Mentorship, Mindset and Learning Strategies: An Integrative Approach to Increasing Underrepresented Minority Student Retention in a Stem Undergraduate Program

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Introduction

In the United States, growth in healthcare fields and technological changes in other industries have created high demand for workers skilled in science, technology, engineering and mathematics (STEM) disciplines (Carnevale, Smith, and Melton 2011). However, close to one half (48%) of students that enter college as a STEM major will either change to a non-STEM major or leave college without a degree (Chen 2013). Disproportionately low retention of underrepresented minority (URM) students in STEM degree programs continues to limit the overall size, strength, and diversity of the STEM career applicant pool. Gaps between non-Hispanic white and URM students have largely closed in rates of high school graduates who attend post-secondary institutions and in the percentage of first-time, full-time students intending to major in STEM fields. However, the 6-year completion rates of STEM degrees remain substantially higher for white students (43%) than URM students (22-29%) (NASEM 2016). Thus attrition from undergraduate STEM programs, rather than a lack of recruitment, interest or incoming academic credentials, largely accounts for the disproportionately low representation of minority students with STEM degrees (CSRDE 2002; Byars-Winston et al. 2011; NSF 2012).

Mechanisms that better support students through early academic challenges are needed to increase the number and diversity of students entering the STEM workforce. Success in introductory STEM courses plays a pivotal role in STEM student retention (PCAST 2012), and excessive withdrawals from STEM courses strongly contribute to loss of students from STEM programs (Adelman 2006). Challenges typically faced by students in introductory STEM courses can be compounded for URM and first-generation college students, who may be more likely to view early setbacks as indicative of low future potential and not 'belonging' at college (Yeager et al. 2016) and more negatively impacted by traditional STEM curricula and culture that can dissuade student engagement (NASEM 2016). Programs implemented before or alongside early courses can increase retention of URM students by integrating multiple forms of support (for example, Wilson et al. 2012.) Successful programs may:1) provide mentorship and support from peers (Holland et al. 2012; QEM 2009) and faculty (Seymour et al. 2004; Leggon 2009), 2) foster familiarity with university programs and faculty (Nagda et al. 1998; Swail 2000), 3) address student mindset by fostering a growth mindset (Dweck 2008) and introducing an "alternate lay theory" (Walton and Cohen 2011; Yeager et al. 2016), and 4) teach effective learning techniques in the context of STEM material (Novak 2002; Hilbert and Renkl 2008).

1. ***Peer & Faculty Mentorship:*** Mentoring by faculty and peers alleviates social pressures associated with college, softens the transition into the academic community, provides an environment in which to address challenges associated with being a URM student, and promotes coping skills and resiliency (Summers and Hrabowski 2006; Mondisa and McComb 2015). Low income, first-generation students also report mentorship as key to undergraduate success (Levine and Nidiffer 1996). Mentorship also enhances research skills and builds professional and social networks that can reduce the apparent achievement gap between majority and underrepresented students in higher education (Leggon 2009). Students with mentors have higher GPAs and retention rates (Campbell and Campbell 1997) and report increased commitment to their majors (Holland et al. 2012) compared to those without mentors.
2. ***Familiarity with Programs & Faculty:*** Many programs known to increase student success (office hours, academic support programs, student organizations, and undergraduate research) are already widespread across 4-year institutions. However, student use of and/or access to these programs varies. In particular, URM students at predominantly white institutions are more likely to feel intimidated by faculty and less likely to have personal interactions with them than their non-URM peers, although participation in pre-professional clubs and research programs can help (Hurtado et al. 2011). Mechanisms that increase student use of support programs have the potential to make existing programs more broadly effective.
3. ***Student Mindset: Growth Mindset and Alternate Lay Theory:*** Students with a "growth mindset," an understanding that intelligence can be developed, perform better in STEM courses across educational levels than similar students who believe that intelligence is fixed and that setbacks are indicative of ability to succeed (Dweck 2008; Yeager et al. 2016.) If challenges are seen as insurmountable, indicative of an academic trajectory, and/or indicative of a lack of belonging, students may have little incentive to reassess their approach to academics or to seek assistance from faculty, staff, and peers. Fostering growth mindsets can improve student academic success in STEM fields and reduce achievement gaps between advantaged and disadvantaged student groups (Dweck 2008; Walton and Cohen 2011). Presenting incoming freshmen with an "alternate lay theory" that shows academic setbacks as expected, universal regardless of student background or ethnicity, and surmountable (i.e. not necessarily representative of future success) can raise student enrollment, retention and GPAs and decrease racial, ethnic and socioeconomic achievement gaps (Yeager et al. 2016.)
4. ***Student learning techniques:*** Using active learning in the classroom has shown to increase student grades and retention in STEM courses (Freeman et al. 2014). Students can also integrate the principles of active learning into studying, for example through the creation of study materials such as concept maps (Novak 2002). Students with more experience using active learning methods do so more effectively and ultimately achieve greater learning outcomes (Hilbert and Renkl 2008), suggesting that exposing students to such methods early may be particularly beneficial.

Since 2005, the University of Wisconsin-Whitewater (UWW) has been a member of Wisconsin Alliance for Minority Participation (WiscAMP), part of the nation-wide NSF-funded Louis Stokes Alliance for Minority Participation program, which aims to increase the number of underrepresented students achieving bachelor's degrees in STEM disciplines and pursuing graduate degrees. As a

Course	Total Enrollment	URM Enrollment	URM Pass Rates	Non-URM Pass Rates	Pass Rate Gap
Math 141	7277	1341	63%	78%	15%
Bio 141	1493	224	67%	80%	13%
Bio 142	893	116	75%	90%	15%
Chem 102	1736	217	73%	81%	8%
Chem 104	1001	128	78%	87%	9%

Table 1: Pass Rates by URM Status in STEM introductory courses. Enrollment of students in core courses required for UWW STEM majors. A "pass" designation includes students that completed the course (did not withdraw) and earned a C- or higher in the course. Data encompass 2010-2014. Note that Math 141 is a pre-requisite for Chem 102 and, as of Fall 2013, became a pre-requisite for Bio 141.

WiscAMP member, UWW has developed and maintained numerous programs and partnerships aimed at increasing retention of URM students and addressing the achievement gap between URM and non-URM students in STEM majors. Of note, UWW enrolls the fourth highest number of URM students in STEM disciplines among WiscAMP institutions and is unique among WiscAMP institutions in that it enrolls a higher percentage of URM students in STEM (12.9% average annually from 2010-2016) compared to non-STEM (11.8%) majors (UWW defines URM as students with race/ethnicity of African American/Black, Native American or Alaska Native, Hispanic/Latinx, or Southeast Asian, and includes Biology, Chemistry, Computer Science, Environmental Science, Mathematics, Occupational Safety, and Physics as STEM majors.) Unfortunately, approximately one-third of URM students either earn grades of D or F or withdraw from courses that serve as the necessary gateway to most UWW STEM majors. The pass rates of students in the introductory sequences of Biology (141-142), Chemistry (102-104) and Math (141) are low overall, and showed substantial achievement gaps with pass rates 7-15% lower for URM compared to non-URM students from 2010-2014 (Table 1). Across majors at UWW, retention of URM students to their second year (71.5%) and third year (65.6%) of college also lagged behind that of non-URM students (80% to year two, 71.5% to year three) between 2011-2013 (UWW OIRP 2015).

Stem Boot Camp: Program Description

The STEM Boot Camp program was implemented at UWW in 2012 as a "bridge" program to support incoming URM students intending to major in STEM fields. It was designed to increase the success of students through their freshman year and introductory STEM courses and to increase student access to existing academic, social and research programs. Our primary goals were to 1) reduce the achievement gap between URM and non-URM students in core introductory STEM courses and 2) increase retention to their second year. In doing so, we ultimately hope to increase the proportion of URM students at UWW obtaining bachelor's degree in STEM fields and provide a foundation for their future success in STEM careers. Based on numbers of incoming freshmen declaring STEM majors and the proportion of URM students among STEM students we anticipated 40 students annually eligible for the program. We contacted (via email and phone) all eligible students (URM students indicating some interest in STEM majors) as they scheduled freshman orientation and advising, indicating their intention to attend UWW in the subsequent fall. Program applications consisted of short answer surveys. We accepted 11-13 new students annually in addition to 2-3 student program alumni returning in peer mentorship roles, although not all students accepted into the program were ultimately able to attend. Approximately 2 students were rejected annually, based on the application deadline and short answer responses, and ACT scores suggest that accepted students were representative of other URM students in terms of academic preparedness (see Discussion.) Ultimately, 52 students attended and completed the program from 2012-2016 (10.4 new students on average per year, excluding students returning in peer mentorship roles.) Of these 52 students, 35 (67%) declared STEM majors following the UWW designation of STEM majors (28 students in Biology, 3 Chemistry, 4 other), 8 (17%) declared majors in Psychology (5 students) and Social Sciences (3 students), and 4 students (8%) declared majors in Social Work or Criminology.

The SBC program (see details in Table 2) consists of:

1. A two-week summer workshop program for incoming URM students intending to major in STEM that uses STEM material to incorporate elements shown to increase student success

Summer Workshops	The summer workshops were developed and run by two faculty from the biology department of UW-Whitewater (co-authors of this paper). The workshops included: • Assignment to peer mentors selected from program alumni • Discussions about student fears and discussions with professors, peer mentors and upperclassmen about their own fears and undergraduate struggles • Workshops on effective learning, including: growth mindset, active vs. passive learning, note-taking, and creating and using effective study tools • A discussion on active and effective use of office hours • Mock introductory STEM course lectures provided by 3-4 members of the UWW STEM faculty with open question time • Active study workshops with peer mentors and faculty program directors to learn lecture material and prepare for office hours and exams • Mock office hours with UWW STEM faculty following student preparation • Mock exams presented by UWW faculty and graded in class (with feedback) • Mock chemistry laboratory course • Workshops focused on writing in the sciences, finding and summarizing scientific papers, and an introduction to campus writing resources • Discussions about familial and social obligations, support, and boundaries • Introductions to programs available from freshman through senior years designed to enhance and broaden STEM learning and engagement
Academic Year 1	• Encouraged use of campus tutoring services • Invited group discussions and office hours with program faculty mentors • Required meetings with peer mentors (three in fall semester) • Required and guided office hours with STEM faculty of enrolled STEM courses

Table 2: STEM Boot Camp program components

2. Formal mentorship through faculty mentorship and 2-3 peer mentors per 12 students
3. An academic year program designed to strengthen connections within the cohort, between students and peer mentors, and between students and faculty
4. A $1000 stipend per student upon (in part) completion of the summer workshops and (in part) upon completion of first semester meetings and office hours
5. Encouraged enrollment in other programs at UWW and nearby institutions: King Chavez Scholars (UWW), Research Apprenticeship Program (UWW), DSHREP (at Medical College of Wisconsin), McNair Scholars (UWW), Excel (UW-Madison) and mentored research (UWW)

Data Collection & Assessment

Comparative rates (non-URM and non-program participant URM):

We used Chi-square tests to evaluate the null hypothesis that program participation did not reduce the achievement gap between URM and non-URM students in core introductory STEM courses and did not raise rates of URM student retention to year 2. We calculated "expected" Chi-square values (see individual comparisons below) based on course and retention rates of all URM and non-URM students in the same institution between 2010-2014 provided by the UWW Office of Institutional Research & Planning in an independently compiled report (UWW OIRP 2015). For the purposes of comparison with program participants in this paper, data from SBC students were removed for overlapping years (2012-2014).

Retention for SBC students:

University enrollment retention data were collected from student academic reports and transcripts. Students who completed two semesters and enrolled for courses in the subsequent semester were considered "retained to year two." Students who completed four semesters and enrolled for courses in the subsequent semester were considered "retained to year three." Our null hypothesis was that SBC students would be retained at the same rate as URM students not enrolled in SBC, thus we calculated the number of expected SBC students retained to each year using the percent retention of URM students across the University to use as comparative values for all Chi-square tests. Similarly, we used retention rates for non-URM students as our positive control to calculate the expected number of SBC students retained if they successfully overcame the retention gap. We then compared the observed numbers of SBC students retained at UWW to year two (across all 2012-2016 cohorts) and to year three (across 2012-2015 cohorts) with the expected numbers based on URM retention rates and non-URM retention rates (calculated from control data rates) using Chi-square tests.

Pass rates for SBC students:

Pass rate data were collected from student academic reports and transcripts. We assessed pass rates per-student (0 = did not pass, 1= passed) for all SBC students who took any of the five focal STEM courses: Math 141, Bio 141, Bio 142, Chem 102, and Chem 104. Some students tested out of Math 141 prior to enrollment and were excluded from the pass rate calculations. We considered a grade of C- or higher a "passing grade" for courses to standardize our criteria with control data, however for some courses a "C" is necessary to move on in a course sequence. We gave students with multiple attempts at passing a course a composite score based on the average number of successes per attempt; for example, a student that failed twice but then passed a course on the third attempt would receive a score of 0.33. We compared the observed numbers of SBC students that passed and failed each focal STEM course (across all 2012-2016 cohorts) with the expected numbers calculated using the pass/fail rates of all URM students and non-URM students enrolled in each course (from control data) using Chi-square tests.

Course retake and subsequent pass rates for SBC students:

Since the SBC was designed in part to recontextualize and provide tools to address academic setbacks, we also tracked the course retake and subsequent pass rates for SBC students. We used student transcripts to count the number of courses in each cohort in which students did not receive a sufficient grade to move on in the major or course sequence (below C- for math and chemistry, below C for biology), then calculated the percentage of those courses that were re-taken by those students. For the courses that were retaken, we then calculated the percent of retakes that resulted (ultimately) in a passing grade. No comparable institutional data are available for URM nor non-URM students overall in these courses.

Ethical Note:

This study was determined to be exempt from review by the UWW Institutional Research Board for the Protection of Human Subjects (protocol L16706178X).

Results

Retention:

Enrollment retention to year two for SBC students (96%) was significantly higher than the expected retention rate (71.5%) for URM students at UWW (Chi-square $p<0.001$) and even exceeded the University's non-URM rate (80%) of retention to year two (Chi-square $p=0.004$, Table 3). We saw 80% retention of SBC students to year three, which did not differ significantly from URM rates overall (Chi-square $p=0.052$, Table 3).

Program Year	Number of new students funded	Retention to year 2 (completed 1+ years) *UWW URM rate: 71.5%* *UWW non-URM rate: 80%*	Retention to year 3 (completed 2+ years) *UWW URM rate: 65.6%* *UWW non-URM rate: 71.5%*
2012	13	12 (92%)	10 (77%)
2013	9	9 (100%)	8 (89%)
2014	10	9 (90%)	6 (60%)
2015	12	12 (100%)	11 (92%)
2016	8	8 (100%)	*--NA--*
TOTAL	52	50 (96%)	35/44 (80%)

Table 3: STEM Boot Camp student retention to year 1 and year 2. Retention rates to year two of STEM Boot Camp (SBC) students (96%) exceeded the 2011-2013 overall retention rates of both underrepre sented minority students (71.5%) and non-underrepresented students (80%) at the 11 same university. Retention to year 2 was significantly higher for SBC students than for URM students overall (Chi-square test, p<0.001) and non-URM students (Chi-square test, p=0.004.) While not statistically significant (Chi-square test, p=0.052), retention rates to year two of SBC students (80%) were suggestive of a difference from URM retention rates overall that may be verified with a larger sample size. Some students in early iterations of the program re-enrolledfor the subsequent year, most as TA/peer mentors. Therefore, the above numbers denote "new students" only from each cohort. Retention to year 3 does not include the 2016 cohort, currently entering their second year.

Pass rates:

As expected, enrollment of SBC students varied across the five focal introductory STEM courses based in part on student major and course eligibility. As of the summer 2017 semester, total SBC student enrollment per course was as follows (Math 141: 39 students; Bio 141: 35 students; Bio 142: 25 students; Chem 102: 29 students; Chem 104: 22 students). Science Boot Camp student passed at higher rates than expected based on overall URM rates for Math 141 and Chem 102 (Fig. 1, Chi-square tests: $p<0.001$, $p=0.006$ respectively). Although SBC students also had higher pass rates in Bio 141, Bio 142, and Chem 104 compared to expected URM student pass rates overall, the SBC pass rates did not significantly differ from expected rates (Fig. 1, Chi-square tests: $p=0.054$, $p=0.299$, $p=0.14$ respectively). Pass rates of SBC students were also significantly higher than non-URM pass rates for Math 141 (Fig. 1, Chi-square test: $p=0.031$). The SBC student pass rates did not differ significantly from non-URM pass rates for Bio 141, Bio 142, Chem 102, or Chem 104 (Fig. 1, Chi-square tests: $p=0.735$, $p=0.317$, $p=0.058$, $p=0.589$ respectively). The SBC pass rates also generally improved in later cohorts (Table 4).

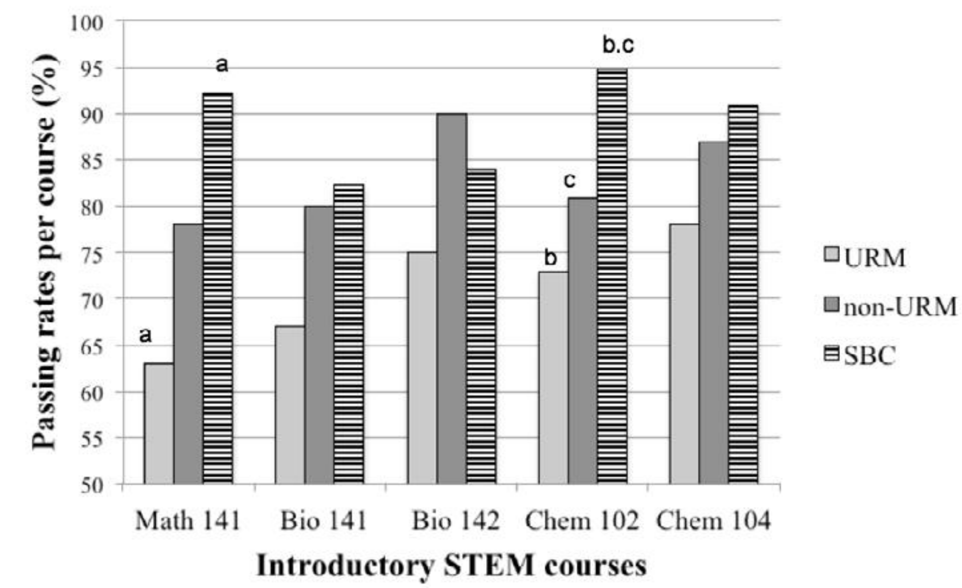

Figure 1: Pass rates in introductory STEM courses for SBC participants (2012-2017) compared to pass rates of other underrepresented minority (URM) and non-URM students (2010-2014) at the same institution. Same letters indicate significance at the α= 0.05 level: pass rates of SBC students were significantly higher than what was expected based on URM student rates for Math 141 (a) and Chemistry 102 (b) only, and were significantly higher than non-URM pass rates for Chemistry 102 (c).

Year	New SBC students	SBC STEM majors (Psych/ SocSci)	SBC students who passed course/ took course (% pass rate)				
			Math 141:	Bio 141:	Bio 142:	Chem 102:	Chem 104:
2012	13	4 (3)	7.5/9 (83%)	5.3/8 (66%)	3.5/4 (88%)	5/5 (100%)	3.5/5 (70%)
2013	9	9 (0)	6.5/7 (93%)	7/8 (88%)	7/9 (78%)	8.5/9 (94%)	6.5/7 (93%)
2014	10	6 (2)	6/7 (86%)	3.5/5 (70%)	2.5/3 (83%)	5/6 (83%)	3/3 (100%)
2015	12	10 (2)	8/8 (100%)	8.5/9 (94%)	8/9* (89%)	9/9 (100%)	7/7* (100%)
2016	8	6 (1)	8/8 (100%)	4.5/5 (90%)	-*	-*	-
UWW URM pass rates:			63%	67%	75%	73%	78%
UWW Non-URM pass rates:			78%	80%	90%	81%	87%

Boot Camp pass rate matched or exceeded 2010-2014 non-URM pass rates
Boot Camp pass rate exceeded 2010-2014 URM rates, but did not reach non-URM rates

Table 4: Pass rates in introductory STEM courses for SBC students in STEM majors. Cohorts in which SBC student pass rates were above overall URM rates in focal classes are shaded light gray, andcohorts in which SBC student pass rates were above non-URM rates are shaded dark gray. Pass rates for URM students and non-URM students overall (2010-2014) are provided below the table for reference. *Additional SBC students are currently enrolled in these courses

Course retake and subsequent pass rates:

In total, students in the STEM boot camp received insufficient grades to progress through core STEM courses in 28 cases (across all five focal STEM courses, our 52 students accumulated 150 initial course enrollments in these courses, 28 of which resulted in a failing or insufficient grade.) Of these 28 cases of failed/insufficient grades, SBC students re-enrolled for the appropriate courses 64% of the time, with the lowest re-enrollment rate (50%) occurring in the first cohort of the program. Overall, SBC students ultimately passed 100% of these retaken focal courses (Table 5).

Discussion

Overall, students who participated in the SBC showed higher early retention and greater academic success through core STEM courses than URM students overall at the same institution. By most measures, SBC students showed similar or higher retention and academic success than their non-URM peers, suggesting that the program was largely successful in helping students counteract factors leading to the ethnic and racial achievement gap at the University of Wisconsin-Whitewater.

Compared to overall URM and even non-URM retention, SBC students persisted to their sophomore year at extremely high rates. Although enrollment to year three did not differ significantly from URM rates, the rates were suggestive of a positive difference that may be verified with a larger sample size. While persistence alone does not guarantee academic success and matriculation, the early retention of SBC participants may reflect an increase in early academic success and/or an increased perception of academic challenges as surmountable. Recent changes to the program include increasing long-term support for students to continue strengthening retention to year 3 and beyond (optional, weekly lunches for current and former program participants and increased education about academic and support programs.)

The pass rates in the five core STEM courses considered (Math 141, Bio 141 & 142, and Chem 102 & 104) generally fell at or above non-URM pass rates. Pass rates were significantly higher for SBC students compared to URM students overall for two focal courses (Math 141 and Chem 102), and significantly higher than non-URM pass rates for one course (Math 141). While not statistically sig-

Cohort	Number of times a core course initially resulted in failed/ insufficient grade*	Number (percent) failed/insufficient courses retaken	Percent retaken courses ultimately passed
2012	10	5 (50%)	100%
2013	8	6 (75%)	100%
2014	6	4 (67%)	100%
2015	3	2 (67%)	100%
2016	1	1 (100%)	100%
Total	**28**	**18 (64%)**	**100%**

Table 5: Courses failed, retaken, and ultimately passed. In nearly two-thirds (64%) of cases in which a focal introductory STEM courses (Math 141, Bio 141, Bio 142, Chem 102 and Chem 104) was initially failed (or earned insufficient* grades) by an SBC student, the course was retaken. All focal courses retaken were ultimately passed by SBC students. *C- or below was considered "insufficient" for biology since a grade of C is a prerequisite for higher biology courses, D or below was considered insufficient for math and chemistry

nificant, the pass rates were also suggestive of a positive difference for SBC students compared to URM students overall in Bio 141 (p=0.054) and compared to non-URM students in Chem 102 (p=0.0581). These might be verified with a larger sample size. Pass rates did not differ significantly from non-URM pass rates for other focal courses. The pass rates that we used to compare to overall URM rates were also calculated as an average of all course attempts per SBC student. This method of reporting allowed a more direct comparison to institutional URM and non-URM rates, but likely underestimates actual core course success rates for SBC students since many students retook and ultimately passed the core courses.

Since much of the program is designed to help students overcome initial setbacks, the 64% rate of introductory course retakes (of courses initially failed or with an insufficient grade) and particularly the 100% retake success rate suggests that the pass rates alone, while still generally positive, may underestimate program impact on early student success. Course retake rates and retake pass rates are not often directly measured or reported in institutional reports, but may be a useful measure of student success (and persistence) to consider when assessing the impact of student programs. The success of student retakes suggests that these students not only persisted but adapted their approach to the course to achieve success.

As with many voluntary programs, the application process required for SBC selection (including a short-answer application) may have selected for students with other factors that might increase the likelihood of success compared to students overall. While our selection process likely increased the chances of accepting students who were motivated to attend our program, participants appeared to be representative of URM students as a whole in terms of academic preparedness. We accepted nearly all eligible applicants into the program who applied, typically rejecting 0-3 applicants per year. We made acceptance decisions irrespective of prior grades or test scores, with priority given to students who applied by the deadline. We filled all remaining spots with late-applicants, giving preference to students with greater depth of responses and indication of strong commitment, self-reflection, and high concern about preparedness. Ultimately, SBC students had ACT scores typical of incoming URM students. The average composite ACT score of SBC students overall was 20.45 (median: 21), which is below that of the University average (22.6 across all majors) and within the range of average incoming ACT scores of URM students from 2006-2016 (annual mean scores for URM students ranged from 18.8-20.9.) Degree-seeking undergraduates intending to major in STEM fields upon enrollment at UWW also have higher ACT scores than those intending to major in non-STEM fields. Less than 33% of students intending to major in STEM from 2007-2016 had ACT scores at or below 21 (the median ACT score of SBC students) compared to nearly 43% of non-STEM enrollees, again suggesting that our application process did not inadvertently select students of higher-than-average academic preparedness. While the program provides detailed feedback on student work, it differs from actual courses in that there are no immediate repercussions or rewards (such as grades) based on student work quality. Motivation of participants to participate in the program may therefore be an important component to the program success.

Future surveys of SBC students are needed to assess the relative impact of program components. However, program components may also create a synergistic effect. By design, the summer program provided students with many tools and techniques that could be helpful in addressing common challenges and setbacks, regardless of their source. Faculty (mentors and guest lecturers), peer groups, and peer mentors also shared their own experiences with facing challenges in their undergraduate years. The repetition of key concepts from multiple sources may destigmatize discussing setbacks and encourage students to seek help and to vary their approach to challenges rather than withdrawing. Many SBC students also formed lasting friendships with other program participants, and actively sought interactions with peer and faculty mentors far beyond program requirements. In fact, the frequency with which students came to faculty and student mentors "just to talk" led to the addition of a weekly, informal SBC lunch-hour, which is now regularly attended by current and previous SBC students. It was often through these informal interactions that students were encouraged to apply what they learned in SBC to actual academic and personal challenges. Following conversations with faculty and peer mentors, SBC students made changes to work and course schedules, set up peer study sessions, sought psychological and academic assistance, applied to research programs and scheduled meetings with the professors of courses in which they were struggling academically. Through the incorporation of mock office hours in the summer program, required office hour visits in the first semester, and continued encouragement to seek out new faculty interactions, SBC may have helped students overcome the higher feelings of intimidation and lower personal interactions with faculty reported by URM students in Hurtado et al. (2013).

The increased early retention rates and academic success of SBC students compared to URM (and, often, non-URM) students at UWW suggest that the program has been largely successful in helping counteract the challenges disproportionately faced by URM students. While continued strengthening of connections to other programs will be important to translate early student success into undergraduate matriculation and retention in STEM careers, programs like the SBC can play an important role in helping students overcome the substantial barriers to success early in their undergraduate STEM careers.

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