53 (43%)
Women	55 (82%)	12 (18%)	67 (58%)	26 (66%)	43 (54%)	69 (57%)
All St.	96 (82%)	21 (18%)	117 (100%)	41 (32%)	81 (68%)	122 (100%)

The mean age (standard deviation) of undergraduate and graduate students in the sample was 21.2 (2.12) years and 28.2 (3.85) years, respectively.

Table 2 gives data for men and women respondents regarding whether they were the first person in their family (FIF) to attend a four-year university. Nearly two-fifths (39.2%) of the respondents indicated that they were FIF students, including 33.3% of men and 43.8% of women (Figure 2). The mean self-reported grade point average for the entire sample was 3.55, with men and women reporting a mean difference of less than .05 grade points.

Table 2

First in Family Status and Grade Point Average by Gender

	FIF to attend a four-year college			GPA (self-report)
	Yes	No	Total	
Men	16 (34%)	32 (67%)	48 (43%)	3.57
Women	28 (44%)	36 (56%)	64 (57%)	3.53
All Students	44 (39%)	68 (61%)	112 (100%)	3.55
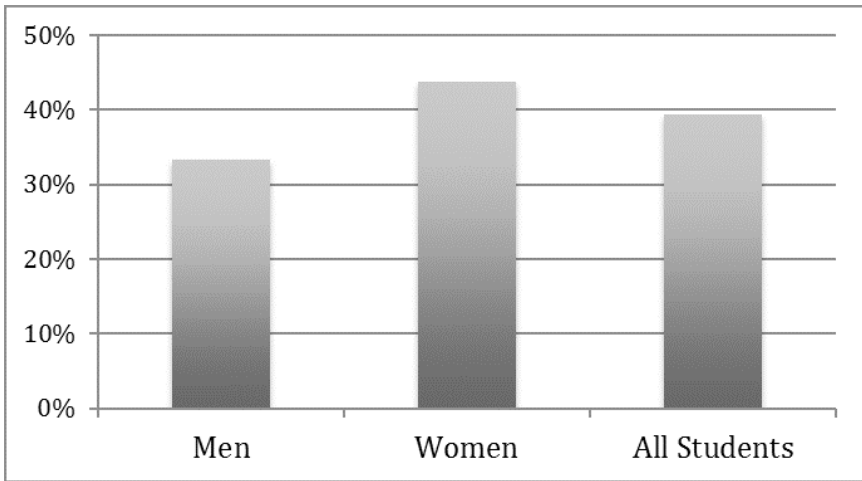
Figure 2. First In Family to Attend a Four-Year College or University

Participants were asked to report each of their parents' highest level of education. Ninety-five percent of the students responded to this question. There were four "peaks" in the responses: high school graduate (21%), some college (22%), bachelors' degree (20%), and a graduate degree (16%). More than ten percent (27/232) of these NOBCChE conference attendees indicated that their parents had less than a high school education.

Financial Aid and Conference Support

Conference participants were asked if they were receiving financial aid for the 2017-18 academic year and, if so, approximately what the amount of aid (from all sources) was. Each of the 122 respondents (100.0%) answered both questions. Among undergraduate students, 90.2% indicated that they were currently receiving financial aid, with an average annual support level of $16,500. Among graduate students, just over half (50.6%) indicated that they were currently receiving financial aid, with an average annual support level of $19,500. About one-fifth (22.1%) of the students reported being involved in at least one other NSF-supported grant project besides NOBCChE.

Conference participants were asked if they had received NSF or other support to attend the NOBCChE conference. This question was of particular importance to the conference leadership team

as well as to the NSF which provided partial funding for student support for this conference. Based on conference records, fifty-two (52) participants received NSF support to attend the conference. Overall, more than ninety percent of the 122 students in the sample reported having received financial support to attend the 2017 NOBCChE conference, including (mostly graduate) students who were not receiving financial aid during the 2017-18 academic year. Support was provided for registration costs (90.2%), hotel costs (86.1%), and travel expenses (42.6%).

Undergraduate Student College Experience
Student Survey

As described earlier, a student survey was developed based on critical factors affecting student achievement and on information in which conference leaders and the NSF had indicated a particular interest (Appendix A). Nominal and open-ended items included variables related to the students' demographic and personal backgrounds. The survey also asked students to rate the quality of each session they attended during the conference. The paper-based survey was administered to student participants on the last full day of the conference during the afternoon and evening sessions.

Student participants were asked to rate their own involvement levels in various school-based academic activities such as participating in a research or internship program. Academic involvement has been positively correlated with higher levels of student achievement, especially for underrepresented minority populations in STEM fields (Drew, 1996, 2011; Treisman, 1985). A five-point Likert scale was used with the following values: Not Involved (1); Somewhat Involved (2); Involved (3); Very Involved (4); and Extremely Involved (5). Undergraduate students reported moderate levels of involvement in research projects (2.43) and low levels of involvement in internships (1.32). Not surprisingly, graduate students reported somewhat higher levels of involvement in research projects (2.99) and low levels in internships (1.57). Undergraduate men and women reported higher levels of involvement in college or university school-related activities (4.02) compared with that of graduate students (3.58).

Students were also asked to rate the support they had experienced during the current school year from various people in their lives, including family, friends, and faculty/staff at their college or university. A five-point Likert scale was used with the following values: No support (1); Very Little Support (2); Some Support (3); Lots of Support (4); and Incredible Support (5). Tables 3 and 4 give the mean responses for undergraduate and graduate students by gender, respectively. Undergraduate students felt supported by family, friends, and faculty/advisors, with mean scores near 4. The greatest gap between men and women occurred for "support from friends," with men and women reporting mean scores of 3.54 and 4.21, respectively.

Table 3

NOBCChE Undergraduate Student College Experience by Gender

	Number of Students	Involvement Measures			Personal/Academic Support			
		Research Particip.	Intern. Particip.	Involv. Level	From Family	From Friends	From Fac./Adv.	Other Prog.
Men	15	2.69	1.31	4.07	3.53	3.54	4.07	1.46
Women	26	2.29	1.33	4.00	3.92	4.21	4.17	1.58
Total	41	2.43	1.32	4.02	3.78	3.97	4.13	1.54

Table 4

NOBCChE Graduate Student College Experience by Gender

	Number of Students	Involvement Measures			Personal/Academic Support			
		Research Particip.	Intern. Particip.	Involv. Level	From Family	From Friends	From Fac./Adv.	Other Prog.
Men	38	2.97	1.65	3.54	3.00	3.65	3.58	1.92
Women	43	3.00	1.50	3.62	3.60	3.67	3.73	1.81
Total	81	2.99	1.57	3.58	3.37	3.66	3.66	1.86

Graduate students' reported mean scores for these variables were around 3.7. In both graduate and undergraduate groups, women's mean scores were higher than those for men. Lower mean scores on "involvement in other programs" were reported by both graduate (1.86) and undergraduate (1.54) students, suggesting that the students' association with NOBCChE was the main source of their academic support.

Career Aspirations for Undergraduate Students

Undergraduate students, including native students who began their college careers as freshmen at the four-year institution, together with transfer students, were asked about their career plans after graduation. Of the 35 (out of 41) usable responses, only one student indicated that he or she was currently attending a community college. Nine students were transfer students, while the remaining 25 students (71.4%) had begun their college careers at their present four-year college or university. More than half (54.3%) of the students indicated that they planned to enter graduate school immediately after graduation, with all but three (8.6%) of the remaining students planning to go on to professional/medical school (20.0%) or enter the workforce industry (17.1%) in a STEM field (Figure 3). The students seemed to be confident of their likelihood of success in this endeavor, with two-thirds of the students (65.7%) stating that it was "very likely" or "extremely likely" that they would be admitted or employed.

Self-Efficacy in STEM

Conference participants were asked to rate themselves on fourteen self-perceived qualities identified in the literature as being critical for success in STEM (as well as other) disciplines (Astin, 1997; Bandura, 1997; Drew, 2011; Pajares, 1996; Tobias, 1990; Sells, 1978). The five response options were based on a five-point Likert scale as follows: Far Below Average (1); Below Average (2); Average (3); Above Average (4); and Far Above Average (5). The directions asked students to:

> "Please rate yourself on the following traits compared to the average person your age. Please provide the *most accurate estimate* of how you see yourself."
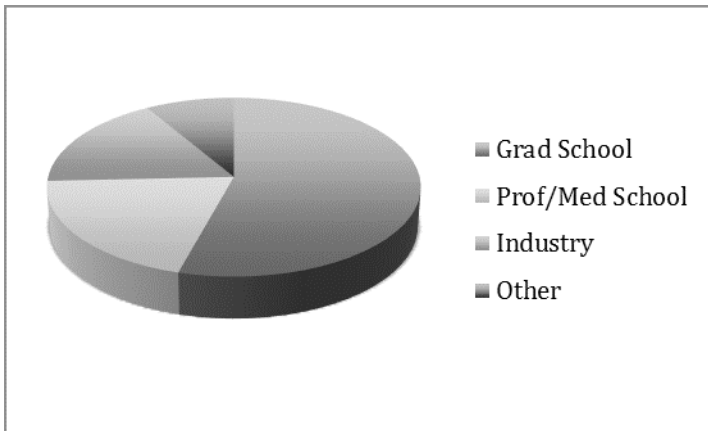
Figure 3. Immediate Career Plans of Undergraduate Students

Table 5

NOBCChE Student Self-Efficacy in STEM Data Summary

	Men (n=49)		Women (n=63)		t-test comparison	
	mean	st dev	mean	st dev	alpha	significance
Academic Ability	4.22	.74	4.03	.65	.153	No
Competitiveness	4.16	.94	3.90	.89	.143	No
Computer Skills	3.81	.85	3.63	.85	.267	No
Creativity	4.18	.83	4.05	.81	.388	No
Drive to Achieve	4.51	.77	4.54	.62	.826	No
Risk Taking	3.98	.95	3.87	.96	.557	No
Leadership Ability	4.31	.85	4.27	.70	.809	No
Mathematical Ability	4.22	.77	3.82	.85	.011	Yes
Compassion	4.37	.88	4.48	.74	.489	No
Self-confidence (intellectual)	4.22	.85	3.92	.83	.060	Borderline
Self-confidence (social)	4.10	.93	3.71	.92	.030	Yes
Self-understanding	4.41	.67	3.98	.79	.003	Yes
Critical Thinking	4.51	.71	4.14	.76	.010	Yes
Problem Solving	4.43	.65	4.25	.65	.159	No
ALL RESPONSES	4.25	.83	4.04	.83	.036	Yes

Table 5 gives the mean and standard deviation of each response for men (n=49) and women (n=63) separately, as well as a t-test comparison between gender groups for each variable. The overall mean response rating for men was 4.25 (SD=.83), compared with that of women 4.04 (SD=.83). Consistent with findings from other studies, men rated themselves higher than did women on every variable except compassion and drive to achieve. The highest-scoring attributes for men were critical thinking (mean=4.51), drive to achieve (4.51), problem-solving (4.43), and self-understanding (4.41). The highest-scoring attributes for women were driven to achieve (4.54), compassion (4.48), leadership ability (4.27), and problem-solving (4.25). Both men and women gave their lowest self-concept score in computer skills (men=3.81, women=3.63).

T-test analyses were run on each variable between the two gender groups, using a two-tailed test allowing for different variances (heteroskedasticity) between groups. Statistically significant differences between gender groups were noted for four variables, each favoring the men: social self-confidence (alpha=.030), mathematical ability (alpha=.011), critical thinking (alpha=.010), and self-understanding (alpha=.003). The variable intellectual self-confidence was borderline significant as well (alpha=.060). Men's overall self-concept rating on these fourteen variables (mean=4.25) was statistically significantly higher (alpha=.036) than that for women (mean=4.04).

The self-reported mean grade point averages for men (3.57) and women (3.53) were not significantly different (alpha=.82), indicating no observable differences in academic achievement at the college level. However, 44% of the women in the survey reported that they were the first in their family (FIF) n0n to attend a four-year university, as compared with 34% of the men, a borderline significant difference (alpha=.062). Thus, there may have been differences between men and women based not only on gender-related factors but also on familial academic experiences.

Conference Session Impact
Quantitative Data

Student participants were asked to identify and rate the sessions that they attended during the conference (Appendix A). A five-point

Likert scale was used with the following values: Not Helpful (1), Somewhat Helpful (2); Helpful (3); Very Helpful (4); and Extremely Helpful (5). Participants gave the conference an overall rating of 4.73 out of 5. The highest rated and highly attended sessions centered around career development topics, including Career and Academic Expo (4.73) and Careers in Academia (4.54). Also popular were scholarship and student-led sessions, including the STEM Weekend College Scholarship information (4.70) and the STEM Weekend College Student Panel (4.73), although these sessions had lower attendance than did the career-based sessions. Interestingly, the social media "boot camp" earned relatively low scores.

Written Comments

Participants were asked to briefly respond to the following two questions:

1. How helpful has this NOBCChE conference been for you?
2. How helpful has your association as a member of NOBCChE been for you?

A total of 54 students gave a written response to the first question and 29 to the second. Responses to both questions were extremely positive, with main themes centering on networking and career development. For example, more than half of the responses to the first question mention networking and/or the opportunity to talk with potential employers. Responses to the second question centered on coming together as a community of Black scientists, with several students referred to NOBCChE as feeling like "a family." Several students stated that participating in the conference was a "life-changing experience." The complete set of student participant responses to each question are given in Appendix B.

Summary and Further Research

This study examined the background, academic self-perceptions, and experiences of a predominantly African-American group of students attending a chemistry conference. This study drew upon the classical and updated frameworks of Bandura (1997, 2002; Pascarella and Terenzini, 1991, 2005; and Tinto, 1994, 2012). These seminal works describe in detail the factors affecting students'

choices to go and leave college in the context of their individual and collective experience. The current study builds on this framework to suggest that the factors impacting college behavior remain salient for students moving to the next professional level as well. Moreover, these effects are often pronounced for students who belong to a highly underrepresented group in the profession.

Not surprisingly, students in the study saw themselves as having strength and confidence in their academic abilities. Consistent with earlier findings (e.g., Ost, 2010), male students tended to rate themselves somewhat higher than did their female counterparts on most measures. Significant differences were observed for self-perceived mathematical ability, self-confidence, and problem-solving, despite no significant differences between men and women in self-reported grade point averages. Perhaps most importantly, the present study found evidence supporting Blair's claim (2012) that black women in science can be deeply influenced by both negative and positive experiences that occur both inside and outside the classroom, thereby underscoring the importance and impact of conferences such as this.

Written comments indicated that the most useful aspect of the conference was the opportunity to network with vendors, potential employers, and graduate school representatives. Some students indicated that coming to this conference actually had changed their professional lives. There was evidence of a strong sense of camaraderie among participants as persons of color who were emerging scientists. This is consistent with the findings of Griffith (2010) and Micari et al (2016). Moreover, the findings here suggest that the experience of being part of the national conference reflected many of the same dynamics of a college or university learning center setting that have a positive influence on student attitudes and achievement (Covington, et al, 2017). The present findings also help address concerns laid out by Wang and Rovner (2015) and Widener (2017) concerning how to buoy up the numbers of young black chemists going into university academic positions.

The current study also supports the findings of Webber and Ehrenberg's 2010 study, "Do expenditures other than instructional expenditures affect graduation and persistence rates in American higher education?" They state that:

Our most important finding is that student service expenditures influence graduation and persistence rates and their marginal effects are higher for students at institutions with lower entrance test scores and higher Pell Grant expenditures per student. Put another way, their effects are largest at institutions that have lower current graduation and first-year persistence rates. Simulations suggest that reallocating some funding from instruction to student services may enhance persistence and graduation rates at those institutions whose rates are currently below the medians in the sample. (p. 947)

The present study confirms that experiences such as this those documented in this conference are critical for the professional development of students of color. Specifically, money spent to send students to such conferences may be every bit as impactful as money spent in hiring an outstanding professor or adapting a new curriculum.

Given the evidence of the conference's impact on participating students, NOBCChE and other similar organizations may wish to continue to expand their influence at colleges and universities, including urban two-year colleges and comprehensive universities. We strongly encourage such organizations to continue to seek funding sources, including the NSF, other public and private funding organizations, and vendors to support more students at this conference. It also may be helpful to create a database of students attending the conference and update it each year for both current and former conference attendees. Information gathered could include variables presented in the current study as well as the professional trajectory of these students over time. These longitudinal data may also help document the impact of such conferences on participating students as well as provide further evidence for the importance of continued funding. The present study found that male students tended to rate themselves somewhat higher than did their female counterparts on most academic measures whether or not these were in fact true. Additional research might also focus on specific gender differences and the long-term impact of these activities for men

and women. In summary, further research may help to reveal the profound impact that these gatherings can have on students who have been traditionally underrepresented in STEM fields, including both the African-American student majority in this study as well as the seventeen percent of students who identified as other than African-American.

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Appendices

Appendix A: NOBCChE Conference Student Survey

Name_____   College/University_____

Email_____   Today's Date_____

PART I: STEM Background and Experience
1. Are you currently an undergraduate or graduate student?
Undergraduate _____   Graduate_____

2. What undergraduate or graduate major are you planning to complete?

3. What is the highest level of education you plan to attain?
Bachelor's Degree   Master's Degree   Academic Doctorate
Medical Doctor   Other

4. How likely is it that in the future you will continue to work in a career directly involving science, technology, engineering, or mathematics? Please circle one.
Not Likely   Somewhat Likely   Likely   Very Likely
Extremely Likely

5. Have you participated in a research project?
Not at all_____   A little_____   A lot_____

6. Have you participated in an internship program?
Yes_____   No_____

7. How involved in school-related activities at your college/university have you been?
Not Involved   Somewhat Involved   Involved   Very Involved
Extremely Involved

8. How much personal or academic support have you received from your family this past year?
No support   Very Little Support   Some Support Lots of Support   Incredible Support

9. How much personal or academic support have you received from your college/university friends this past year?
No support   Very Little Support   Some Support Lots of Support   Incredible Support

10. How much personal or academic support have you received from faculty/advisors this past year?
No support   Very Little Support   Some Support Lots of Support   Incredible Support

11. Were you, or will you be, the first person in your family to go to a four-year college/university?
Yes_____   No_____

12. As best you remember/know it, what is your current overall college GPA?   Please circle one.
Below 2.0   2.01-2.49   2.50-2.99   3.00-3.29   3.30-3.49
3.50-3.69   3.70-4.00

13. Are you currently receiving financial aid?
Yes_____   No_____

If so, about how much in financial aid from all sources (not including your family) will you receive this year?
$0-3,000 $3001-6,000 $6,001-9,000 $9,001-12,000 $12,001-15,000 $15,001-18,000 $18,001-21,000
More Than $21,000

14. Are you currently involved in another NSF program such as STEP or LSAMP?
Yes_____   No_____

Please answer questions 15-18 only if you are an undergraduate. If you are a graduate student, skip to Part II.

15. Are you currently attending a two-year or a four-year college/university?

Two-year_____   Four Year _____

16. Were you, or do you plan to be, a transfer student to a four-year college/university?

Yes_____   No_____

17. What do you plan to do immediately after graduating from college?

Graduate School   Prof./Medical School   Work in Industry

Work in Med. Field   Other

18. How likely do you think it is that you will successfully be admitted/employed in this capacity after graduating? `

Not Likely   Somewhat Likely   Likely   Very Likely

Extremely Likely

PART II: Experience at the 2017 NOBCChE Conference

Please put an X (under "Attended") next to any of the sessions/activities that you went to and then rate the session. If you did not attend a session leave that rating blank.

		Not Helpful	Somewhat Helpful	Helpful	Very Helpful	Extremely Helpful
OVERALL CONFERENCE RATING		1	2	3	4	5
STUDENT DEVELOPMENT	Attended					
1. Conference Overview		1	2	3	4	5
2. Giving Presentations		1	2	3	4	5

	Attended	Not Helpful	Somewhat Helpful	Helpful	Very Helpful	Extremely Helpful
3. Resume/Mock Interviews		1	2	3	4	5
4. Grad Lab		1	2	3	4	5
PROFESSIONAL DEVELOPMENT	Attended					
1. Social Media Boot Camp		1	2	3	4	5
2. Hard & Soft Skills		1	2	3	4	5
3. Nailing the Interview		1	2	3	4	5
5. NIST Symposium		1	2	3	4	5
6. Financial Literacy		1	2	3	4	5
7. Forensics Workshop		1	2	3	4	5
8. Careers in Academia		1	2	3	4	5
TECHNICAL SESSIONS	Attended	Not Helpful	Somewhat Helpful	Helpful	Very Helpful	Extremely Helpful
1. Analytical Chem Sep and Char		1	2	3	4	5
2. Biochemistry & Chemical Biology		1	2	3	4	5
3. Computational Chemistry		1	2	3	4	5
4. Green Chemistry & Engineering		1	2	3	4	5
5. Catalytic/ Synthetic Chem & Eng I		1	2	3	4	5
6. Bio-Inspired Materials		1	2	3	4	5
7. Biochemistry		1	2	3	4	5
8. Engineering - Process and Chemical I		1	2	3	4	5

9. Organic Chem Synthesis		1	2	3	4	5
10. Polymers and Nanoscience		1	2	3	4	5
11. Biochem, ChemBio, and BioEng		1	2	3	4	5
12. Chemistry: Pharmacology		1	2	3	4	5
13. Nanoscience		1	2	3	4	5
14. Analytical Chemical Characterization		1	2	3	4	5
15. Engineering - Process and Chemical II		1	2	3	4	5
16. Medicinal Chemistry		1	2	3	4	5
17. Catalytic/ Synthetic Chem & Eng II		1	2	3	4	5
18. Regenerative Engineering		1	2	3	4	5
PROF. TECHNICAL SESSIONS	Attended	Not Helpful	Somewhat Helpful	Helpful	Very Helpful	Extremely Helpful
1. Univ Scientists & Their Advancements		1	2	3	4	5
2. Recent Advancements in Gov Research		1	2	3	4	5
OTHER SESSIONS	Attended					
AAAS Fellowships		1	2	3	4	5
Career and Academic Expo		1	2	3	4	5

STEM Weekend Ice Breaker		1	2	3	4	5
STEM Weekend Science Fair		1	2	3	4	5
STEM Festival and College Fair		1	2	3	4	5
STEM Weekend College Scholarship Info		1	2	3	4	5
STEM Weekend College Student Panel		1	2	3	4	5
NOBCChE Chat and Chew		1	2	3	4	5
Science Bowl		1	2	3	4	5

Part III: Background Information

1. What is your current age?

2. What is/are your ethnic affiliation(s)? Circle all that apply.

African American/Black   Asian American/Asian
Hispanic/Latino/a   Native American/Pacific Islander
White/Anglo   Other

3. What is your gender?
Male_____Female____ Other____

4. What is the highest level of formal education obtained by your parents? Mark one in each row.

	Middle Sch. or less	Some High School	High Sch. Grad.	Postsec. school other than coll.	Some college	Bachelor's degree	Some grad. school	Graduate degree
Mother								
Father								

5. What is your father's occupation?_____

6. What is your mother's occupation?_____

7. Please rate yourself on the following traits compared to the average person your age. Please provide the most accurate estimate of how you see yourself. Mark one answer for each trait.

	Far Below Average	Below Average	Average	Above Average	Far Above Average
Academic Ability					
Competitiveness					
Computer Skills					
Creativity					
Drive to Achieve					
Risk Taking					
Leadership Ability					
Mathematical Ability					
Compassion					
Self-confidence (intellectual)					
Self-confidence (social)					
Self-understanding					
Critical Thinking					
Problem Solving					

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY!

Appendix 2: Students' Written Comments

1. How helpful has this NOBCChE conference been for you?

- I appreciate all the help NOBCChE has provided for me.
- NOBCChE helped me connect with scientists doing similar work that helped me move my work forward.
- Maybe have more information about international students.
- I came primarily for the career fair.
- It is unique from other conferences I attend and is helpful.
- It would be nice to know what companies are doing onsite interviews.
- I loved the conference. The science bowl is great at creating the scientist for our future.
- Great opportunities for networking and collaboration.
- This meeting has been very informative. I learned technical skills in job interview, new methodologies in my research and also broadened my network.
- Highly recommended, will want lower class undergraduates to attend.
- First time, extremely helpful with networking.
- I've done a ton of networking.
- More exposure to career opportunities through networking, academics, government, and industrial employers.
- Explaining a brief overview of each session's topic would help.
- I got to interact with representative from national labs, which allows me to consider them as future career opportunities.
- Great networking for grad school.
- Extremely helpful. I am a sophomore. I learned how to work on poster presentation, professional resume, Linkedin profile. I connected with prospect internship/summer research companies, and four-year universities to transfer in spring 2018.
- First conference I have attended, encouraged to keep attending other conferences including ACS.
- Exposure to current research trends and networking activities.
- Dr. Laurencin is my hero now!!
- This has been an awesome experience! Thanks.
- Eye opening on intelligence level, social skills, networking, etc.

- Meeting Cargill representative and technical talks related to my research.
- I have enjoyed connecting with professionals from companies that don't recruit in my state, as well as having exposure to new science organizations previously unknown to me.
- Interactions, inclusive environment, new and interesting information.
- Great networking opportunity, opportunity for young presenters.
- Keep it up.
- The workshops, technical presentations, and especially the networking.
- This conference has incredible amounts of useful info regarding industry positions.
- Networking opportunities are amazing.
- Great conference!
- Great opportunity to meet important scientists, and view their works.
- Networking opportunities have been excellent.
- Great conference for networking (esp. NIST scientists). I wish there were more talks on atmospheric chemistry.
- I was able to network and connect with students and professionals.
- Please include more useful information and opportunities for international students in careers/academics.
- NOBCChE enables me to connect with colleagues from other institutions.
- Excellent talks, perfect size, amazing network.
- It is great to get a network of brilliant people who look like me and care about same issues.
- Amazing! I have made a large advancement for my career.
- Very helpful for my professional development. Does not inherently peak my interests as a physics major.
- I thoroughly enjoyed the conference.
- The Advancing Science Award helped me get back connected after 3 years away.
- Great conference! It was my first and I will be back. Great networking and technical sessions.

- I would love to be able to come back again! Very amazing, helpful, and inspiring.
- THANK YOU THANK YOU!!
- Fantastic; very helpful.
- Best conference I've ever attended.
- The conference has been a great help in my search for a post-doc. I have had the opportunity to network with several professionals and post-docs.
- I learned a lot from this conference. Thank you!!!
- This is my 2nd NOBCChE. I appreciate all that NOBCChE has done in addition to allowing me to bring my daughter with me to inspire her.
- Great experience.
- Networking and opportunities are unmatched by other conferences.
- I have built a network of support from attending every NOBCChE conference since the 40th in Indianapolis.

2. How helpful has your association as a member of NOBCChE been for you?

- I love NOBCChE! It's a great organization filled with love and support from other black scientists.
- Recently new member.
- I now volunteer time to help with the planning of the conference.
- As a member of NOBCChE, I have had the opportunity to attend conferences and have leadership roles within the organization.
- Recently joined.
- Giving confidence needed to move forward with my goals.
- It helped me get into the conference; I am a brand new member.
- Kept me uplifted over the years during my PhD.
- We need to get our chapter more active; I will now help.
- Just recently became a member, but I anticipate it being very helpful.

- Given me the opportunity to attend my first conference which has been eye opening.
- Having the opportunity to be a president of my chapter has allowed me to help develop our chapter and my leadership skills.
- I am a relatively new member, so I am still getting to know the organizations and find ways to get involved.
- I feel like I'm entering a family.
- Became a member less than a month ago.
- The network provided is super reassuring.
- It has allowed me to reconnect with such a valuable community.
- Very grateful to be a part of this organization.
- The website largely benefits those who have a career or PhD in a science related field. The job postings are not entry-level friendly.
- It helps me to make networking and understand its importance.
- I love the family feel; connecting with people.
- I've had great opportunities.
- I have been able to connect and learn from people of various fields in STEM, advance my research potential.
- NOBCChE is small at my home institution.
- I've been able to grow my network while at the same time becoming more involved in science outreach activity all because of being a part of NOBCChE.
- Helped with REU's and awards.
- I just joined so I'm still evaluating.
- Boosted my confidence to become a graduate female engineer networking with other graduate minority scientific females.
- I have received help to attend the conference but have not utilized many other resources that may be available, if any.

Students as Colleagues: A Paradigm for Understanding Student Leaders in Academic Support

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Abstract

The authors call for a paradigm shift away from thinking of student peer educators as junior employees and toward thinking of them as colleagues, capable of many higher-order responsibilities and duties. Our services become more learner-centered when we fully engage peer educators in our work – not just in the delivery of services, but in program development, assessment and evaluation, outreach, peer training, and research. The authors suggest that this paradigm is central to the work practitioners do in the field. Moreover, implementing this paradigm is a way of conceptualizing our own work and profession, not an add-on to our work.

Introduction

The authors of this paper share a belief in, and practice of, treating student peer educators as colleagues, capable of many higher-order responsibilities and tasks. When we refer to peer educators as colleagues, we do not suggest that they work the same hours, receive the same pay, or have the same responsibilities we do. Rather, we choose to understand peer educators as colleagues who may have expertise in areas that we do not, who have experiences that we will not and cannot have (e.g., being a college student today), and whose perspectives are valuable and worthy of consideration.

We call for a paradigm shift away from thinking of students as junior employees, restricted to direct service provision, and toward thinking of students as colleagues, capable of leadership and innovation, and qualified to take on complex projects often

reserved for full-time staff members. If we give students intentional professional, cognitive, and psychosocial development opportunities (which call for the right paradigm on our parts) and balance structure and accountability with room for creativity and innovation, students can thrive in roles that look, in many ways, like our own. We should count this as a success and an advantage. We are not diminishing our own work as full-time professionals or endangering our jobs in recognizing students' capabilities. We are building sustainable programs that validate the unique contributions student-colleagues bring to the provision of academic support services.

In the vignette below, Anna Sharpe describes one of her experiences of this philosophy in practice. Though the narrative is her own, we have all had similar experiences with very talented, committed students making meaningful contributions to academic support in higher education. It is, in part, because the authors have so many of these stories that we have decided to start a conversation meant to center our practice on students as contributors to our programs and services.

"I think a lot about what my role as a professional in higher education—part developer of students, part coordinator of programs—should look like. If I imagine myself on my best days, I am turning conduct meetings into teachable moments, making informed decisions about programmatic concerns based on experience and good judgment, and advising campus partners and administration about best practices in my area of expertise. Key to my duties is also providing meaningful professional experiences for my student colleagues and leveraging their strengths to build a stronger department. As student developers, we give the students with whom we work job-related training, but, more importantly, we develop them as scholars, professionals, and adults. We know they are competent and responsible, and feel a great sense of ownership of the programs they help run. However, as we think about our work in the ways I described above, there is a strange and inconsistent shift in our thinking. We come to believe that perhaps students can provide great tutoring or be great study strategy consultants, but they cannot conduct disciplinary meetings, create departmental policy, or be deployed to advise faculty on matters of student support. In this

article, we argue that student colleagues can and should contribute to higher-order efforts like these, that they have something unique to contribute to our field, and that their work merits the same kind of attention our own contributions do.

Perhaps an example is in order. In September of 2014, two major things happened in my life: my first child was born and the program for which I was responsible at the time opened a second location in a new building I helped design. The construction of the space cost the university well over $2 million USD, and the highly-visible project—in a highly-visible space on campus—needed to be a success from the beginning. Important as this grand opening was to the institution and my department, I couldn't be there—not for the opening, not for the creation of the large schedule of over 120 tutors, not for the leaky pipes or falling ceiling tiles or malfunctioning technology. I was home with a newborn. Who planned the grand opening, created a highly-complex schedule, and oversaw the completion of construction? A group of six highly-committed, well-trained, very capable veteran student colleagues. We had planned for this—talked about what the opening should be like, strategized how to make decisions about the schedule, went over contacts for the construction company. They were my colleagues and they could pick up where I left off.

In providing these students with the guidance and supervision they needed to be able to rise to the challenges of complex, professional work in higher education, I had given them meaningful professional experience while creating a stronger department that not only survived but thrived in my absence. Our student colleagues are capable of this kind of work and derive great benefits from it, as do our departments."

In this article, we begin by examining the current or traditional paradigm used in academic support to make sense of how we work with students. We acknowledge that the use of this paradigm, as pervasive as we find it to be, may often be an unconscious choice. We then propose a shift to a new paradigm in how we, as learning support professionals, interact with peer educators, the student-staff with whom we work so closely.

Current Paradigm for Peer Educator Roles and Contributions

Throughout this article we use the term "peer educator" to encompass student-staff in leadership roles in academic support on our campuses. When employed here, this term functions as an umbrella that includes a variety of student roles, specific examples of which include peer mentors, learning community assistants, peer tutors, and peer coaches (see Latino and Unite, 2012, and Hamid and VanHook, 2001, for an overview of the roles peers play in academic support settings). While there are many similar student roles across the entire field of student affairs, the authors' professional experience in the academic support and student success subfield informs the research, examples, and vignettes offered here.

Research into the role of peer educators in academic support settings in higher education has traditionally focused on the positive influence of near-peer learning on the students using services and on the peer educators themselves (see, for example, Arco-Tirado, Fernandez-Martin & Fernandez-Balboa, 2011; Colvin, 2015; Heys & Wawrzynski 2013; Latino & Unite 2012; De Rijdt, van der Rijt, Dochy, & van der Vleuten, 2012), but there is scant information about peer educators' broader impact on the academic support profession. Additionally, there exist very few meta-analyses on peer educators in higher education, with works by Topping (1996) and Falchikov (2001) as the most comprehensive reviews. More recently, Burgess, McGregor, and Mellis (2014) conducted a systematic review of peer educator research within medical schools and focused on the experiences of the peer educators themselves. All three reviews cite ample evidence of the benefits peer educators perceive from their involvement in peer-based learning programs, most notably, increased knowledge of academic material and improved skills in transferable areas such as leadership (Falchikov), metacognition (Falchikov, Topping), and professionalism (Burgess et al.).

If we look at the benefits of peer educators for students receiving services, we find more support in the literature for greater gains in students' transferable skills than in their academic performance. Both Topping (1996, 2005) and Falchikov (2001) note that students participating in some peer-based programs demonstrate increased academic achievement, but such gains are not standard

across all peer-based programs. Worth noting, however, is Leung's (2015) meta-analysis of peer tutoring from kindergarten through post-secondary, which concluded that peer tutoring had a positive effect on tutees' academic achievement. The research in higher education more commonly highlights gains in metacognitive skills and improved attitude towards the subject material (Falchikov 2001; Topping, 1996; for specific case studies with similar findings, see Arco-Tirado et al., 2011; Nelson et al., 2013). Both Topping (1996) and Nelson et al. (2013) speculate that students' increased motivation may be due in part to the experience of receiving help from fellow students rather than from a figure with greater perceived authority, such as teaching staff.

Peer educator-based academic support programs can provide students with more personalized support, such as in small-group peer tutoring, or the more formal Supplemental Instruction model. The literature on peer educators in health education supports this supposition through research indicating that peer educators, particularly in clinical settings, enable students to receive more individualized attention than would be possible without them (Evans & Cuffe, 2009; Power, Miles, Peruzzi, & Voerman, 2011; Secomb, 2008). This ability to provide support that identifies and targets specific gaps in learning is an apt example of what a peer educator can do very naturally that may be difficult or impossible for a staff professional to replicate as they are further removed from initial exposure to the material.

Beyond benefits to individuals, peer-based academic support programs provide advantages to the institutions that support them (Shook and Keup, 2012). Topping (2005), Falchikov (2001), and Shook and Keup (2012) mention the cost-effectiveness of peer educator programs, but none of these authors explains at length how savings are realized (See Hamid and VanHook, 2001 for case study-level information about cost-effectiveness). Another major institutional benefit to peer-based academic support programs is the creation of valuable opportunities for students beyond the first year, allowing for meaningful leadership and engagement opportunities as students continue their academic careers (Shook and Keup 2012; Astin, 1999). Additionally, peer educator roles amount to valuable

leadership positions for students as they continue at their institutions. Finally, institutions may realize gains in student retention and persistence, as well as the closing of achievement gaps, as a result of implementing and supporting peer-based academic support programs.

The authors' personal knowledge includes many examples of peer educators in campus leadership roles, offering informed student opinions on committees and serving on cross-campus educational initiatives. However, there is relatively little information in the literature about the influence peer educators exert on their institutions through such roles. Shook and Keup (2012) extol the impact peer leaders can have on institutions' abilities to accommodate large numbers of students, provide important feedback, disseminate information to campus through existing networks, and shape the experiences of potential and new students. Likewise, a few case studies (see, for example, Huang et al., 2013, Power et al., 2011, and Magyar et al., 2011) mention that peer educators provide a link between teaching staff and students, serve on committees, and contribute to curriculum development. These observations are supported by much of the literature on students as partners in the research enterprise (see, for example, Healey, 2005), but there seems to be little research on peer educators specifically outside of case-based, qualitative studies on this issue.

While this research does help explain the kinds of impacts peer educators have on students, it tends do so in a vacuum. These studies rarely consider larger programmatic differences, account for differences in approaches by the professionals who lead them, or move beyond a case-study level of analysis. Though they are still useful in creating campus-based programming, the research around the impact peer educators have on students too often fails to consider how the peer educator roles themselves are constructed. This is a substantial variable and suggests that the field needs to develop models for understanding peer educator roles and the broader impacts they have.

Thus, what is largely absent in the literature is an understanding of the impacts peer educators have on the programs they coordinate, the professionals with whom they work, and on the field of academic

support. We find ample evidence in the literature about how the role of the peer educator influences the students within that role and influences the students who access academic support services, as well as anecdotal evidence about the influence of peer educator programs or of individual peer educators on institution-wide or program-wide endeavors. However, nothing regarding the influence of peer educators on their supervisors, who reside at the very core of establishing, maintaining and developing peer-based academic support programs, exists in the current literature. We hope this article will initiate a paradigmatic shift in our field by beginning a discourse about the impacts of student colleagues on their supervisors and the academic support field.

A Theoretical Framework for Understanding Peer Educators

The peer educator programs we have worked in vary in their connections to the theories that undergird peer-to-peer learning. The Peer Tutoring Program at the University of Kentucky was conceived and rooted in the specific conceptual tradition of social learning and its inextricable connection with student development, as espoused originally by Vygotsky (1978). The Learning Commons Peer Helper programs at the University of Guelph have incorporated phenomenographic approaches to student learning, such as those initially addressed through Marton and Saljo's (1976) work on deep and surface learning, and the notion of communities of practice (Lave and Wenger, 1991) into the role of peer educators in understanding students' contexts and motivations for learning (Schmidt & Kaufman, 2005). Despite differences in programming models and theoretical foundations, we find connections among the theoretical lenses through which we make sense of the work we do and the impacts we, as scholar-practitioners, and our students, have on each other.

The social learning theory that emanates from Vygotsky's work in the early twentieth century teaches us that learning and development are inextricably intertwined, literally that one cannot happen without the other. Relevant to our work with peer educators is the assertion that social interaction is required to incite learning and development (Vygotsky, 1978). Further exploring the role of

social interaction in these processes, Rogoff's (1990) work around cognitive apprenticeship demonstrates that social interaction around learning and development is both bidirectional (i.e., all involved are impacted) and a process of cultural construction. This suggests that our work with peer educators has widely-varying, direct impacts on professionals and the culture of the field that we all construct together.

The phenomenographic approach to learning acknowledges the contexts which students bring to their work, and that students adopt different approaches to learning based on their motivations, prior experiences with learning, and perceptions of their courses and instructors' expectations (Marton and Saljo, 1976; Trigwell, Prosser & Waterhouse, 1999). While this research focuses on the student as learner, the role of peer educators within academic support models emphasizes the contextual nature of learning and recognizes that peer educators, as students themselves, have adopted a wide array of learning approaches and can empathize and connect with students who are "in the trenches" of learning in a specific course or discipline.

We also understand our work with student peer educators as participation in a community of practice (Wenger, 1998). When we involve students in our work, we are initiating a process through which they become members of our community of practice through an apprentice-like process described as "legitimate peripheral participation" (Lave and Wenger, 1991). Essentially, newcomers become members by participating in tasks that are simple and low-risk, yet still contribute to the community's goals. Through these activities, they become increasingly familiar with key aspects of the community, and gradually their contributions become more important to its functions. Understanding students as part of our community of practice provides a lens through which we can evaluate the reciprocal processes of teaching and learning that take place between students and professional colleagues in higher education. If we acknowledge our student colleagues as partners in our work with a skillset and expertise that we do not have, then we must also reflect on what and how they teach (or develop) us.

Students as Colleagues: A New Paradigm

There is little literature exploring the impact of peer educators on student support professionals; thus, many of the observations in this section come from our own experience and that of our colleagues. We acknowledge at the outset that research is needed to understand these interpersonal professional relationships, the cultures they construct, and the impacts of how we, as professionals, conceptualize the peer educators who work so closely with us.

Regardless of the need for this research, our call to the field is clear: students who serve in peer educator roles make immense contributions to our work, our campuses, and the field. They are capable of extraordinary things, and they bring experiences and expertise to the work that we as professionals do not and cannot possess. As such, we call for a new paradigm, wherein professionals conceptualize student peer educators as colleagues. While they should not reasonably be expected to perform the same roles as professionals, the level and quality of the contributions they can make, and the dedication with which they approach the work, demand our respect - recognizing them as partners in our work, equal members of our community, and experts in their own right.

Redefining Professional Expertise

The identity of any profession is based, in part, on expertise and credentials. For academic support professionals, in what is a relatively new area in higher education, the notions of expertise and credentials may be more fluid or flexible than in more established roles. Within the students as colleagues paradigm, students are not only clients and the recipients of services; they are considered to possess expertise which, though different from that of practitioners, is equally valid. This both challenges and expands boundaries of what constitutes professional expertise.

Because few graduate or professional programs in academic support exist in North America, many academic support professionals begin their careers with a foundation of graduate education and experience in a related area, such as tutoring, teaching, or counseling. Once on the job, learning from practice is a major component of professional development. Knowledge of relevant theories also plays a key role in informing what we do and how

we do it. Since academic support is a relatively new field in higher education, without clearly established graduate preparation programs, many academic support departments hire practitioners who bring with them wide-ranging combinations of credentials, skills, and experiences. Situated in a field that values diverse backgrounds, we argue that our profession is ripe to value the student experience as another qualification that makes practitioners, student or otherwise, uniquely qualified.

Within the students as colleagues paradigm, peer educators' lived experience as current students is often the primary source of knowledge they draw from to perform their duties. When we train our peer educators, they filter that training through the lens of their lived experience, and compare, validate, and assess it relative to their own perceptions and perspectives as a learner. The lived experience of students is thus a different, but equally valid, source of expertise, and one which is difficult for staff to replicate. One challenge for us is to enable our peer educators to mobilize this tacit knowledge embedded in their experience by enhancing their metacognitive awareness and ability to reflect and learn from their experience (Cox, 2005).

Redefining Learner-Centeredness

Many of us claim that our services are learner-centered, but for staff whose only contact with students is trying to meet their needs as clients, that claim may be limited. Our understanding of students is even more limited if we work within the "medical model" in which we "fix" their learning issues by bestowing knowledge and skills on students. While few now intentionally adopt such a model, its legacy can still be felt when our work is solely or mostly shaped by interactions with students who come to us because of a perceived gap or problem in their learning. When we work with peer educators, we are surrounded by students who have chosen to seek out experiences that will help them develop skills in teamwork, leadership, and other areas. In the authors' experiences, our interactions with student colleagues have helped us develop a more holistic view of all students. We are less likely to work within the expert-client dichotomy, and more likely to adopt a mentor-mentee approach, or, in Hilsdon's (2014) terms, to work "alongside" rather

than "with" students. We recognize that this shift in conceptualizing how we work with students represents a choice to refute traditional power dynamics that have long existed in higher education.

Our services also become more learner-centered when we fully engage peer educators into our work – not just in the delivery of services to students, but also in program development, assessment and evaluation, outreach, peer training, and research. We believe that it is, in fact, difficult to claim authentic "learner-centeredness" if students are only at the center of receiving services and not at the center of developing them. When we empower our student colleagues to see themselves as learning specialists, both by helping them to mobilize their lived experience and by enabling them to develop services, we must share some of our own authority.

Shifting some of the power from "professionals" to those who are also "clients" can influence not only how we think about students, but also how we conceptualize our role within academic support. Are we teachers? Mentors? Trainers? Supervisors? Counselors? Coaches? Our colleagues in Australia and the U.K. have explored issues of identity and role definition within the academic support profession, specifically as we relate to teaching faculty, instructional support staff, and the institution as a whole (see, for example, Catterall, 2003; Gibbs, 2009; Jones, Bonanno and Scouller, 2001; Percy, 2014; Samuels, 2013). We propose that the students as colleagues paradigm forces us to extend our conceptions of roles and identity even further. We believe that this paradigm is as fundamental – if not more so – to our conceptualization of our profession, as our relationships and collaborations with other professionals at our institutions.

Addressing Ephemerality and Precarity

It is critical to acknowledge the relatively short time we are able to work with any particular peer educator. The nature of our field means that our student colleagues are transient. Similarly, we understand that our students are constantly engaging in other endeavors on our campuses. Thus their lives as college students do not afford them the ability to focus on the work the way we, as professionals, are able to.

However, the nature of peer educator roles also means that students often have broad, holistic and immediate experiences and

understandings of what it means to be a student today. This is a particular expertise that we cannot adequately develop and maintain. In order to capitalize on this expertise, we have to be willing to listen and to understand that student culture changes rapidly. What was attractive to and worked with students two or three years ago may no longer be relevant.

Situating the Paradigm as Central to the Work

Just as we envision our peer educators' roles as a trajectory of continual development, we also consider our work to be in constant motion. Working with students as peer educators has helped us reconceptualize our work, not as a linear path with an end goal of creating an "ideal" program, service, or department; but as a part of campus culture that is continuously evolving. Put simply, acknowledging and learning from peer educators as we would other colleagues has changed us and our work for the better.

Finally, in calling for the consideration of this new paradigm, we also feel it is important to situate this understanding of peer educators in the larger field of the work we do in higher education. Based both on our experiences and on the literature, we recognize that when professionals are attentive to their interactions with peer educators, they create more intentional and more informed programming. As a result, we suggest that this paradigm of students as colleagues is central to the work practitioners do in the field. Moreover, implementing this paradigm is a way to do the work, not something done in addition to, or separate from, the work.

The Paradigm in Practice

Working within the students as colleagues paradigm shapes the work of academic support professionals in a number of ways. In this section we provide some concrete examples, drawn from our programs, of what this looks like in practice. Further along, we hypothesize about the impact of the paradigm on staff and the profession.

The Power of Language

Many in the field of academic support are accustomed to thinking of students as the recipients of the services we provide. One of the challenges of the paradigm shift is changing the way that we,

and our colleagues, conceptualize the roles that students can play in our services. What nomenclature we give our peer educators is one of the primary means of communicating, framing, and positioning their role. When choosing what to call peer educators, it is important to be cognizant of the significance of naming in power relationships and forming identities:

> The power which comes from names and naming
> is related directly to the power to define others—
> individuals, races, sexes, ethnic groups. Our identities,
> who and what we are, how others see us, are greatly
> affected by the names we are called and the words with
> which we are labelled. (Bosmajian, 1983, p. 3)

Every term is laden with assumptions, precedents, and other baggage. When it comes to the students with whom we work, the terminology challenge is exacerbated by the current diversity in the ways we refer to peer educators. "Tutors," "peer helpers," "paraprofessionals," and "coaches" are but a few examples. One of the most compelling features of the program at the University of Kentucky (UK) is their use of the terms "professionals" and "colleagues" for their student colleagues. By removing any qualifying terminology, UK is making a clear and profound statement about the nature of their peer educators' work, and the nature of their relationship with their peer educators. We recommend that careful consideration be given to the choice of terminology used for peer educator programs, and that the terminology chosen intentionally reflects the paradigm adopted for the program.

The Hiring Process

What we call our peer educators is one of many facets of how their positions are conceptualized and designed, and how this is communicated to campus stakeholders and the peer educators themselves. A program's design and conceptual framework are also communicated both explicitly and tacitly through hiring processes.

This communication goes well beyond what you say and how you say it. A hiring process in which students must submit a resume and cover letter and participate in an interview suggests an approach similar to the hiring of non-student staff. Where this process is

also competitive, the notion is reinforced that specific qualities are being sought in applicants, that the work is important, and that the qualifications sought through the process will have a direct impact on the programs and services with which the student works. This helps to support the credibility of the student colleagues and protect the integrity of the program.

The role of peer educators in important decision making is also communicated by the active and visible participation of current peer educators in the hiring process, such as conducting interviews, completing applicant evaluations, and having a voice in the selection of new peer educators. Equipping students with the skills to be strong interviewers and competent decision-makers takes training and development, which is a foundational part of bringing students into our communities of practice.

Training and Development

Students have intimate knowledge of campus culture and student life, and many of them bring skills and experiences that make them valuable parts of our teams. However, these talents cannot fully equip them to be student colleagues in our departments. Institutional inner workings and history, best practices specific to programs and services, and theories and principles undergirding departmental missions and goals are all things that we, as higher education professionals, must learn as we settle into our own jobs. Our student colleagues need the same foundation on which to build. As we provide orientation, training, and professional development to these colleagues, we need not restrict it to task-based training. Introductory sessions should ingrain in student colleagues the philosophies that inform what we do and how we do it. That foundational knowledge empowers and equips students to make decisions and judgment calls. Often those decisions and judgment calls are imbedded in the day-to-day operations of our departments in ways we may not recognize until we delegate them to students. For example, helping student colleagues understand what it means to be a department working without a recurring budget equips them with the knowledge they need to develop a system for scheduling tutors that is fiscally responsible and defensible to administrators. There will be a hundred small decisions and judgment calls inherent in that process,

but armed with the institutional and departmental history they need, they are capable of making most decisions independent of full-time staff members. As for the inevitable uncertainties and need for more advanced skills as students take on more responsibilities, these are fertile ground for student colleagues' professional development through meetings and trainings.

Take as another example the always-tough decisions about what is included in (and excluded from) training sessions. Often held annually or biannually, the brief time we get to train and develop our peer educators is precious. Delegating planning and executing training to student colleagues would necessarily mean walking them through the research, principles, and practices that inform training and developing peer educators. After gaining a working knowledge of Kolb (2014) and Vygotsky (1978) and reading well-selected book chapters and journal articles, they feel able to make good decisions about what their peers need to know.

The ability and confidence to make decisions is critical to the paradigm shift for which we are advocating. Because decisions are so imbedded in the coordination and provision of programs and services, we cannot more fully include student colleagues in our communities of practice until we equip them to take on higher order responsibilities and empower them to make decisions. Thus, our student colleagues' abilities to take on new and increasing responsibility are dependent on our willingness to equip them with the foundational knowledge they need to make decisions confidently and competently.

Student Colleagues' Contributions Outside of Service Provision

Student colleagues who have been provided with intentional training and development are capable of amazing work—much of which could not be replicated by full-time staff members.

Marketing and outreach. Raising awareness of services is an ongoing challenge for many academic support practitioners, and an area in which few have any formal training or expertise. Peer educators can be engaged in these activities at several levels. At a minimum, they can provide a critical student perspective on promotion and outreach. Their feedback on specific strategies and the visual design of materials provides the perspective of a key target group.

As an in-house, readily available "focus group" with which to share and generate ideas, we can further leverage peer educators' tacit knowledge of their own preferences, their peer groups, and the institution's particular student culture, to assist with the conceptualization and strategic planning of promotion and outreach, ranging from deciding which groups to target, to when and how to promote services, to what the latest social media craze is. Peer educators experienced in utilizing social media platforms can reach students with nuanced messages tailored to the specific customs and cultures of these digital spaces. Peer educators with marketing, public relations, graphic and web design, or communications backgrounds may be especially adept at outreach and promotional tasks, and the experience they acquire promoting campus programming can serve them well in other academic and career pursuits. When we play to these strengths, students develop their portfolios, and they also develop the programs and services offered by their departments.

Assessment. Student colleagues' unique positionality as students also enables them to make unique and impactful contributions to assessment. They have intimate knowledge of the student experience that most professionals lack, enabling them to provide very grounded analyses of quantitative and qualitative assessment data that provide context to potentially confusing findings. When we utilize member checking as a method to validate the interpretation of qualitative and quantitative data, our peer educators fulfill a vital role as members of the student body we are seeking to understand (Carlson, 2010). Additionally, if departments are tapping the potential of students from various disciplines, many of them have skills we may lack. Economics students can analyze quantitative data; students of English can analyze focus group transcripts; and marketing students can conduct focus groups. Incorporating students in such efforts helps us ask the right questions and conduct a thorough, grounded analysis that accurately reflects and contextualizes the data.

Program design. Program development and design is another area in which our student colleagues can play a vital role. At the University of Southern Ontario, student colleagues have been instrumental in changing the ways in which some academic support

programs have been provided. As students, they are attuned to the ever-shifting needs of their cohort and can give professional staff valuable feedback about students' perceptions of programs. From small changes – such as renaming a service or changing the time when a service is offered – to larger changes, such as proposing a brand new program – our student colleagues are capable of providing not just suggestions, but leadership, in our work.

Supervision and leadership. Finally, as students gain experience and expertise from on-the-job training, calling upon them to serve as supervisors and leaders within the program is a logical extension of the meaningful work they already do. Veteran student colleagues have intimate knowledge of our programs and services, firsthand experience of student life, and significant "on the job" experience as peer educators. Who, we may reasonably ask, could possibly make a better direct supervisor for new student colleagues? This question becomes all the more pressing when we remind ourselves that the effectiveness of peer-to-peer support extends into the workplace as well. Student supervisors are often mere months away from losing "student" as a qualifier within whatever job title they occupy. After they graduate, employers will trust them to issue loans, manage finances, perform medical procedures, and educate children. Certainly, after having proven themselves as competent peer educators, we can entrust to them key parts of departmental operations.

Challenges to Operationalizing the Paradigm

Treating students as colleagues develops their skills and abilities and allows departments to improve programs and services by leveraging those skills and abilities, but there are significant challenges to operationalizing the students as colleagues paradigm.

Students only work as peer educators part time. Students can't handle highly sensitive issues. Students can't be trusted to maintain confidentiality. Students have multiple, competing priorities. Students don't have the depth and breadth of expertise in academic fields like scholar-practitioners do (or at least should). These are examples of criticisms, concerns, and challenges that we have encountered when we tell our peers, and in some cases our supervisors, that we work

intentionally to understand and treat our student peer educators as colleagues. Some of these statements are simple facts (e.g., students should be students first and their work with us is indeed part-time).

We do acknowledge that peer educator roles have some specific limitations, in addition to the particular benefits discussed here. Some colleagues may suggest that peer educators are less credible or provide less rigorous academic support. Peer educators need ongoing support and training from their supervisors in order to maintain their credibility, and for us to ensure that their work is of a high standard. For arguments about student colleagues providing less rigorous academic support than professional staff, we note that student colleagues – who are immersed in their disciplinary field of study – often, in fact, can provide more rigorous support than staff many years removed from being students.

There are also time limitations with peer educators, both in terms of how many hours they are able to work per week and how many semesters of service they can contribute. While this does result in a need for regular, systematic hiring and training, it also means that burnout is less likely, training will be updated regularly, and that opportunities for student leadership roles will open cyclically.

We challenge the traditional notion that an individual can only be our "colleague" if they have attained certain academic credentials, have lived to a certain age, and work at least as many hours per week as we do. Implementing this paradigm of students as colleagues challenges us to problematize the notion of colleague, to move beyond simplistic understandings of this construct, and even to confront fears of inferiority or inherent power structures in our institutions and field. This work is not easy.

At the heart of the issue, such a paradigm shift calls those of us working as professionals in the field to be vulnerable to changing our perceptions. Brown's (2012) recent work on vulnerability illuminates just how difficult this can be, but also how allowing ourselves to be vulnerable can lead to new perspectives, new understanding, and new ways of making sense of the structures we shape and the interactions we have every day.

As we determine what the best practices in our field are and how to put theory into practice, professionals in higher education

constantly work to weigh costs and benefits. There are challenges associated with supporting and treating students as colleagues. Full-time coordinators and administrators may find themselves expending financial, human, and political capital to implement and perpetuate this model. However, it is the firm belief of the authors that the benefits outweigh the costs significantly, and that this can be a sustainable, mutually beneficial, efficient model for providing high quality support to our campuses.

Conclusion

One of the student colleagues who took on major responsibilities while Ana Sharp was on maternity leave now works in the field of higher education coordinating academic support. The experience she gained supervising other students, coordinating logistics, planning trainings, and completing other complex responsibilities worked to her great benefit as she applied for positions in higher education. She began her career with an already robust resume and a sound foundation in the field. As she developed as a professional, she served students, faculty, and staff with commitment and enthusiasm. She is now enrolled in a graduate program in higher education. While not every narrative about treating students as colleagues ends quite as neatly, this student's experience illuminates the ways in which bringing students into our communities of practice is just an extension of our work to develop their whole selves.

We hope this call for a paradigm shift is the beginning of a conversation about students as colleagues and how they can, and should, change how we work. We have argued that student colleagues bring unique experiences and expertise to the work and can contribute to our services in many ways beyond junior staffing roles. We have also acknowledged that this work is not easy, and it requires us to open our minds to new ways of thinking about, working with, and supporting students. By bolstering their efforts and skills with our own knowledge and experience, and allowing them to take on progressively greater responsibilities through meaningful, impactful work, student colleagues become capable of making substantial contributions to our work and to our profession. As professionals

dedicated to student learning and development, we can and should embrace this new paradigm for their benefit and for ours.

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Book Review: *Teach Yourself How to Learn: Strategies you can use to ace any course at any level*

McGuire, S. A (with S. McGuire). (2018) Teach Yourself How to Learn: Strategies you can use to ace any course at any level. Sterling, VA: Stylus.

Reviewed by Ryan Korstange

In *Teach Yourself How to Learn*, Saundra McGuire summarizes various advances in learning science research and uses her professional experience as both a Professor of Chemistry and director of the Center for Academic Success at Louisiana State University to describe to students how they can develop an intentional system for proactive learning. The need for such a book is clear. Access to a college education has increased exponentially since 1980, while graduation rates have remained relatively stagnant. Clearly, all students who are admitted into college find academic success.

There are a number of factors which contribute to student success. McGuire takes on only one of these issues directly – student approaches to learning. The basic thesis of the book is that everyone can effectively learn in college if they use an effective, intentional approach to learning. The corollary presupposition is that most students use inefficient and ineffective study practices, and so learn less than they need. This book is written with students in mind – it is envisioned as a guidebook to contentious students, aiming to discover how to learn (a topic regrettably absent in many curricula).

The argument of the book itself takes place over ten chapters. In terms of structure, the chapters 1-2 set the context by describing the Authors' experience in discovering how to learn (Ch. 1), and for the need for new approaches for learning (Ch. 2). The main part of the content of the book is in chapters 3-5, which advocates for the productive use of metacognition (Ch. 3-4) and identifies several strategies for metacognitive learning (Ch. 5). Chapters 6 - 8 cover a

few non-cognitive factors which affect student learning including intelligence mindset (Ch. 6), motivation, and self-talk (Ch. 7). Chapter nine provides various time management and test-taking tips. The book concludes, in chapter ten, with a plea for experimentation with intentional study methods. The book also contains five appendices identifying study strategies mentioned in the book (Appendix A), resources for further reading (Appendix B), a learning strategies inventory (Appendix C), a categorization of student feedback on metacognitive learning (Appendix D), and a list of study tools (Appendix F).

The metacognitive strategies center around a five-step learning process, where students are encouraged to first preview the material, then attend class, review their notes, participate in intensive study sessions (self-directed), and finally assess their learning. The description of these steps emphasizes the importance of active reading of the assigned material, though this reading does not receive its own stage in the learning cycle. Further, the learning cycle is aided by the use of ten metacognitive learning strategies, as laid out in chapter five. The strategies described herein are previewing, preparing for an active reading, paraphrasing, active reading, using the textbook, going to class and taking notes by hand, doing homework without solutions or examples, teaching the material to real or imagined audiences, working in pairs or groups, and creating practice exams. Several of these strategies are described at length, and the description focuses not just on the precise process, but also on the benefit these practices have for learning. Taken together, the strategies given present a good entry point into effective study strategies, though the lack of emphasis on distributed practice and interleaving is an unfortunate omission as these strategies are the ones that rise again and again in learning science research.

Teach Yourself How to Learn fits into a developing trajectory of works focused on helping students improve their learning experience. Due to the fact that it is addressed to students, similar to Bain (2012), and Badder (2011). The learning science and study suggestions find a parallel in Carey (2014), Ambrose, (et al., 2010), and Brown, Roediger, and McDaniel (2014), each of which describe the conditions affecting learning, and strategies to effectively promote

learning more comprehensively. In effect, the book summarizes some of the gains from learning science for the benefit of students, and so the summary nature of the tips and description are natural to the intended purpose of the volume. However, using the technical terms coming to the fore in learning science research (encoding, distributed practice, recall, interleaving, etc.) would have been a good point of connection for students, and would have helped provide them helpful vocabulary.

The gap between student study skills and the expectations of college-level learning seems to be widening these days, and the need for tools to help students develop a strategy for effective learning is increasingly clear. Curricular resources and books aimed at a non-technical audience are essential in overcoming this learning gap. However, in the final review – this book doesn't get all the way there. And ultimately, it is not a book that I would recommend to my students. Three primary features make this book less successful than it could be. First, the intended audience seems to shift between students wanting to learn how to learn, and instructors looking to help their students learn more effectively. This is most pronounced in the shift between the second and third person in the text. Second, the organization of the material is not always straightforward, which reduces the clarity. For example, Chapter five, which lists ten metacognitive learning strategies – the heart of learning strategy presented in the book – but the descriptions of each strategy are set under unclear headings. Previewing becomes "active reading, step one: previewing." (p. 42-4). Previewing is unquestionably an important reading strategy, but it also an important learning strategy. The author misses the larger implications of this metacognitive strategy by organizing previewing under reading. Another example, strategy 4, reading actively becomes "flashcards and maps and outlines, oh my!" Also, in Chapter eight, the five strategies for maintaining motivation are not listed individually, rather strategies 2, 3, and 4 are listed and described together (p. 83). Finally, the book lacks an overarching description of how learning works. An example of such description is found in Willingham (2009, pp. 42-9), which works into the following diagram (adapted from p. 42):
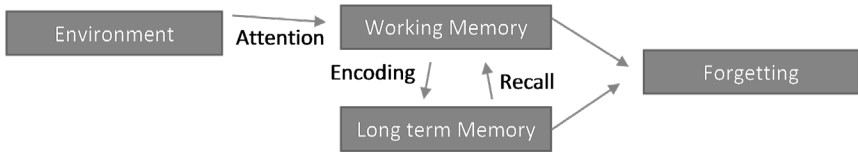
Willingham's description of memory is clear and simple and provides students with an important context for understanding what is happening as they go through the various learning strategies and cycle that are described in this volume. Such a description would have been welcome in the book under review.

Criticism aside, there are many things to commend about this volume. Students need better study skills to maximize their learning in college, which will result not just in increased retention or higher student GPA, but better learning. McGuire makes these points clear, and persuasively presents the case for the necessity of student investment in their learning practices. The learning cycle suggested is a good starting point for proactive student learning, and the metacognitive strategies presented form the backbone of an effective toolkit of study practices (even if the strategies presented are not all properly metacognitive). Further, there are many tips throughout the book which will aid students in their efforts at college success, for example McGuire presents a guide to reading syllabi (p. 55), and an interesting description of the way Blooms taxonomy can be used in class to help students recognize the inadequacies in their study practices (chapter 4).

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Best Practices to Support Generation 1.5 Student Writers

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Abstract

University writing centers can provide effective one-on-one tutorials to support Generation 1.5 students by training tutors to be aware of students' linguistic backgrounds and vary their tutoring style. This research review provides practical tutoring techniques involving giving explicit feedback on students' writing and asking known-information and information-seeking questions to guide students. Using varied techniques while tutoring can make Generation 1.5 students feel comfortable while revising and can provide them an opportunity to practice institutional academic discourse norms. This article ends by offering suggestions for tutor training that will equip writing tutors with questioning and directive techniques during tutorials.

University writing centers provide support to students during their writing process, often via one-on-one tutorials in which a student and tutor work together to improve a piece of writing. With increasingly diverse student populations, ensuring the effectiveness of these tutorials can be difficult since a one-size-fits-all tutoring approach may not be effective for everyone, especially linguistically diverse students, one of the fastest growing student populations in the U.S. (de Kleine & Lawton, 2015; Harklau, Siegal & Losey, 1999).

In particular, Generation 1.5 students may benefit from tutoring techniques that differ from those traditionally used with

other student populations. These students immigrated to the U.S. at an early age (elementary or middle school, typically) or are American-born but were raised speaking a language other than English or other languages in addition to English. They are typically "ear learners" in that they learned English through oral practice, not written, which may result in "many subject-verb agreement, number agreement, and verb tense errors" (Peña, 2014, para. 10). Thus, they are usually highly acculturated into American society and have native-like oral English, but they typically have limited knowledge of writing and grammar concepts (Blanton, 1999; Friedrich, 2006; Muchisky & Tangren, 1999; Peña, 2014). Because of this limited knowledge, Generation 1.5 students may be hesitant to participate in university English classes when they are unfamiliar with the material, so teachers may misunderstand their students' behavior and falsely assume they do not wish to learn (Friedrich, 2006; Muchisky & Tangren, 1999). These characteristics coupled with being labeled ESL (English as a Second Language), which many students view as discriminatory or a mischaracterization due to being native or near-native English speakers, may discourage Generation 1.5 students from seeking help with their writing (Blanton, 1999).

Best practices during one-on-one tutorials promote the use of these students' social knowledge and personal motivations to help support their developing academic English literacy and empower and legitimize what these students bring to the table (Friedrich, 2006; Rodby, 1999). Relatedly, Bandura, Barbaranelli, Caprara, and Pastorelli (1996) found that "children who believe they can exercise some control over their own learning and mastery of coursework achieve success in their academic pursuits" (p. 1217). Encouraging and engaging one-on-one tutorials can be a place for college students to develop this control and mastery while writing, leading to positive outcomes. When developing writing support programming and training tutors, it is important for university writing centers to consider how to best serve Generation 1.5 students, particularly in one-on-one tutorial settings, which can provide a comfortable and confidential environment for these students to receive writing help.

The Value of One-on-One Tutorial Writing Support

In a typical one-on-one writing tutorial session, students bring coursework they wish to revise and improve with the help of a tutor. These tutors attempt to guide students through the improvement of coursework in such a way that maintains the students' voice and ownership over their work and teaches appropriate ways to request and receive feedback. Researchers agree that writing centers can be a valuable space to support Generation 1.5 student writers, who often need focused guidance on norms of appropriate behavior in an academic setting (Koshik, 1999). In particular, one-on-one writing tutorials can help socialize students into the institutional norms of oral academic discourse and academic writing. For example, a tutorial can model for students how to appropriately and politely give or respond to criticism and challenge a teacher or tutor. Furthermore, these tutorials can teach students the value of intellectual property and how to avoid plagiarism through encouraging students to maintain their own voices in writing and by clearly stating the tutor's role is not to write for the student. One-on-one tutorial sessions can help students become comfortable with the institutional norms and know how they fit into the institution.

Kroll (2001) further argues that English language learners, in particular, need one-on-one tutorials more than native English speakers because

> …conferences allow the teacher to uncover potential misunderstandings the student might have about prior written feedback or issues in writing that have been discussed in class…students can usually learn more in the one-on-one exchange than they can when attempting to decipher teacher written commentary on their own. (p. 228)

Researchers also argue that not only should these students meet with the same tutor regularly (particularly when working on a single assignment), but tutors should also be assigned strategically, for example, a Generation 1.5 student paired with a tutor who has training in working with this population (Frodesen & Starna, 1999; Hartman & Tarone, 1999).

In terms of tutor hiring, researchers disagree on whether tutors should be specialists or generalists. Wolfe-Quintero and Segade (1999) specify that having discipline-specific writing tutors can help students develop both their content and their language as many professors complain that tutors do not do enough to help their students in writing for intensive content classes. In particular, these researchers suggest three levels of tutors: those who can help with content conceptualization, those who can help with composition (e.g., clarity and structure), and those who can help with language and mechanics. However, Zemliansky (2005) disagrees and argues that generalist writing tutors can help give students an outsider's perspective on their writing by providing feedback the student may not have received otherwise and encouraging students to vocalize their discourse's norms, thereby solidifying the norms in students' minds. Regardless of whether the tutors are specialists or generalists, one-on-one tutorials should be a foundational part of any writing center. In particular, tutorials that practice techniques that empower students to become better writers can motivate students to become involved in their own education, which can benefit both the students and the campus as a whole (Tinto, 2006-2007).

Best Practices in Oral Questioning Techniques during One-on-One Tutorials

A common tutoring technique used in one-on-one tutorials is teaching by asking questions in which the tutor guides students to improve an assignment through a series of non-directive questions (e.g., the Socratic Method) that lead the student to clarify wording on their own and/or encourage the student to think deeply about a topic. Teaching by questioning allows the tutor to gently guide students while they write but not be too directive as to take over the writing process. Furthermore, asking questions during the revision process can open up a dialog between the student and tutor, which may, in turn, lead to useful conversations about academic discourse during the tutorial session. This teaching technique is based on the assumption that students have a basic understanding of how to write and just need a tutor's guidance rather than direct instruction.

However, teaching by asking non-directive questions becomes

problematic when Generation 1.5 students are unaware of how to respond to these questions and what academic writing norms they should have in their writing (Friedrich, 2006; Thonus, 2003). These students may not come to the university with conceptual knowledge of writing and grammar, so asking a student what belongs in a conclusion paragraph, for example, may only be frustrating. Instead, Friedrich (2006) and Thonus (2003) argue that tutors should be more explicit and directive with feedback, often using declarative statements, to Generation 1.5 students and teach them how to write in general, not just for a particular assignment. To refer to the example above, a tutor could first explain in general what a conclusion paragraph should look like and then ask the student to apply that explanation to their own writing. Thonus (2003) emphasizes that tutors must be aware of and value cultural differences in their students and not assume their students have native speaker intuition or knowledge of academic writing conventions. So, Dudley-Evans and St John (1998), Lee (2006), and Waring (2012) argue that comprehension checks should gauge students' understanding via questions and declarative statements that narrow down information, allow students to exchange information, and give them a model of a thought process they can replicate on their own. Ultimately, tutors should use techniques that avoid making students feel uncomfortable with publically admitting their lack of understanding and avoid making students feel they are potentially disrespectfully challenging a teacher's expertise.

Koshik (1999, 2002, 2005, 2010) presents practical suggestions to educators for how to support student learning by varying the types of questions they ask depending on the situation and students' responses to the questions. She proposes two types of known-information questions (meaning that the teacher expects a particular response): Reverse polarity questions (RPQs) and alternative questions. RPQs are questions in which a "no" response is preferred to "show what is problematic about a portion of the student text or talk and, in the process, [point] to a possible solution" (Koshik, 1999, p. 97). For example, if a student's sentence is missing a verb, the tutor may ask, "Is this a complete sentence?" expecting the student to reply "no," which can lead to a discussion of what makes a sentence

complete. Alternative questions are questions in which the teacher or tutor gives the student several options to choose from when making corrections, which can ensure that the student ultimately decides how to revise. Often, some choices are more valid than others, leading the students to choose the correct answer (Koshik, 2010; Ritter, 2005). Alternative questions can also provide the student with multiple revision options, demonstrating that there may be more than one way to revise an error. When both tutors and students know the writing norms, RPQs and alternative answer questions can effectively teach students editing strategies that they can employ individually. However, when students are unaware of these norms, as is often the case with Generation 1.5 students, these questions can be problematic, especially when tutors misleadingly frame a question or when students give the preferred "no" response to an RPQ without the tutor recognizing the student may not understand what is wrong. It is worth repeating that assuming students are familiar with discourse norms can demoralize and frustrate students, leading to a potentially unhelpful tutorial session (Thonus, 2003).

As an alternative, Koshik (2002, 2010) describes designedly incomplete utterances (DIUs), which involve the teacher or tutor reading the student's text aloud up until the error and stopping, leaving the student room to fix the error. Encouraging Generation 1.5 students to reframe an ill-formed sentence orally can be effective because they usually have a native-like oral fluency in English. And, by reading the student's text aloud and "begin[ning] a way for the student to redo his or her own sentence," this technique encourages self-correction, which can help teach students effective editing strategies they can use on their own (Koshik, 2002, p. 303).

Lastly, questions that "animate the voice of an abstract audience" are those in which the teacher or tutor pretends to be an audience for a student's paper and frames questions from that perspective (Koshik, 2010, p. 181). These may be information-seeking questions, as the tutor may not have a preferred response in mind. With these questions, the correct answer is less important; instead, the student needs to use their knowledge of the intended audience to understand the question so he or she can respond to their revision. This technique can help students enter the academic discourse

conversation by encouraging students to consider their audiences' needs when writing in a particular discipline. Blanton (1999), Dudely-Evans and St John (1998), and Johns (1999) all emphasize the importance of students investigating and considering a genre's audience's needs to make their writing align with that discourse community.

Tutor Training

Implementing the above questioning techniques is no easy task. Effective questioning during tutorials should be strategic, and tutors need to know when to switch modes to a different technique to best support students. When developing training for writing tutors, university writing centers can teach these strategies so tutors can tailor one-on-one tutorials to meet students' needs, as much as possible. This tutor training can have learning outcomes related to tutors learning how to meet students where they are academically and linguistically, create empowering tutorial sessions, and model academic behavioral and writing norms. While it may not be reasonable to expect tutors to know their students' backgrounds before a tutorial session, tutors can learn how to employ multiple strategies, depending on students' interactions in the moment, in order to model the ways in which students can effectively request and receive feedback on college-level writing from tutors and their instructors. The above research leads to the conclusion that using a variety of oral questioning techniques mixed with declarative statements can help students practice interacting appropriately in academic conversations and can provide scaffolding and teach them academic norms in a way that is comfortable for the student. The Appendix and the following discussion provide a sample lesson plan and suggestions for adapting the activities, respectively, that are used as part of an intensive 5-day tutor training class required of newly hired writing tutors at UC Davis. Each session focuses on a different topic including departmental policies and procedures, how to help students with essay writing, and how to use resources during tutorials. The sample lesson plan provided in the Appendix, developed by UC Davis Writing Specialists Ariel Loring and Bridget Mabunga, focuses on how to give effective feedback that incorporates the best practices mentioned above.

It is important to provide new tutors with anonymized, authentic student writing and tutoring scenarios to best prepare them for working with students. These texts and scenarios can come from student populations commonly found at the tutors' university, perhaps including Generation 1.5, and can familiarize new tutors with the types of writing they will encounter while tutoring, which may help make both the student and tutor comfortable when working together (Frodesen & Starna, 1999; Hartman & Tarone, 1999). These texts can exhibit a variety of issues students typically have in their writing, for example, grammar errors, illogically organized paragraphs, or underdeveloped thesis statements. Scenarios can focus on potentially tricky situations tutors may encounter such as students writing about abuse, questioning the tutor's authority, or having trouble understanding the tutor. When training tutors to work with Generation 1.5 students' writing, it can be helpful to include scenarios and sample texts that introduce tutors to some of the common characteristics of Generation 1.5 students mentioned earlier (Blanton, 1999; Friedrich, 2006; Muchisky & Tangren, 1999; Peña, 2014).

As the lesson plan in the Appendix shows, the tutors can use the sample student texts and scenarios to practice a variety of techniques. Training leaders can use these techniques verbally and in written materials, and be explicit about doing so, so tutors can see positive modeling of these techniques. For instance, along with sample student texts, tutors can be given alternative ways to respond to each text, mimicking the alternative questioning technique tutors can use with students (Koshik, 2010; Ritter, 2005). The alternative responses can range from inappropriate (e.g., assuming a lack of knowledge), to ineffective (e.g., directly correcting a student's wording), to effective (e.g., asking a question or explaining a grammar rule). Training leaders can then hold an open discussion, asking tutors why they chose particular responses over others. In the end, training leaders can directly provide pedagogical bases behind the effective responses as Friedrich (2006) and Thonus (2003) argue that it can be helpful to provide direct feedback when a student (or tutor, in this case) may not be familiar with the expected norms.

For open-ended practice, tutors can respond to difficult student writing and scenarios with techniques they think would best suit that situation. For instance, a tutor may choose to pose questions from a reader's perspective to demonstrate how a student text is difficult to follow (e.g., "As a reader, I think you're discussing the author's main idea here. Is that what you intended?"). Or, when looking closely at a student's grammatical errors, a tutor may choose to try RPQs (e.g., "This sentence is incomplete; can you see a subject anywhere?"). Following this activity, an open discussion can focus on why tutors chose specific strategies with each of the texts and evaluating the effectiveness of the strategies they chose. This discussion can help show tutors that some strategies may be more or less helpful than others when working with student writing. For example, using an RPQ may be unhelpful for an English language learner who is unfamiliar with grammar rules. Rather, a more directive approach may be more beneficial (e.g., "Sentences in English must contain a subject, which is the doer of the action in the sentence. I don't see that you have a subject, so how can you revise this?"). Evaluating the effectiveness of techniques can help tutors be better prepared when they need to decide how to give feedback to students (Koshik, 2002; Thanus, 2003).

Finally, just like students who need more directive instruction, tutors may as well. Tutors may be able to recognize problematic wording or an illogically organized paragraph but may not know how to phrase a question that will point students toward the issue. It can be helpful for training leaders to give tutors (or have the tutors brainstorm) examples of questions they can ask students to start a conversation about an essay. For example, if a tutor wants a student to revise a paragraph with too many examples, he or she can pose an alternative response question by asking the student which piece of evidence most clearly relates to the paragraph's topic sentence. Tutors can refer to this list of questions during a session if needed. With this kind of guidance, tutors can feel more comfortable and confident when doing comprehension checks in a session to ensure they steer the conversation effectively for the student (Dudley-Evans & St John, 1998; Lee, 2006; Waring, 2012).

Of course, it is important for training leaders to regularly assess the effectiveness of their training curriculum to ensure tutors provide effective support to students. One option is to collect feedback from tutors on how the training has helped or not helped them improve their tutoring practices. Training leaders can also record or observe tutors working with students and reflect with the tutors to identify any gaps in training. These gaps can then lead to improvements in the training curriculum. However, Bell (2001) found that reflective tutor training practices did not always lead to significant positive changes in tutor training or practice, so training leaders should be aware of the limitations of relying solely on tutors' reflections and feedback when evaluating tutor training effectiveness. It may also be useful to formally assess the training at the programmatic level, using a theoretical model such as action theory, as Hassan (2013) suggests, to identify possible improvements in training effectiveness. At UC Davis, training leaders conduct an annual review of the curriculum, taking into account feedback from tutors, observations of tutors working with students, feedback from students who have received tutoring, and best practices in the literature regarding tutoring and training. In the end, it is important for training leaders to consider what their student population needs in terms of writing support when designing and evaluating their tutor training curriculum.

Conclusion

The above review of the research emphasizes that university writing centers are critical places for Generation 1.5 students to become familiar with academic norms and more deeply engage with their writing. Indeed, one-on-one tutorials are a highly effective way to engage these students, who often need specialized, individualized support in a comfortable environment. Well-trained tutors can provide that comfortable environment by posing questions and giving explicit feedback in a way that caters to the students. Not only will Generation 1.5 students benefit, but other students who participate in these tutorials will benefit as well. There is no one-size-fits-all approach to tutoring, and having a variety of tools available to use during a tutorial session can lead to effective communication and valuable teaching moments.

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Appendix

Sample Tutor Training Session

Topic: Giving feedback while working with students
Materials:
- Samples of authentic student texts with specific areas of concern (e.g., grammar or organization) and varying ways to respond to each text.
- List of potential questions tutors can use to begin conversations with students around essay writing
- List of realistically difficult tutoring scenarios

How to give general feedback
    a. Tutors are given samples of authentic student texts with specific areas of concern and must choose appropriate responses from a list of alternative responses to each.
    b. After tutors complete the activity, a whole group discussion follows in which the training leaders ask the tutors to evaluate each of the alternative responses and justify their choices. The training leaders can also explain that the strategy of giving alternative choices can be useful to use with students during a session and can offer guidance on why some choices are more effective than others.

How to give grammar feedback
  a. Tutors are given scenarios necessitating grammar feedback and must brainstorm how they would respond to each. Scenarios should mimic what tutors may actually encounter in terms of students' expectations of getting grammar feedback.
  b. After tutors complete the activity, a whole group discussion follows in which the training leaders ask tutors to share their brainstorms. During this discussion, tutors can be made aware that no one strategy for teaching grammar will work best for all students. For example, some students need direct instructions on rules while others may only need error trends pointed out to them.

How to give essay feedback
   a. Training leaders transition to discussing giving feedback on essay organization, development, thesis, etc. and how to handle difficult tutoring situations.
   b. Training leaders provide tutors with a list of potential questions tutors can ask when providing essay feedback. Tutors should be told these questions can be helpful as a starting point, especially when the tutor is unsure of how to phrase a question to get a conversation started during a session.
   c. Tutors are presented with realistically difficult tutoring scenarios. Tutors must discuss how they would react both during and after each scenario. A whole group discussion follows in which training leaders share with tutors what resources they have available to them if they are unsure of how to help a student (e.g., using a thesaurus to help with word choice errors or when it's appropriate to ask a supervisor for assistance).
   d. Tutors will watch the video, "Purdue Writing Lab Tutor Training Video: The Intractable Tutee" (OWLPurdue, 2014), taking notes on what they observe in the video. A whole group discussion follows, analyzing the effectiveness of the techniques used by the tutor.

Final Thoughts
   a. Training ends with a group discussion of the following question, "How could we apply today's lessons to working with students?" Training leaders should remind tutors of the techniques reviewed in this session.

Learning Center Advisory Boards: Results of an Online Exploratory Survey

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Abstract

The National College Learning Center Association considers usage of learning center advisory boards an important criterion for the Learning Centers of Excellence certification. Through an online survey, this study explored the use of advisory boards for learning centers. Survey results (n = 230) provided insight into the current usage of advisory boards with 27 respondents (11.7%) indicating that their learning center had an active advisory board. The survey provided information on current status, mission, and operation of advisory boards and on possible reasons why so many learning centers do not have active advisory boards. Suggestions on starting an advisory board are included.

Improving Practice in the Learning Center with an Advisory Board

Learning center leaders face significant demands to demonstrate and communicate the impact that their centers make on their institutions' students. Such pressures are exacerbated when the role and functions of the learning center are not well understood or appreciated by all stakeholders or when the image of the learning center lacks clarity. Maxwell (1997, p. 113) called focusing on these concerns "the most difficult task" of the learning center leader. Arendale (2010), Christ (2009), Craig (2005), Maxwell, and others have urged implementation of a learning center advisory board as an important element in the administrator's toolkit for overcoming these challenges.

Indeed, key professional organizations recommend the use of advisory boards for learning centers. The Council for the

Advancement of Standards in Higher Education has advocated for advisory boards since at least 2003: Learning assistance programs (including learning centers) "should have a broadly constituted advisory board to make suggestions, provide information, and give guidance" (Miller, 2003, p. 210). In the latest update of standards and guidelines for learning assistance programs, the Council has continued to recommend implementing an advisory board (Council for the Advancement of Standards in Higher Education, 2016). The Council's compendium of professional standards is widely recognized as the baseline for best practices in higher education. Frank Christ (2009) developed a list of *Best Practices for Learning Support Centers in Higher Education.* He was so committed to the idea of learning centers having advisory boards that he listed it ninth in his best practices list. (The complete list can be found on the Learning Support Centers in Higher Education website, http://www.lsche.net/). Christ's best practices list provided the backbone for the development of the National College Learning Center Association (NCLCA, n.d.) Learning Centers of Excellence certification program. The Learning Centers of Excellence evaluation criteria are divided into seven major categories, and because the use of an advisory board is identified as a best practice, it is included in the Promotion and Public Relations category.

Advisory boards in learning assistance centers have been on some campuses for several years. Nevertheless, anecdotal evidence from conference sessions, conversations with colleagues, and other informal means has suggested that a significant percentage of learning centers do not have an advisory board. This engendered questions of whether learning center advisory boards are useful for accountability, policy making, or advocacy. This article is intended to provide some insight to these questions (a) by reporting results of a survey on the current state of learning center advisory boards and (b) by offering practical guidance for establishing and operating an advisory board.

Review of the Literature

What is an advisory board? According to Wikipedia (2018), "An advisory board is a body that provides non-binding strategic

advice to the management of a corporation, organization, or foundation. The informal nature of an advisory board gives greater flexibility in structure and management compared to the Board of Directors. Unlike the Board of Directors, the advisory board does not have authority to vote on corporate matters or bear legal fiduciary responsibilities." The ultimate goal of an advisory board is to contribute to the success of the organization (Reiter, 2003).

There are essentially three types of advisory boards: those used in the business world, those in a vocation/technical/industry setting, and those used in education, mostly in a higher education setting (Penrose, 2002; Olson, 2008). The composition of an advisory board should be determined by the expectations or the role of the board (Reiter, 2003). Olson (2008) recommended that advisory boards have official by-laws, objectives, and elected officers. He stressed not only the importance of keeping board members actively engaged, but also that it is critical for board members to realize their role is strictly advisory. Many of the advisory boards used in education are composed of alumni or volunteers from the community or business sector. They are used as sources of strategic or programmatic advice. Olson (2008) describes key benefits for these types of boards as serving to get people actively involved or vested with an ultimate result of financial support. The boards described are typically large, 25-30 members, and may consist of influential community members, politicians, alumni, those in professions in related fields (e.g., law, medicine), emeritus faculty, or people with development connections (Nagai and Nehls, 2014; Olson, 2008).

The idea of using an advisory board for a learning center has been around since at least the early 1990s, but very little data is available in the literature. Silver (1992) recognized that the role of advisory boards in higher education was to assess academic programs and make recommendations for improvements. Lowenstein (1993), who was expanding a learning center at a small private college, described the process and challenges of establishing an advisory board. For her, finding the specific role for the advisory board was critical, but she struggled initially to determine the mission and specific responsibilities. Maxwell (1997) recommended that advisory board members include both faculty from multiple disciplines

with varied viewpoints and students representative of the entire student body. She also espoused that the chair of an advisory board should be someone other than the center director. The use of an advisory board can be helpful in establishing credibility with the institution, and representatives should include faculty and student leaders (Christ, 2000). Faculty and other advisory board members act as advocates for the center, provide ideas, and serve as ready sources for ongoing support and feedback (D'Avanzo, 2009). O'Hear (2000) stressed the importance of selecting well-respected faculty who can effectively communicate the needs of the learning center with campus committees and campus administration. Creation of a strong advisory board is critical to providing support for the center (Maxwell, 1997). The recommended number of members for the advisory board varies greatly from as few as seven (Craig, 2005) to as many as 20 (Lowenstein, 1993). Membership will depend on multiple factors, including the mission, goals, and function of the learning center (Craig, 2005).

An advisory board can be a vehicle for marketing the learning center and its programs, strengthening relationships with key learning center stakeholders, prioritizing programs and budgets, and providing feedback on the mission, goals, and objectives of the learning center (Craig, 2005). Silver (1992) described advisory boards as "academic partnerships that work."

Methods

To increase our knowledge regarding the current state of learning center advisory boards, this study addressed the following questions:

1. What percentage of learning centers in higher education have advisory boards?
2. Are there distinguishing characteristics of learning centers that have advisory boards?
3. How do learning center advisory boards function?
4. What is the impact of a learning center advisory board on the learning center and on the institution?
5. Why do many learning centers not have advisory boards when this has been identified as a best practice by NCLCA and other organizations?

Procedures

To obtain data relevant to these questions, we developed an online exploratory survey using Google Forms. We posted a note (see Appendix A) explaining the purpose of the survey to the LRNASST-L message list for learning assistance professionals (currently hosted by the Teaching Center at the University of Florida and available at https://lists.ufl.edu/archives/lrnasst-l.html) and the membership message lists of NCLCA and the Association of Colleges for Tutoring and Learning Assistance. The note included a link to the survey, and several follow up reminders were sent. The survey focused on four areas: institutional characteristics, learning center characteristics, learning center advisory board characteristics, and reasons that a learning center either does not have an advisory board or has a board on hold with no future meetings scheduled. The survey branched to collect data from those with a currently functioning advisory board, those with no advisory board, and those with an advisory board on hold. The survey was active from November 2017 to early January 2018. Survey results were reviewed in Google Forms and exported to Microsoft Excel for ease of sorting.

Participants

We requested data for this survey from learning center administrators and received 230 survey responses. The note we posted introducing the survey requested one survey response per learning center to be submitted by an administrator of the center. Although we did not request titles of those submitting the survey, we did request the name and other characteristics of the learning center. Based on survey submissions, we are confident that the survey respondents were in fact learning center administrators.

Measures

For all respondents, we requested information regarding the institution and the learning center, and status of having an advisory board. For the institution, we obtained descriptive data on institutional type, size, and location. For the learning center, we obtained descriptive data representing learning center size, placement within the institution, functions or services provided, staffing, number of students served, and current status of utilization of an advisory board.

For those learning centers with advisory boards, we obtained both descriptive statistics and narrative information, including the name of the advisory board, the year the board was established, units served, mission or purpose, member selection process, number of members, titles of members and areas represented, term limits on membership, meeting frequency, identification of the chair and chair selection process, key activities of the board, and advisory board benefits to the learning center and to the institution. Some respondents provided additional documentation related to their advisory boards.

For those learning centers without advisory boards, we obtained descriptive data and narrative information on the reasons that the learning center did not have an advisory board. For those learning centers that had an advisory board, but the board was on hold, we obtained narrative information on the reasons the board was on hold and expectations for the future of the board.

Results
General Characteristics of the Institution and the Learning Center

The 230 survey responses were approximately evenly distributed among both institution types and sizes as shown in Figure 1 and Figure 2, with the exception that no responses were received from private 2-year colleges. Respondents were also spread geographically with submissions from learning centers in 39 states, two Canadian provinces, and one South American country. Thirteen respondents did not list their state. Regarding institutional alignment, 155 learning centers were in academic affairs, 47 in student affairs, and 7 were in a university college. Of the remainder, three respondents indicated that their learning center reported to both academic and student affairs or that these were merged into one organization in their institution.
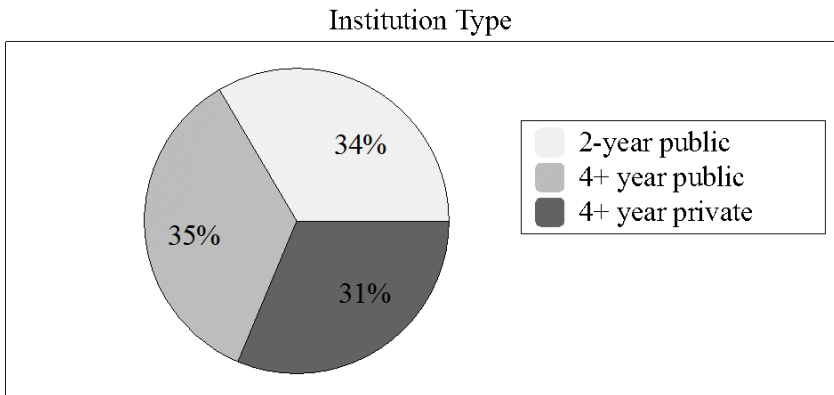
Institution Type

Figure 1. Type of Institution (n=230)
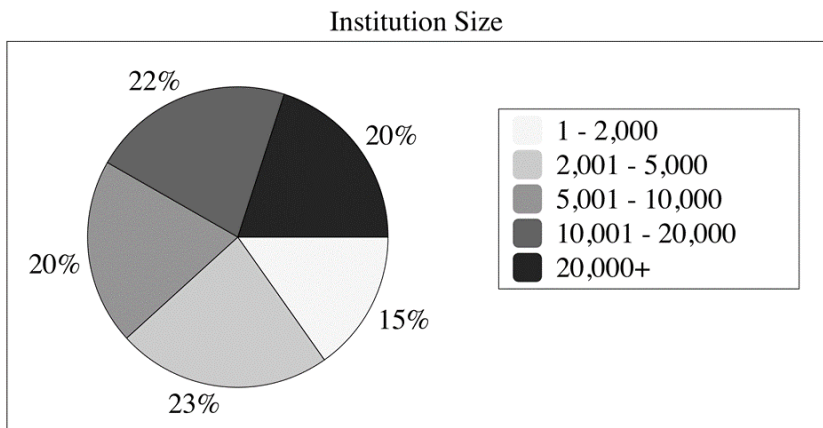
Institution Size

Figure 2. Size of Institution (n=230)

Tutoring was by far the most common program or service with nearly all—227 of 230—respondents citing it. Table 1 lists the frequency of learning center services. Among those in the *Other* category, one provided English language learner conversation groups, two provided developmental coursework, two provided community tutoring (at least one was fee-based), one provided reading labs, one loaned calculators and other materials, two supported faculty, one supported summer bridge programs, one proctored tests, and two hosted learning communities.

Table 1

Learning Center Programs and Services Reported (n=230)

Program or Service	Number of Learning Centers Reporting
Tutoring	227
Academic Skills Workshops	173
Peer Cooperative Learning Programs (SI, SLA, PLTL, …)	132
Academic Coaching	125
Dedicated Computer Lab	75
Early Alert	71
Peer Mentoring	66
Academic Recovery	62
Student Athlete Support	59
First Year Seminar/Study Skills Course (credit bearing)	58
Disability Services	49
Placement/Assessment Testing	36
Academic Advising	36
Student Veteran Support	33
Grant-Funded Services (TRIO, etc)	21
Writing Center/Math Center (separate from tutoring)	4
Other services	22

What Percentage of Learning Centers in Higher Education Have Advisory Boards, and Are There Distinguishing Characteristics of Learning Centers with Advisory Boards?

A total of 27 (11.7%) of the 230 respondents reported a currently functioning advisory board. Advisory board usage was geographically spread across 19 states in all regions of the United States and in one other country. No state was represented by more than two learning centers with advisory boards. Two respondents with advisory boards did not list a state. Twelve learning centers reported that their advisory boards were on hold with no meetings scheduled. These were also geographically spread across eight states with no state having more than two such learning centers. Table

2 lists the number of learning centers with advisory boards by institutional type. Table 3 sorts learning centers with advisory boards first by size of the institution, then by type of institution.

Most learning center advisory boards are relatively new boards with 16 of the 27 learning centers having formed advisory boards since 2015 (seven in 2017, five in 2016, and four in 2015). Of the others, one advisory board was established in 2014; two in 2013; and one each in 2012, 2010, 2008, 2004, and 2002. However, the board formed in 2004 was on hold for several years before being reestablished in 2014. Two learning centers had long-standing advisory boards that were in place well before the year 2000. One center did not report the year of advisory board formation.

Table 2
Learning Center Advisory Boards by Institutional Type (n=230)

Type	Number of LCs with Advisory Boards
2-yr public	9
4-yr private	8
4-yr public	10

Table 3

Learning Center Advisory Boards by Institutional Size and Type (n=230)

Size	Number of LCs with Advisory Board	Type
1 – 2,000	**2**	4-yr private
2,001 – 5,000	**7 total:** 2 4 1	2-yr public 4-yr private 4-yr public
5,001 – 10,000	**8 total:** 4 1 3	2-yr public 4-yr private 4-yr public
10,001 – 20,000	**4 total:** 2 1 1	2-yr public 4-yr private 4-yr public
20,001 +	**6 total:** 1 5	2-yr public 4-yr public

Institutional placement for learning centers with advisory boards was not markedly different from that of learning centers as a whole. Of the 27 learning centers with advisory boards, 20 were in academic affairs, five in student affairs, and two were in other areas.

How Do Learning Center Advisory Boards Function?

Key elements of a mission or purpose statement for the learning center advisory board as reported by respondents included the following:

- "serve in an advisory capacity" for learning center programs and services
- "provide advice and counsel" to ensure alignment with institutional goals
- "assist with long term strategic planning"
- "provide guidance" or "help prioritize" services
- "inform and steer the work" of the learning center

- "make recommendations on" or "develop and improve" learning center programs and services
- "provide feedback on current services and help identify growing student needs"
- "recommend opportunities for collaboration"
- "explore avenues for improvement"
- "help the learning center [leader] think critically and creatively about how we use limited resources"
- "make recommendations" on how funding is allocated
- "serve as a liaison" or "serve as ambassadors" between the learning center and various departments and the college
- "develop and maintain strong relationships" with departments served and other stakeholders
- "serve as a vehicle for marketing" learning center services and "managing [the learning center's] image
- "raise awareness of resources and services for students"
- serve as "advocates" for the learning center "in the university community"

Three respondents indicated that they did not have a formal mission statement for their advisory board; two of those were in the process of drafting one.

Most learning center advisory boards either invite specific individuals to serve as members of their advisory boards or invite key academic and other departments to nominate a representative. Several respondents noted that invitations were based on familiarity or interaction with learning center services along with representatives from areas such as disability services, advising, and student affairs or what one respondent called "strategic campus partnerships." In other instances, board members were assigned by academic or other departments or by the student body. The learning center leader often worked with a higher-level administrator or other department heads to determine whom to invite. Some centers solicit interest from faculty, staff, and students via email. One learning center had a formal process with advisory board members being elected by faculty and student senates. Of the 27 learning centers with advisory boards, 17 explicitly noted that students served on the advisory board. Whether

any of the other 10 included students on the advisory board was undetermined.

Titles of advisory board members varied widely depending on the specific nature of the learning center and institution. Common titles were variations of professor, director, dean, peer tutor, vice president, provost, and student. Common areas represented included various academic departments, academic advising, personal counseling, testing, disability services, first-year experience programs, and centers for teaching and learning as well as one or more representatives from the learning center. A few specifically included athletics, veterans' affairs, institutional effectiveness, or enrollment management. One center included community volunteers. In institutions with decentralized academic support with separate departments similar to but not part of the learning center (e.g., writing center, math lab, athletic academic support), representatives from those areas were also included in the learning center advisory board or were part of a joint academic support advisory board.

Five respondents stated that advisory board members had term limits of one to three years. Students typically served for one year. Two respondents stated that their boards were new and decisions on term limits had not been made. Twenty boards had no term limits, and some asked annually if members wished to continue.

From our survey, the number of members on learning center advisory boards exhibited a large spread—from as few as four to as many as 22 board members. Two respondents listed a range of 7 - 10 in one case and 16 - 18 in the other. The most popular were advisory boards comprising nine, 10, or 12 members with three learning centers reporting advisory boards of each size. One learning center from a large, four-year public institution reported three types of advisory boards, one for students (10 members), one for faculty (seven members), and one for student development professionals interested in academic support (12 members). Size of the advisory board did not appear to be related to the type or size of the institution.

The frequency of advisory board meetings varies from once a month to once a year. The most common schedule is once per semester with eight boards reporting that number. Another board

meets at least once a semester. Two boards meet three times per year, not necessarily on a semester schedule. Four boards meet twice a year, which may mean once per semester except summer. Four boards meet twice per semester, and one meets three times per semester. Five boards meet monthly. The remaining boards meet on a variable schedule of between one and three times per year.

The chair or leader of the learning center advisory board is also the leader of the learning center on 24 of 29 advisory boards. Two advisory boards are led by faculty; the chair is elected in one case and appointed in the other. For the learning center with multiple advisory boards, the student board is led by a graduate student who is appointed to the role. Two advisory boards have no chair.

Key activities of learning center advisory boards are shown in Table 4. The top three activities were (a) serving as a sounding board for learning center planning, (b) developing and supporting advocates for promoting the learning center, and (c) encouraging faculty involvement in the learning center.

Table 4

Key Activities of Learning Center Advisory Boards (n=27)

Key Activities	Times Cited by LCs with Advisory Boards
Acting as a sounding board on learning center tactical/strategic planning	24
Developing and supporting advocates for promoting the learning center	23
Encouraging faculty involvement in the learning center	21
Providing guidance for prioritizing learning center initiatives/services/budget requests	17
Reviewing learning center status/data	16
Ensuring collaboration opportunities are maximized	16
Providing specialized expertise to aid the learning center (e.g., statistical analysis, training)	6
Providing student and faculty perspectives on services and marketing	1

Table 4 Continued	
Key Activities	Times Cited by LCs with Advisory Boards
Promoting the services of the learning commons	1
Encouraging the participation of faculty in analyzing factors relevant to persistence and developing actions to promote permanence.	1

What Is the Impact of a Learning Center Advisory Board on the Learning Center and on the Institution?

Frequently mentioned benefits of having a learning center advisory board included stronger advocacy on behalf of the learning center, better feedback from stakeholders, and strengthened relationships with faculty and staff. Two respondents stated that the advisory board has been an impetus toward centralization of academic support. Others have gained support for increasing tutor pay or increasing the responsibilities of the learning center director. Another cited improvement in tutor hiring and training processes based on advisory board discussions. One learning center director stated that collaboration with the advisory board resulted in a paper jointly published with faculty members. Another mentioned that specialized expertise was made available as part of the advisory board. A few respondents noted that their advisory board was too new to determine benefits. Some comments from respondents on benefits to their learning centers are listed below:

- "We get great advocates and various perspectives from across campus."
- "Having stronger ties to different divisions is very helpful in developing collaborative projects."
- "We are able to obtain a fresh perspective on what areas or programs are working and what needs improving."
- [We have a] "better relationship with academic departments and faculty, improved currency in materials and resources for students."
- "I don't feel as though I'm making as many decisions in a vacuum."
- "It feels good to have decision-makers and campus influencers

know what we do and be able to speak knowledgeably about our work to others."
- [We have seen a] "strengthening of campus partnerships."
- "We have received sound advice and a different perspective on several new initiatives."
- "We have also learned new marketing ideas and have strengthened our relationship with faculty, staff, and other partners."
- [Benefits included] "better connections with other campus support programs and students having a voice in the direction of the center."
- "They definitely helped us shape our strategic plan into something that addresses the needs of our stakeholders."

Several respondents indicated that the benefits to the institution from the learning center advisory board were the same as many of those listed as benefits to the learning center. That is, a win for the learning center is a win for students and for the institution. Some comments included the following:
- "Better services translate to better outcomes for students."
- [The advisory board resulted in] "new collaborative efforts and initiatives."
- "If the [learning center] benefits, then the college benefits."
- "I don't think it's an accident that our utilization numbers have greatly increased. Plus, other members of the committee are now using our meetings to address concerns/issues that they have….It's a win-win for many of us."
- [The advisory board resulted in] "a collaborative effort to support student success."
- "Service changes are vetted by college representation."
- [We have] "support and outreach to the rest of the campus community."
- "The existence of the [advisory board] has generated a synergy in the initiatives of the institution to address issues of learning and permanence."
- [The advisory board resulted in] "a better center that is more responsive to the needs of stakeholders."

Why Do Many Learning Centers Not Have Advisory Boards?

Learning centers that do not have an advisory board cited a variety of reasons. Most common, cited by nearly 38% of respondents, was that an advisory board had never been considered. Another common reason, cited by 14% of respondents, was that they were unclear about what an advisory board does. However, about 24% of respondents indicated that formation of an advisory board was under consideration or one was currently in the process of being established. About 8% of respondents stated that their learning center once had an advisory board but that it had been disbanded. Some did not have an advisory board because they believed that informal relationships, accessible faculty, or small size of the institution provided sufficient interaction. As one respondent stated, "I just talk to faculty about needs for their students. Our campus is small, and our faculty tend to be approachable." Similarly, some mentioned that they sat on campus committees that, although established for other purposes, served as a de facto advisory board for the learning center. A few respondents simply had no time for anything beyond current work demands due to staffing or budget factors. Several noted that political support from higher-level administrators to establish an advisory board was "lukewarm," lacking, or negative.

Others mentioned that they were unsure of the benefits of an advisory board. Some cited that there are already such a large number of committees that "employees just don't want to take on any more." In at least one case, the concern was the difficulty in gaining faculty participation "in extra, non-contract activities." One person lamented, "There are so few people on my campus who understand or care deeply about learning assistance that I don't see the point. Seems like a bureaucratic roadblock to have one." A few felt that obtaining student and faculty feedback from learning center surveys provided the needed insight. Some were concerned that an advisory board might disrupt the vision or autonomy of their learning centers.

Twelve (5.2%) learning centers have advisory boards on hold. The most common reasons for having a board on hold (with no meetings scheduled) were:

- The prior learning center leader left, and new or interim leadership has not convened the advisory board.

- The institution or significant areas within it are reorganizing, restructuring, or implementing new policies and procedures.
- It was too difficult to convene the board; lack of interest and attendance.
- Staff are stretched thin often from staff and budget reductions.
- The advisory board was ineffective.
- The advisory board was created to establish a new learning center but put on hold or disbanded after implementation.

Some respondents stated that they intended to end the on-hold status of their advisory board or recreate one; others thought that the advisory board would not return.

Discussion

What Percentage of Learning Centers in Higher Education Have Advisory Boards, and Are There Distinguishing Characteristics of Learning Centers with Advisory Boards?

Only about 11% of learning centers responding to the survey had active advisory boards. This confirmed our estimation (based on informal or anecdotal evidence) prior to conducting this research, so this is a disappointing but not surprising result. In sum, we did not identify any characteristics of learning centers that distinguish those that have an advisory board in terms of geography, type or size of the institution, or placement within the institutions from those that do not have boards.

How Do Learning Center Advisory Boards Function?

The way that learning center advisory boards operate varied somewhat among centers. This seemed to be due primarily to the characteristics of the particular learning center and the organizational and political environment in the institution. Board size did not correlate to institutional type or size. Board members were more often invited than appointed. Board composition appeared to be a function of areas supported by the learning center as well as allied areas such as advising or counseling. Most boards included at least one student representative. About three-fourths of boards did not have term limits for members. The usual meeting schedule was once per semester although the frequency among centers varied from once

a year to once a month. The board chair was also the learning center leader for 89% of respondents. The main activities for a learning center advisory board were to advise on center plans, develop advocates for the center, encourage faculty involvement, and provide input on center priorities.

What Is the Impact of a Learning Center Advisory Board on the Learning Center and on the Institution?

Respondents with learning center advisory boards reported significant impacts. Many of the impacts were a direct result of the chief activities of the board. These impacts included gaining new perspectives on the effectiveness of the center, increasing collaboration with the collegiate community, obtaining sound advice on center plans and priorities, and developing advocates for the center. In addition, serendipitous impacts occurred such as gaining specialized expertise to assist in center activities and jointly publishing a paper with board members. The institutions gained from these impacts as well. As one respondent stated, having an advisory board resulted in "a collaborative effort to support student success." Collaboration, synergy, and "better outcomes for students" reverberated throughout the comments.

Why Do Many Learning Centers Not Have Advisory Boards?

Reasons stated for not having an advisory board are understandable and logical. A significant percentage of learning centers without a board never considered having a board or were not sure what an advisory board does. Communication and outreach by professional organizations can help with these issues. Indeed, in the survey comments, there is some evidence that the NCLCA Learning Center of Excellence certification is beginning to spur learning center administrators to consider implementing advisory boards. Additional support for this is that almost 60% of learning center advisory boards have been formed since NCLCA's certification was established and that about one-fourth of those without a board were considering implementing one.

For learning center directors who do not have the political support to form an advisory board or who have been discouraged from forming one, the benefits collected from survey respondents could provide documentation for the added value an advisory board

can bring to the overall functioning of a learning center. Learning center leaders are encouraged to complete the Recommendations Worksheet for Starting and Operating a Learning Center Advisory Board (Appendix B). The process of planning an advisory board with specific ideas about how it would operate and benefit the center can be a very helpful exercise and may ultimately support a request to administration. In lieu of a formal advisory board, a learning center director can also meet informally with individuals or small groups to discuss the learning center operation and gain ideas and support for improvement. In addition, a learning center director can speak to center concerns in other campus or institutional committee meetings and perhaps add agenda items to those meetings to place some focus on the learning center.

Limitations

Although the survey reported in this article had a significant number of respondents, the survey responses did not comprise a random sample of learning centers. Thus, the results have limited statistical validity. Also, because no survey responses were received from any 2-year private colleges, the survey results may not be typical for this institutional category.

Conclusions and Recommendations for Practice and Future Research

Only a small percentage (11.7%) of learning centers have advisory boards despite decades-old recommendations from professional organizations and some of the most respected founders of the field of learning assistance. Benefits of learning center advisory boards elicited in this study strongly support the value of an advisory board. With two major reasons for not having a board being (a) never having considered one and (b) not understanding what a board does, a greater emphasis by professional organizations on learning center advisory boards may be a key to encouraging increased adoption of the practice. Additionally, we urge learning center administrators with successful advisory boards (a) to present at regional and national conferences, perhaps in conjunction with a board member external to the learning center; (b) to submit articles

on their experiences to journals or newsletters of professional organizations; and (c) to serve as mentors for new learning center directors.

The survey conducted for this research has shed light on current practices for learning center advisory boards. We suggest further research to include in-depth reviews of well-established, successful learning center advisory boards. Such research may provide additional layers of detail on implementation, operation, and benefits of advisory boards. Interviews of selected learning center administrators with and without advisory boards and administrators of those centers that have abandoned their advisory boards could provide greater insight to benefits, potential pitfalls, and success criteria for learning center advisory boards. Research on the perspectives of board members external to the learning center may be particularly helpful in determining board candidates and future directions and actions for advisory boards. Another avenue of research is to identify how some boards have persisted for many years while others have been abandoned when personnel or organizational changes have occurred.

We believe that the benefits of learning center advisory boards are compelling and strongly urge center administrators to implement them. At the same time, we recognize the paucity of information on effectiveness and use of learning center advisory boards. To assist in getting started with advisory boards, we offer the following brief outline based on our review of the literature and results of the survey:

- Identify and collaborate with a champion for the learning center—who is not part of the learning center.
- Develop a draft mission, charter, or purpose statement for the board.
- Identify candidates and recruit board members.
- Determine specific activities for the board.
- Determine how often and when to meet.
- Devise a draft agenda—for the first meeting and for a typical meeting
- Schedule and conduct the first meeting. Provide a copy of the agenda and other materials in advance of the meeting. Send a meeting reminder one or two days prior to the meeting.

See Appendix B for a worksheet to assist in marshalling ideas for starting and operating a learning center advisory board.

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Appendices

Appendix A: Introductory Note

In order to introduce the learning center advisory board survey, we posted the following note to LRNASST and to the membership lists of NCLCA and ACTLA:

Dear Learning Center Cohorts,

Thank you in advance for your support for this learning center advisory board project. You are receiving this survey because you are involved with a college or university learning center. In an effort to enhance our profession's knowledge base about best practices for learning assistance programs, we have created a survey to collect data on usage and benefits of advisory boards for learning centers. In addition, we want to identify reasons that many collegiate learning centers do not have an advisory board.

Your responses are important whether you have an active advisory board or not. The survey is "branched" to minimize time needed to complete the survey. If your learning center does not have an advisory board or your board is inactive, then we estimate the survey will take about five minutes. If your learning center has an active advisory board, we estimate that the survey can be completed in 10-15 minutes.

Data is anonymous (unless you choose to provide your contact information) and will be reported collectively. Shared or published results will not identify specific institutions or learning centers. Because of this, we ask that one person be designated as the representative from your center to complete the survey so that we receive just one response per collegiate learning center. Please complete the survey as soon as possible. Results of the survey will be reported through the National College Learning Center Association and are intended for publication in a professional journal in the field of learning assistance. The results and recommendations will in turn help centers that don't have an advisory board and want guidance to establish one.

Please go to this link to complete the survey: https://goo.gl/forms/B6UP90O2Ac1nymSE2

Thank you for contributing to research intended to help learning centers function with highest impact. We greatly appreciate your time and effort in participating in this survey.

Thank you!
Dr. Alan Craig, Georgia State University, Perimeter College
Dr. Jacqueline Harris, Emerita, Ball State University
Dr. Elaine Richardson, Professor and Director Emerita, Clemson University

Appendix B: Recommendations Worksheet for Starting and Operating a Learning Center Advisory Board

Having an established advisory board in a learning center is considered a best practice by multiple professional organizations. NCLCA includes the use of an advisory board as one of the criteria for certification as a Learning Center of Excellence. This worksheet is based on established practices and results of a research survey on advisory boards in learning centers.

Benefits of having a learning center advisory board include:
- Increased collaboration on campus
- Strengthened campus partnerships
- Improved relationships with academic departments and faculty
- Enriched perspectives on marketing, programs and services
- Enhanced voice for students in the direction of the center
- Enhanced professional feedback on center mission, goals and objectives
- Increased advocacy for the learning center
- Increased faculty involvement

Determine Purpose/Mission

A key recommendation in developing an advisory board is to create a purpose or mission statement based on the mission, goals and objectives of your learning center.

Consider: provide advice/counsel/guidance, gain ideas for marketing the center and programs, provide a sounding board for center director and staff, assist with developing collaborative relationships or strengthening current relationships with key stakeholders, prioritize programs and budgets.

Example: Advise the Learning Center Director on ways to increase the impact of the Learning Center.

Your purpose? _____
_____ _____
_____

_____

_____

_____

Determine Specific Activities for Your Advisory Board

An effective advisory board will have clearly established activities or goals. These activities will set the stage for establishing a successful advisory board.

Consider: providing input for prioritizing learning center initiatives, services, and budget requests; acting as a sounding board regarding learning center tactical and strategic plans; ensuring collaboration opportunities are maximized; reviewing the status of the learning center operation, budget, services, and initiatives.

Your goals for key activities: _____

_____ _____

_____

_____

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_____

Identifying Board Size and Members

The average board size is 9-12 members and it is not related to size of the institution. The actual size may be less important than selecting the right members who will help you accomplish your purpose/ mission; consider the key stakeholders. Some learning center directors request appointments from key areas, and others invite specific individuals from those areas. Membership will depend on multiple factors, including the mission, goals, and function of the learning center. The center director may serve as the chair, or members of the advisory board may elect a chair. Usually the learning center director schedules and leads the meetings; however, it may be more beneficial to have someone from the advisory board to serve as chair.

Consider: Faculty from key areas supported, key administrators, housing/student life representatives, academic advisors, disability services, veterans' affairs, athletics, student body representatives, or others who have a vested interest in the learning center services, mission, and goals.

Your Proposed Advisory Board Membership: _____
_____ _____
_____
_____
_____
_____

Your proposed Board Chair: _____

Term Limits and Meeting Frequency
Decide how long you would like members of the board to serve and how often you would like the board to meet.

Consider: Some boards have 1-year term limits for members, especially for student representatives; other boards have term limits of up to three years. Some review membership annually, often inviting current members to continue. Others have no term limits.

Advisory board meetings may be held monthly, twice a semester, each semester, or annually. The learning center director needs feedback on budget opportunities in time to include them in budget requests. A meeting prior to the start of the academic year helps ensure the program is focused and visible.

Your proposed member terms: _____
_____ _____
_____

Your proposed meeting frequency and schedule: _____
_____ _____
_____

Final Thoughts

Many learning centers formalize these choices to create a set of
bylaws for the advisory board so that all understand the purpose and
operational rules of the board. In addition, someone from the board
or the learning center should be responsible for taking minutes to
provide a record for each board meeting. Lastly it is important that
the meetings be planned and conducted well—if needed, review
methods for running effective meetings.

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Strategic Collaboration for Richer Assessment: Educational Data Mining to Improve Learning Centers

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Abstract

Learning center leaders can expand their assessment and research practices by partnering with research faculty. Research faculty should consider integrating learning centers into their formal research portfolios. This study describes such a research partnership. The authors, a tenured mathematics faculty member and the director of a college quantitative skills center, used education data mining to explore whether underrepresented groups in mathematics had equitable access to tutoring services. Disproving the researchers' initial thinking, this research suggests equitable access across groups underrepresented in math. However, it raises other STEM equity questions including the impact of the required placement test.

Introduction

Learning center assessment serves several crucial functions, including guidance to improve services, effective use of resources, and demonstrating value to campus leaders and other key stakeholders (Babcock & Thonus, 2018). However, learning center administrators must make hard choices about the depth and scope of assessment activities; energies and monies dedicated to assessment are not available to directly serve students. Learning center leaders have become expert at walking this line: constructing meaningful, impactful assessment strategies using the fewest resources possible. One avenue for extending learning center assessment work is for leaders to recruit research collaborators from within their campus communities. Cross-disciplinary partnerships offer one sustainable model for conducting impactful learning center assessment.

In this paper, we present a model for conducting research on learning center effectiveness that is more time- and resource-

intensive than typical learning center assessments permit. Author 2, the learning center director, advocated for Author 1, a tenured faculty member, to collaborate on this research in such a way that it became part of Author 1's formal research portfolio. By framing the learning center as an important site of study and linking research questions to themes already in Author 1's research portfolio, Author 2 was able to extend her own research efforts while still attending to requisite administrative and managerial tasks. Establishing this partnership enabled the authors to embark on a research program that far exceeded the capacities within the center or with the campus institutional research office. Indeed, crafting a research agenda framed around the effectiveness of the learning center without the usual constraints of "in-house" assessments has greatly expanded the purview of our research questions.

In the present case, we describe a cross-disciplinary collaboration where a math education researcher (Author 1) uses "light" educational data mining techniques on a large existing database to open up questions on the impact of a learning center on increasing gender equity in STEM education. We describe the campus context, our rationale for choosing to focus on mathematics, our educational data mining process, our results, and conclusions. Finally, we posit that these types of collaborations between faculty and staff can benefit both the learning center and the faculty's research portfolio as well as strengthen campus assessment of programs.

The Campus Context

The university featured in this study is primarily a commuter campus with a student population of approximately 6,000 and which has a commitment to underserved students. In 2014, the university formed a new School of STEM and reorganized mathematics into the new Division of Engineering and Mathematics. The university's Quantitative Skills Center (QSC) is an important part of this thriving campus environment focused on STEM education. The QSC is a drop-in quantitative peer tutoring center which helps students in all quantitative subjects including math, physics, accounting, engineering, and computer science. Staffed by a team of 30 trained peer tutors, the QSC is a drop-in center, open over 50 hours a week during the

academic year. The QSC is a key component of operationalizing the campus' STEM education equity agenda.

Informed by growth mindset pedagogies (Dweck, 2016), tutors help students see themselves as quantitatively competent as they increase their quantitative reasoning skills. The QSC is a popular destination for students: it has outgrown its space twice in the past decade and provides over 12,000 tutoring sessions a year. Prior to this study, we had not systematically assessed usage patterns for gender and racial equity. Author 1 raised this as a researchable question, one of vital importance to Author 2 and with clear links to Author 1's existing research agenda. Author 1 proposed a multi-staged research process, beginning with mining patterns in the existing corpus of data since the inception of the School of STEM. Patterns revealed through the data mining process would then drive the subsequent qualitative research efforts to follow up on why those patterns may be happening.

Mathematics as Gatekeeper

Students in developmental mathematics and gateway mathematics courses make up a large percentage of the students who use campus drop-in quantitative tutoring services. Approximately 30% of students entering 4-year institutions will be enrolled in at least one developmental math class with the rest in a gateway class such as calculus (Chen & Simone, 2016). This percentage is significantly higher among Latinx, African American, first-generation, and low-income students (Jimenez et al, 2016).

Research suggests that taking developmental courses increases students' time to degree completion and thus significantly decreases their chances of graduation (National Center for Public Policy in Higher Education, 2010). Some analysis shows that students who have to take at least one developmental class are 60-70% more likely to drop out of college than those who start in a gateway course in their first year (Armstrong & Zaback, 2014). This statistic is associated with a large number of students who fail to complete this developmental coursework (Chen & Simone, 2016). In light of these numbers, we are motivated to understand the effect of drop-in tutoring services on student success in these developmental and

gateway courses as well as in students' persistence toward a degree. In the current study, we wanted to gain a more complete picture of the role our campus' QSC plays in supporting students through the developmental and gateway mathematics courses.

Research Questions and Methodology

Informal observations led researchers to suspect that women and underrepresented minorities used the QSC at lower rates than other students. If confirmed, this would cause us to explore how to restructure the center to be more equitable for all groups.

We thus began this study to answer the following questions:

1. What differences (if any) exist in QSC usage by female vs male students in developmental and gateway mathematics courses?
2. What differences (if any) exist in QSC usage by students in developmental and gateway mathematics courses from underrepresented groups in STEM vs students who are not underrepresented (i.e., White and Asian students).

As is often the case when mining large data sets, the exploratory data analysis used in this study led to many more questions than it answered.

In the current era of "Big Data," decision-making informed by data mining has become a core practice in business and industry. Companies use complex information and customer data to mine for historical trends and to create models for predicting future patterns of customer behavior. These data analytics, in a broad sense, apply procedures from computer science, mathematics, and statistics to extract usable information from very large datasets. The education sector has been slower to implement similar data analytics to improve educational practices. The use of appropriate educational data may help to maintain a consistent focus on improving teaching and learning (Leithwood & Riehl, 2003) and help to discover hidden patterns which may contribute to some of the current challenges in education such as lack of diversity in STEM fields.

Although the process of data mining may reach very complex stages which can be intimidating to many researchers, it typically also offers less complex yet valuable stages such as scalar and bivariate data visualizations and simple data manipulation which shed light on the path for a heavier lift into more complex analysis and data mining approaches (Li, 2015). The study featured in this paper is an example of the knowledge that can be discovered through examining educational databases at even this earliest point in the data mining process. As such, these earlier visualizations and analyses helped to amplify our understanding of data connections that could not be seen when only examining the abstract data pulled from a database (Stahl, Gabrys, Gaber, & Berendsen, 2013; Card, Mackinlay, & Schniederman, 1999).
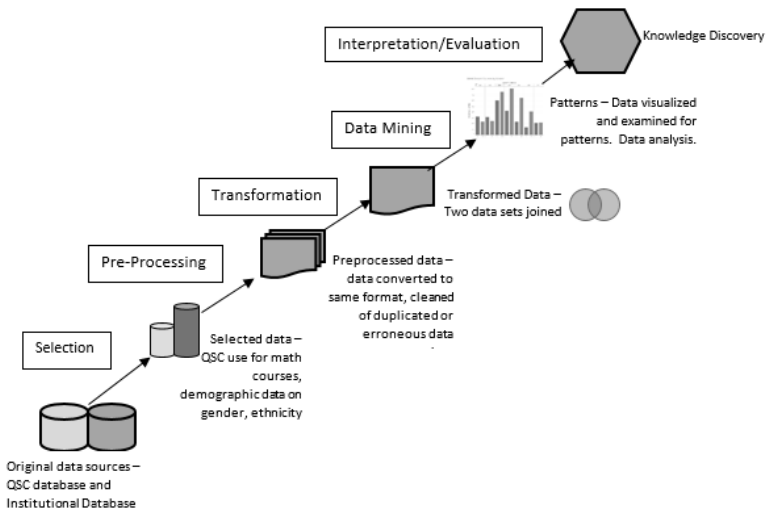

Figure 1: Application of Knowledge Discovery Process (Fayyad, Piatetsky-Shapiro, Smyth & Uthurusamy, 1996)

In this study, researchers sought to use the Knowledge Discovery Process (KDP) (Figure 1) and employ educational data mining, learning analytics, pattern recognition, statistics, and visual data analytics to determine usage patterns in the QSC. The KDP seeks to extract knowledge from data in large databases through high-

level applications of data mining techniques. We applied the KDP to explore our two research questions.

Author 1 gained access to usage data from the QSC from 2014-2017. This data contained all information from students who visited the center for any quantitative course, not solely mathematics courses. Since this study only focused on selected developmental and gateway mathematics courses, the full data set had to be stripped of instances where students had come for tutoring in other quantitative subjects. Furthermore, since this data only contained student ID number and email, Author 1 gained access to corresponding institutional data with information on gender, ethnicity, veteran status, grade point average, course grade, and major. The two data sets were then put into the same format for processing.

At this point, researchers discovered specific odd instances of duplicated data. On further examination, the duplicated data was being extracted through bad SQL scripts from the main institutional database. This required additional data cleaning to resolve and allowed researchers to give feedback to our campus' institutional research office regarding problems with the extracted data.

After the intensive data cleaning process, we joined the data using Tableau software and removed all identifying student data. The resulting join produced 14,147 data points corresponding to all students in developmental or gateway math courses from 2014-2017 and each time they visited the tutoring center for one of those courses. There was a nominal loss of data (n = 423, <3%) from students who could not be paired due to incomplete records. Joining the two data sets allowed for filtering the larger set of data by gender and ethnicity as well as building visual displays of data (Figure 2) in order to harness the visual capabilities of humans to look for patterns and structure (Johnson et al. 2010). Visual data analysis makes it easier to interpret large collections of complex and multidimensional data such as is featured in this study.
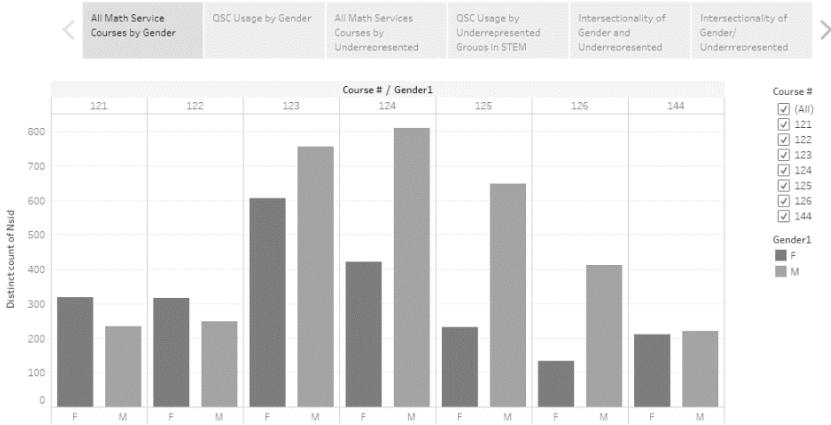
Figure 2. Math Developmental and Gateway Courses & QSC Use 2014-2017

Once patterns were identified in the data, formal statistical processes were conducted to test for significance. When testing equality of gender representation in the QSC, tests for equal proportions (Hollander & Wolfe, 1999) were run to determine differences in gender use for each course. However, ethnicity was distributed across three categories, thus a Pearson's x^2 test for goodness of fit (Devore, 2016) was conducted to determine if the number of observed students utilizing the QSC from each ethnicity category was different from the expected number of students which was based on the distribution of students in the course from each ethnicity category. Third, since the data on the rate of use by individual students using the QSC in a given quarter is count data which is discrete, not normally distributed, and highly skewed to the left yet not zero-inflated, two sample Poisson rate tests were used to measure the difference in the use rates for gender (Ostle & Malone, 1988). The significant skewness in the data was a result of "power users," students who visited the QSC multiple times per week in order to do homework or just "hang out."

Results & Discussion

Gender

Contrary to the authors initial "hunches" based on anecdotal and casual observational data, this research showed few significant

differences in the proportion of women using the QSC per course compared with the proportion of women in the course (Table 1). As Table 1 shows, with the exception of Calculus III and Business Calculus, all of the courses had a negative Z value. A negative Z value corresponds to a higher percentage of women from each course utilizing the services at the QSC. This suggests that the reason we "feel" like the QSC is dominated by male students is that there are significantly fewer women in mathematics courses in general. Additionally, testing a two-sided alternative for a difference in the rates of use found that women use the center significantly more per course than men. Thus for research question 1, proportionally more women than men use the QSC in the lower, developmental courses and use it more times per quarter. As students gain access to higher level mathematics and pass through the "gate" of Calculus 1 (124), the QSC usage evens out proportionally for women and men; however, women still use it more often. Thus the QSC provides equality of access to services when evaluated solely on gender for a proportional number of visits and rate of use.

Table 1

Proportion of Women Using the QSC per Course

Course Number	Prop. of Females	Prop. of Females going to QSC	Z-Value for Sig.	P-Value	Sample Rate Female	Sample Rate Male	Two Sample Poisson Rate test Z-Value	P-Value
121 (College Algebra)	319/554 =0.576	47/66 =0.590	-2.213	0.033*	4.76	5.56	-1.19	0.242
122 (Precalc I)	315/562 =0.560	62/95 =0.653	-1.679	0,093	7.90	5.677	3.96	<0.001***
123 (Precalc II)	606/1361 =0.445	171/330 =0.518	-2.38	0.017*	8.195	7.225	3.13	0.002**
124 (Calculus I)	422/1233 =0.342	124/289 =0.429	-2.70	0.006**	6.65	6.19	1.43	0.151
125 (Calculus II)	231/880 =0.2625	61/206 =0.273	-0.980	0.327	11.21	7.95	6.46	<0.001***

Table 1 Continued								
Course Number	Prop. of Females	Prop. of Females going to QSC	Z-Value for Sig.	P-Value	Sample Rate Female	Sample Rate Male	Two Sample Poisson Rate test Z-Value	P-Value
126 (Calculus III)	134/545 = 0.246	36/147 = 0.245	0.024	0.981	11.94	10.5	2.08	0.038*
144 (Business Calculus)	210/430 = 0.488	36/74 = 0.486	0.030	0.976	7.87	5.19	4.27,	<0/001***

*Note. *p<0.05, **p<0.01, ***p(0.001*

Underrepresented Groups

Our university's database classifies students as "Caucasian," "Asian," "African-American," "Multi," "Pacific Islander," "Native American," and "International." It does not distinguish between particular Asian regions. For this study, the category "International" was removed from the data set since the data on the ethnicity of those students was not available. The issues around international students were not the immediate focus of the current study; however, they will be part of future work. Students classified as "African-American," "Multi," "Pacific Islander," and "Native American" were grouped together as underrepresented since they are historically underrepresented in STEM fields (U.S. Department of Education, 2017). Thus for ethnicity, there were three groups of students: "Caucasian", "Asian", and "Underrepresented". Although Caucasian and Asian students are not considered underrepresented in mathematics, they were kept distinct to get a better picture of how the three groups utilize the QSC as a resource.

Similar to the data on women, the data showed few significant differences in the number of students from underrepresented groups using the QSC per each course and the expected number of students from underrepresented groups based on the proportion of students in the course (Table 2). Again, contrary to original assumptions, there was a larger proportion of underrepresented students utilizing the services at the QSC rather than smaller. Using Pearson's x^2

test for Goodness of Fit (Devore, 2016) to test for the difference between the observed number of students in each of the ethnicity categories vs the expected number based on the distribution of each ethnicity in that particular course only found significance in 3 courses (Table 2). In each of these cases, there was a higher proportion of underrepresented groups in STEM utilizing the QSC than Caucasian or Asian students. Thus even though it appeared that there were fewer students from underrepresented groups utilizing the QSC, they actually were utilizing the resource in greater proportions than their counterparts who are not underrepresented in STEM. This is consistent with similar research on center use (Duranczyk, Goff, & Opitz, 2006).

This finding points to the larger systemic issue we found when we analyzed based on gender: underrepresented groups make up a small proportion of students in mathematics courses in general. Thus for research question 2, proportionally more students from underrepresented groups use the QSC in the lower, developmental courses. As students gain access to higher level mathematics and pass through the "gate" of Calculus 1 (124), QSC usage evens out for both groups although both groups use it a similar number of times per quarter. Thus the QSC is providing equal access when evaluated solely on ethnicity.

Table 2

*Observed and expected number (based on the proportion of students in the class)
of students using the QSC per each course*

Course	Ethnicity Group	Observed	Expected	Contribution to X^2	X^2 (2 df)	p-value
121 College Algebra	Underrepresented	43	60(.493) =21.199	22.42	32.407	<0.001***
	Caucasian	4	60(.284) = 17.04	9.979		
	Asian	13	60(.222) = 13.32	0.008		
122 PreCal I	Underrepresented	43	90(.454) = 40.86	0.112	0.273	0.87
	Caucasian	25	90(.301) = 27.09	0.161		
	Asian	22	90(.245) = 22.05	0.0001		
123 PreCal II	Underrepresented	134	315(.356) = 112.14	4.261	6.311	0.042 *
	White	96	315(.337) = 106.155	0.971		
	Asian	85	315(.302) = 95.13	1.079		

Table 2 Continued						
Course	Ethnicity Group	Observed	Expected	Contribution to X^2	X^2 (2 df)	p-value
124 Calculus I	Underrepresented	110	257(.342) = 87.894	5.56		
	Caucasian	63	257(.320) = 82.24	4.501	10.156	0.006**
	Asian	84	257(.338) = 86.866	0.096		
125 Calculus II	Underrepresented	71	190(.315) = 59.85	2.077		
	Caucasian	52	190(.353) = 67.07	3.386	5.707	0.058
	Asian	67	190(.332) = 63.08	0.244		
126 Calculus III	Underrepresented	43	131(.308) = 40.348	0.174		
	Caucasian	40	131(.384) = 50.304	2.111	3.736	0.154
	Asian	48	131(.308) = 40.348	1.451		
144 Business Calculus	Underrepresented	25	67(.299) = 20.033	1.232		
	Caucasian	27	67(.394) = 26.398	0.014	2.753	0.252
	Asian	15	67(.307) = 20.569	1.508		

*Note. (*p<0.05, **p<0.01, ***P<0.001)*

Intersectional Analysis

Treating gender and ethnicity as discrete categories render the experiences of women of color invisible. Heeding the call initially brought forth by Black feminists (Crenshaw, 2016; Hull and Smith, 1982), we extended the quantitative analysis to explore the intersection of gender and ethnicity. This analysis revealed that underrepresented women (i.e., women from minoritized groups which are underrepresented in STEM) used the QSC more than their non-underrepresented counterparts but this finding was only statistically significant in the first course in the sequence. In our data set, 160 out of 309 women were classified as belonging to an underrepresented group. Of the 46 students in the developmental and gateway math classes, 33 used the QSC services. This gave a Z-value of -2.54 with a p-value of 0.011. This negative Z value shows that underrepresented women were more likely to use the QSC services.

One area of note is in the proportion of female students to male students in the two developmental math courses (121 & 122). In these two courses, there were considerably more women than men. That trend reverses upon reaching the second precalculus course (123). This course, along with Calculus I, are the "gateway" courses for students interested in medical school. Other STEM majors require students to take the rest of the Calculus sequence, while Business majors take 144 (Business Calculus). The fact that there is a significantly larger number of women in these developmental courses raises questions about whether the current placement test is an accurate indicator of ability or if it is a barrier to women in STEM. This is an area that warrants further study (McCarville-Kerber, 2017; Flow-Delwiche, 2012).

Limitations of the Study

As with data mining in the corporate sector, the results are shaped by the framing of the questions. In the present study, the research questions guided the selection of the data, types of visualizations built, and the types of learning analytics and statistics applied. This leaves a large swath of data and results unexplored. One area of exploration that this study has led to is to examine why

there are more females than males in developmental math courses. Questions we had at the end of this study surrounded issues of placement, Pell-eligible, community college transfers, advising, and student self-selection to a lower course.

As with all quantitative research, the data can only show relationships and patterns in the data. Inferences about why those relationships are evident can only be made after further study. To delve into causality requires a follow-up qualitative study to understand students' rationale for utilizing the quantitative tutoring center or why they do not. A follow-up study using focus groups is planned.

Conclusion

We offer the present study with the intention of spurring further conversation within and between institutions on the potential of learning center leaders collaborating with research faculty. We advocate for strategic partnerships that benefit both the learning center and the faculty member's research portfolio. We also posit that, at small colleges such as ours, researchers are less isolated when there are vehicles for collaboration across disciplines and job positions; thus the intellectual benefit, as well as a feeling of community gained from such collaborations, benefit the entire research team.

In the present study, we argue that educational data mining holds significant promise as a methodological tool to explore complex research questions in our centers. In this case, we used educational data mining to see if groups underrepresented in math had equitable access to drop-in tutoring services. Contrary to the researchers' initial views based on informal observations and anecdotal data, this research suggests equality of usage across groups underrepresented in mathematics in particular and STEM majors more generally. Even though the research showed equality of use, it did not answer questions of equity. This research also raised vexing questions about the role of our campus' required math placement test. The researchers will continue their partnership to explore this next set of questions aimed at ensuring equitable access to mathematics courses and STEM majors.

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

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