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Implementation of a Biology Summer Bridge Program for First-Year Biology Majors

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Abstract

Students are entering higher education at an escalated rate, but many are unprepared for the rigorous coursework that lies ahead of them. As nationwide programs are continuously being implemented throughout high schools to better prepare students for college life, many students are still not equipped with the skills necessary to succeed in obtaining a bachelor's degree. Many students feel discouraged and inadequate when they perform below their academic expectations, and for a large portion of students pursuing higher education, this results in discontinuing their education. While retention rates amongst STEM (science, technology, engineering and mathematics) students are particularly low, the nation is in dire need of students pursuing careers in these fields in order to maintain our globally significant scientific contributions. In order to retain students in higher education, they need to be better prepared from the start. One solution to this problem could be the implementation of a summer bridge program that provides students with the necessary skills needed to succeed during their time at a university.

Introduction

From the fall of 1998 to the fall of 2012, the rate of student enrollment into a postsecondary institution after high school increased by 42%, and is expected to increase another 15% by the year 2023 (National Center for Education Statistics 2016). Due to the massive influx of students pursuing a higher education, studying college retention rates has been of particular interest in recent years (Mattern, Marini, & Shaw, 2015). A college student's first year at a university largely determines not only her success throughout college, but also her chances of obtaining a degree. In fact, the vast majority of students who begin their degree but never obtain it are most likely to drop out between their first and second years at a university (Mattern, Marini, & Shaw, 2015). Additionally, underrepresented minority students, low-income and first-generation college students are four times more likely than their peers to leave their university or college after the first year enrolled (Engle & Tinto, 2008). Academic success, unique to each student, is vital in a student's first year at a university and therefore necessary in shaping the remainder of a student's academic future. In an effort to bridge the success gap in higher education amongst not only at-risk students, but also all students seeking higher education, the implementation of a summer bridge program at Western Michigan University (WMU) should be considered.

According to the National Center for Education Statistics, the six-year graduation rate in 2008 (students who entered college in 2008 and graduated by 2014) for students obtaining a bachelor's degree at a four-year institution was 60%. Much of this failing retention rate can be attributed to the fact that some students perform below their own academic standards within the first couple of semesters, being deemed an "unexpected underperformer" (Mattern, Marini, & Shaw, 2015). Additionally, students who are underprepared to face the rigor of

college also tend to be discouraged and are not retained (Mattern, Marini, & Shaw, 2015). 68% of high school students nationwide will attend college the fall immediately following graduation (National Center for Educational Statistics), and an estimated 75% of those students are underprepared (Kallison & Stader, 2012). As a result, remedial (or developmental) coursework has been implemented in 80% of public four-year institutions throughout the United States. (Kallison & Stader, 2012), WMU being among them. Remedial courses are non-credit bearing for the students, meaning the credits will not contribute to the student's degree. During the 2007-2008 academic year, 20% of first-year students at a university report ever having taken a remedial course in college (National Center for Education Statistics, 2013).

The first step to closing this success gap between high school and college will be to construct a summer bridge program amongst a small cohort of entering biology majors at WMU. The proposed program would make a smoother transition for incoming WMU students from high school to college, raise first-year retention rates of BIOS majors and decrease the amount of remedial courses taken in the fall of the students' first semester. Bridge program students would be introduced to the rigorous coursework they would later experience in the fall and spring of their first year, ideally preparing and inspiring them to complete their Bachelor's of Science. Along with coursework and laboratory experiences conducted at college-level rigor, the program would implement varying aspects of faculty engagement, peer academic success coaching, campus tours, information regarding Registered Student Organizations (RSOs) and how to get involved, introduction to part-time employment opportunities, professional development workshops and Kalamazoo community exploration and networking. Biology students enrolled in this program would find personal academic

potential and success that they otherwise, without the program, may not have found on their journey through higher education.

In order to maintain the high level of scientific proficiencies the United States has been producing the past few centuries, it is projected that the nation needs one million more students graduating with undergraduate degrees in STEM (Report to the President, 2012). Currently, approximately 300,000 students graduate annually with degrees in STEM, but this is only 40% of the students who begin college with a STEM declared major (Report to the President, 2012). According to this executive report, the most financially and economically viable option to decrease this shortage is to maintain those students who originally declare STEM majors and ensure that they graduate and pursue careers in STEM fields. The recurring reasons for poor retention rates in STEM are the lack of enthusiasm for the field after introductory courses and overall deficiencies in math (Report to the President, 2012). Both of these shortcomings will be addressed in the proposed bridge program, in hopes of retaining, at its minimum, that particular cohort of students.

The Data: Western Michigan University

Throughout the 2014-2015 academic year at WMU, 61% of all undergraduate biology courses had DFWI (dropped, failed, withdrawal or incomplete) rates greater than 20%. Biological Form and Function, or BIOS 1600, an introductory and prerequisite biology course for majors, topped the list as having the second highest DFWI rate for all undergraduate courses offered at the university at 53.5%. In the following year, 50% of biology courses had DFWI rates that surpassed 20%, with BIOS 1600 at 34.5%. At WMU, students enrolled in the BIOS 1600 are primarily first-year students seeking to pursue a Bachelor of Science through

any one of the following majors: biology, biomedical Sciences, biochemistry or secondary education in biology.

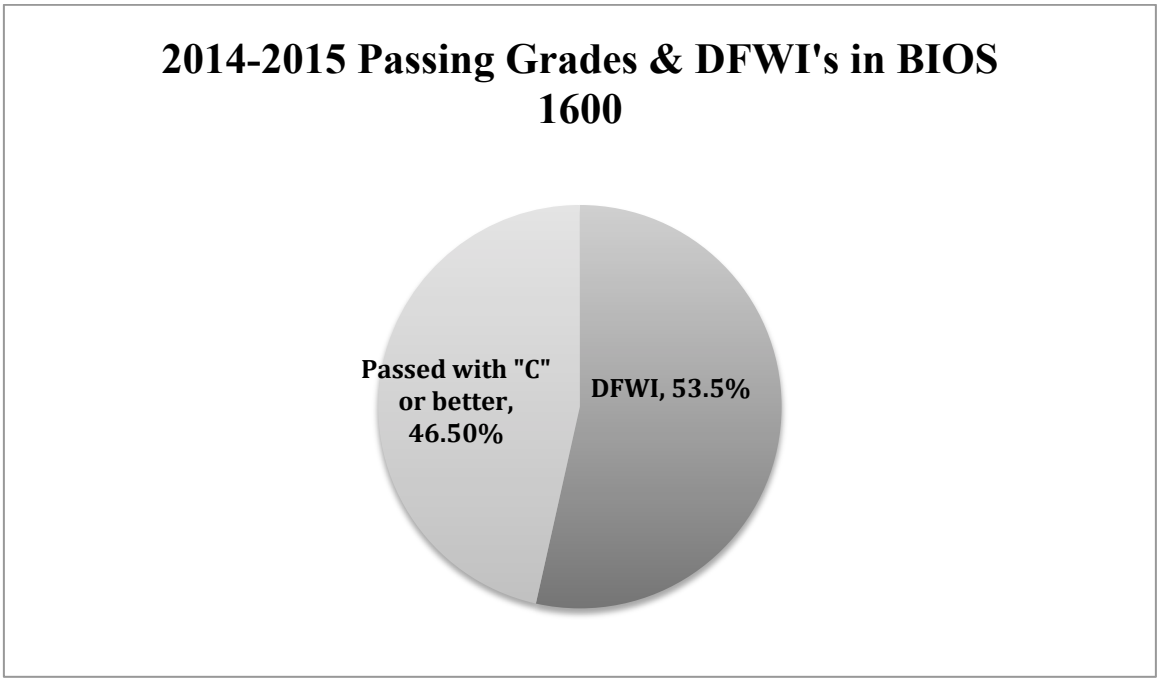

Figure I: Depiction of students who earned a DFWI or passed with at least a "C" in BIOS 1600 during the 2014-2015 academic year at WMU. Total enrollment was 402 students, indicating that 215 students received a DWFI in this course during that semester.

In the 2014-2015 and 2015-2016 academic years, data was collected according to the various races and ethnicities represented, retention information and socioeconomic status of students enrolled in BIOS 1600. During the 2014-2015 academic year, 90 African American students were enrolled in the course and 71 of those students received a DFWI, bringing the DFWI rate for African American students in BIOS 1600 to 78.9%. The lowest DFWI rate (or best success rate) according to race, at 42.5%, was amongst students who identified as white (see Figure II). Similar data from the following year, although overall lower DFWI rates amongst all races, are shown in Figure III.

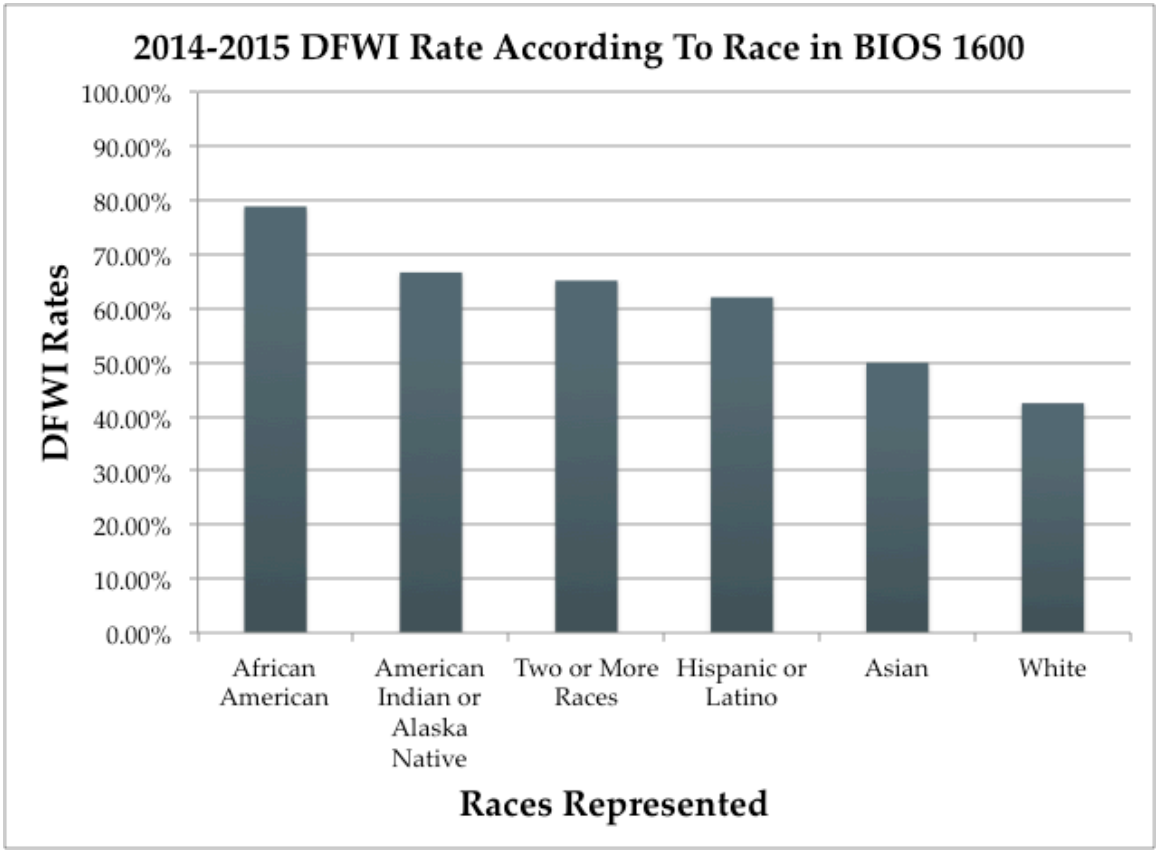

Figure II: 2014-2015 DFWI (dropped, failed, withdrawal or incomplete) rates according to race amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

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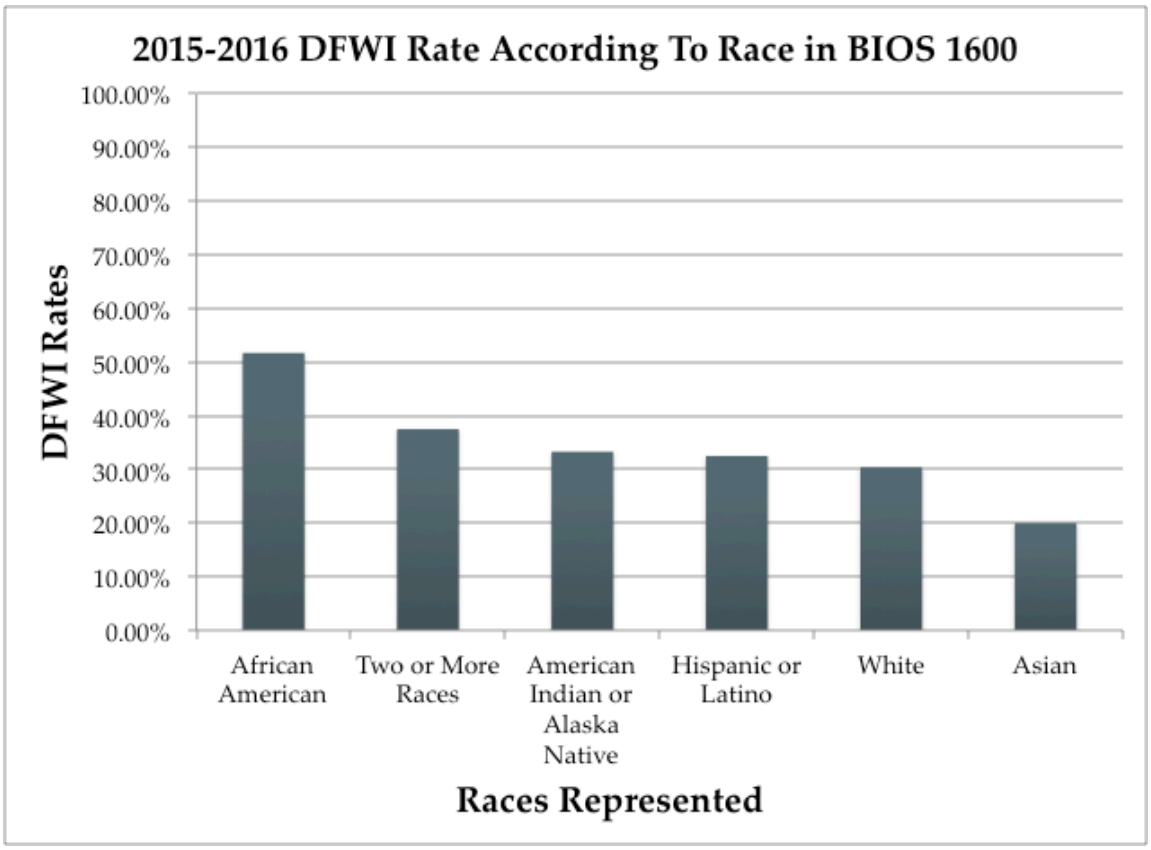

Figure III: 2015-2016 DFWI (dropped, failed, withdrawal or incomplete) rates according to race amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

When assessing the retention data, it was found that amongst the students who were enrolled in BIOS 1600 and were retained within the university (meaning they registered for classes the subsequent semester), 46.8% of them received a DFWI. Out of the students who chose to leave the university the semester following their enrollment in BIOS 1600, 67.2% of them received a DFWI in the course the previous semester. Lastly, amongst the students who were required to leave the university (due to inadequate academic performance), 96.3% of them earned a DFWI the previous semester in BIOS 1600 (see Figure IV). Similar results were found the subsequent academic year, in 2015-2016, as shown in Figure V.

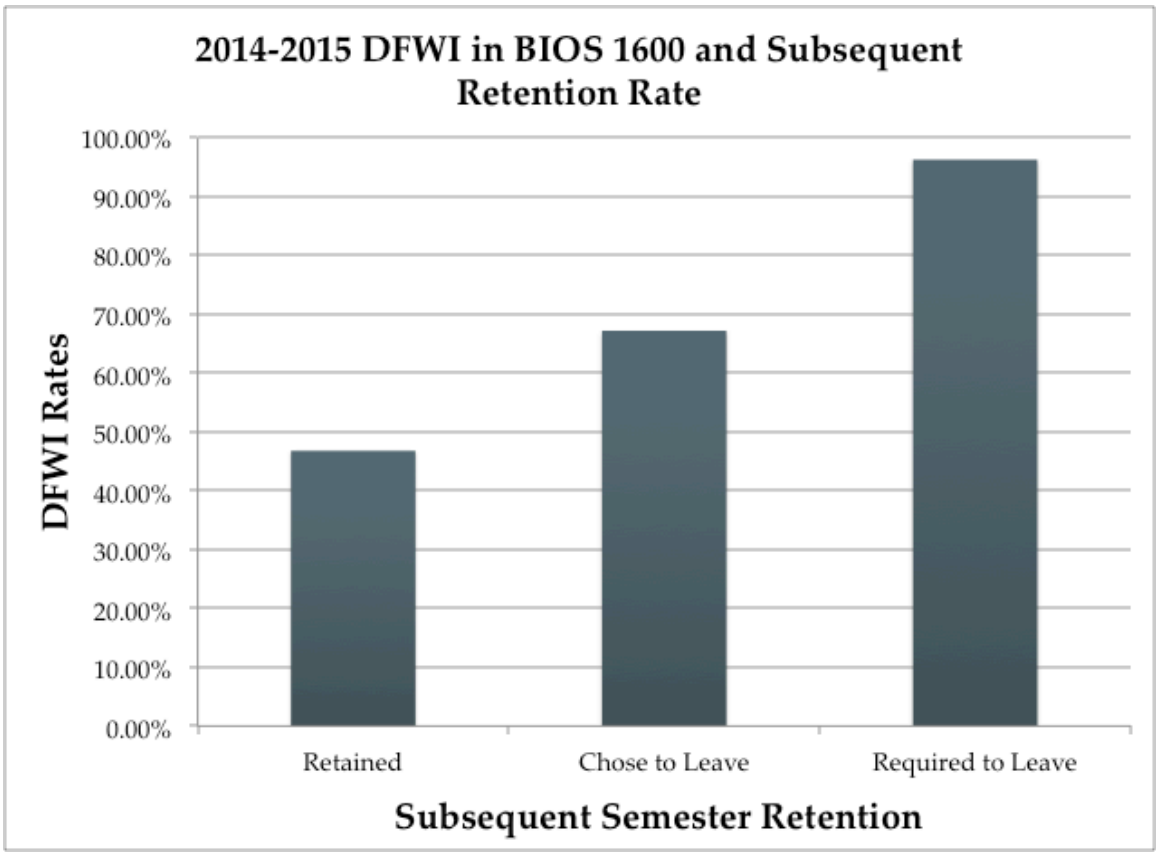

Figure IV: 2014-2015 DFWI (dropped, failed, withdrawal or incomplete) rates according to retention the following semester amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

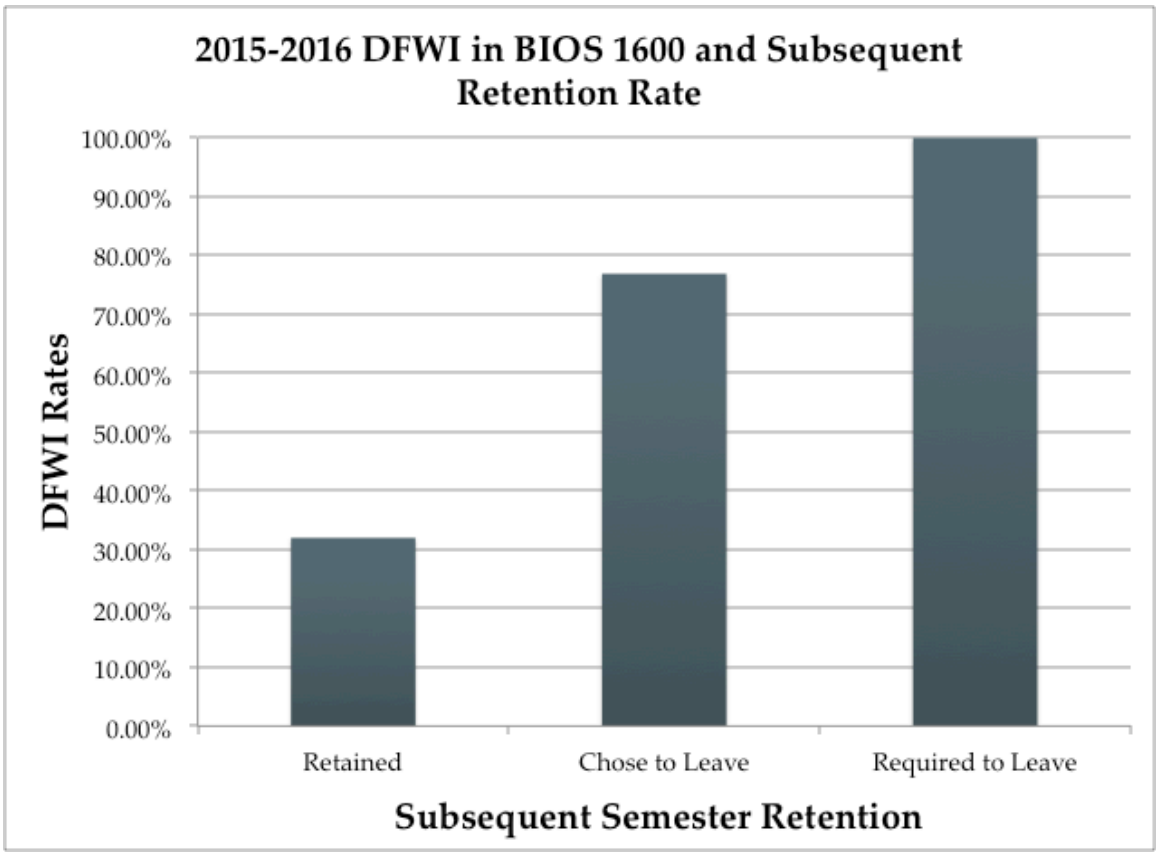

Figure V: 2015-2016 DFWI (dropped, failed, withdrawal or incomplete) rates according to retention the following semester amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

Finally, in the interest of examining low-income, Pell Eligible or first-generation college students compared to their peers, data was collected and assessed amongst those students according to DFWI rates received in BIOS 1600 during the 2014-2015 and 2015-2016 academic years. The Federal Pell Grant is a financial award (previously, $5,775 for the 2015-2016 academic year) given to students from low-income households and can be applied to any of the 5,400 postsecondary U.S. institutions involved (U.S. Department of Education). Although still evident, this separation of students did not seem to have nearly as much of a difference between student groupings. The most significant difference was found in the 2014-2015 data between Pell eligible and non-Pell eligible students, where 61.8% of Pell eligible

students and 46% of non-Pell eligible students received a DFWI. Figure VI and Figure VII show the data for 2014-2015 and 2015-2016, respectively.

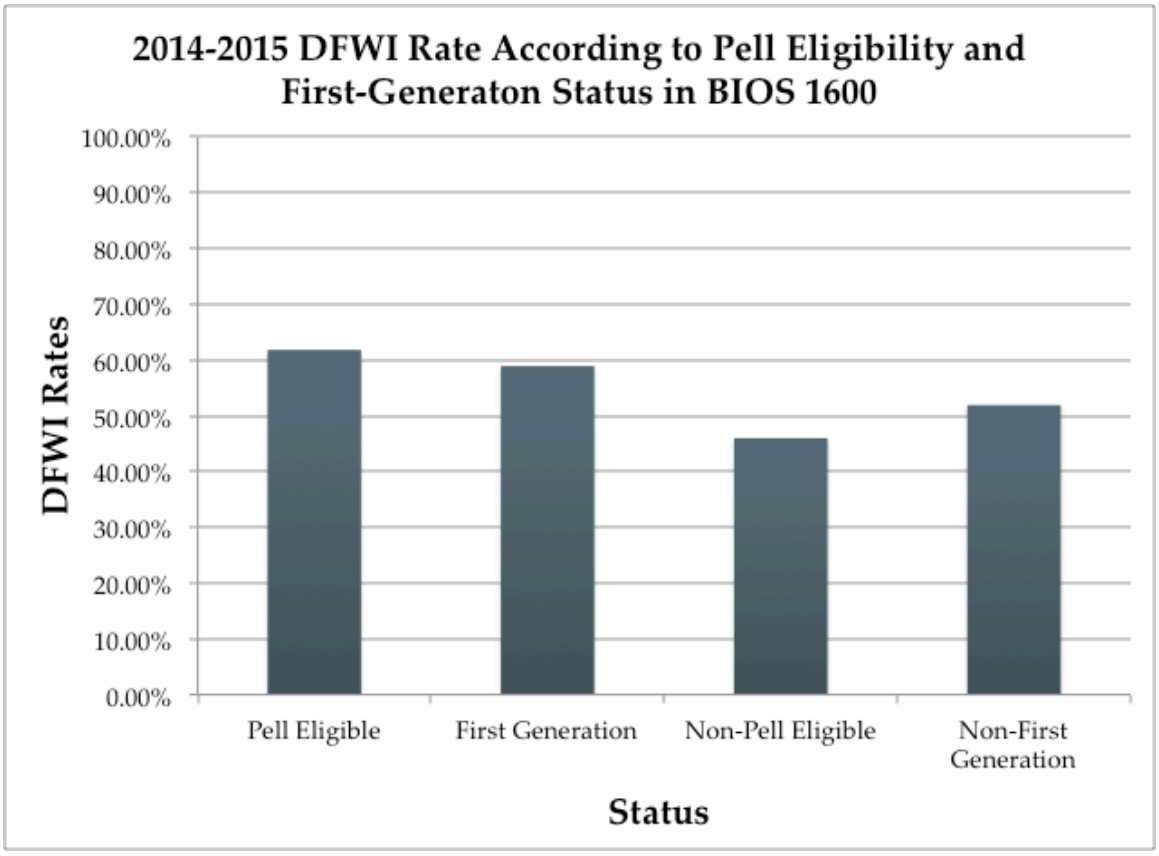

Figure VI: 2014-2015 DFWI (dropped, failed, withdrawal or incomplete) rates according to Pell eligibility and first-generation status amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

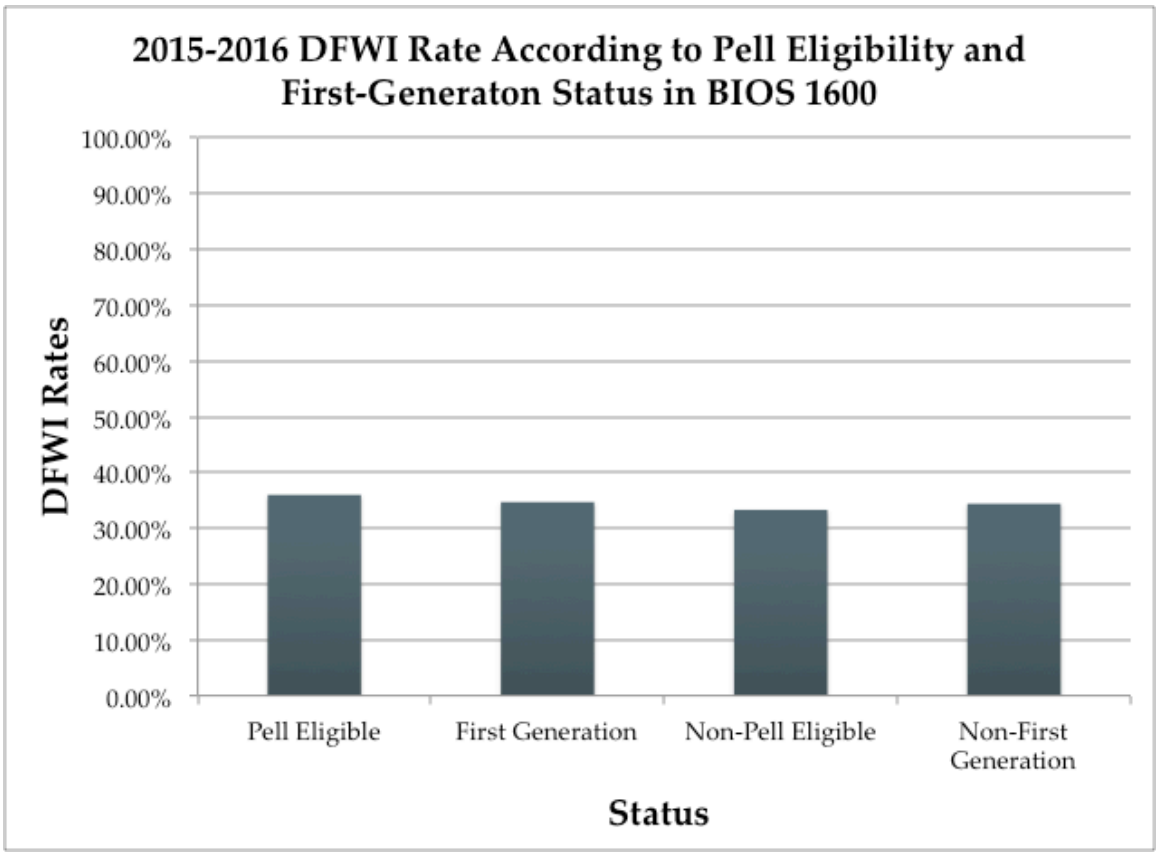

Figure VII: 2015-2016 DFWI (dropped, failed, withdrawal or incomplete) rates according to Pell eligibility and first-generation status amongst students enrolled in BIOS 1600, Biology Form and Function: an introductory biology course at WMU.

Program Details

Many universities offer some sort of bridge program for incoming freshman students (either specific to majors, fields of study, underrepresented minorities, athletes, etc.), to successfully bridge the gap between high school and college. To promote student success among biology majors at WMU, the pilot bridge program will include the following: classroom and laboratory experiences conducted at college-level rigor; faculty engagement; peer coaching; campus tours; Registered Student Organizations (RSOs); introduction to part-time employment opportunities; professional development workshops; and Kalamazoo community exploration.

By implementing the combination of all of the above factors, we hope to see a significant impact on the student success of bridge program participants compared to non-participants. Although it may be difficult to differentiate which aspect of the program led to success for each individual, we hope that at least one aspect of the program will resonate within each participant, subsequently providing positive academic outcomes. This success will be measured by pre and post-program standardized exams, such as the LASSI and ALEKS-PPL (addressed in the *Methods of Assessment* section), to measure overall study skills and skills in mathematics. These will be administered during the first week of the bridge program, which will begin at the start of the summer II session, the week of June 28th, 2018 (the exact start date of the program). Post-program exams will then be administered during the last week of the program, the week of August 17th, 2018 (the exact end date of the program). At the end of a six-year longitudinal study, we will compare bridge participant's academic performance and graduation rates to non-participants. Grade point averages (GPAs) at the end of each semester will be compared to students from similar backgrounds that did not participate in the program. Additionally, semester-to-semester retention in the student's chosen biology major will be monitored to assess retention within biology programs at WMU and will be compared to other programs within the university.

An average day in the summer bridge program will contain structured coursework for a Pre-Algebra/Algebra I combined course and Biological Form and Function (BIOS 1600). Each course will be given in-class instructional time in addition to the two laboratory sessions held twice a week for BIOS 1600. After in-class instructional time, from 3:00 pm to 6:00 pm would be one-on-one time with the student's peer coach, group study or drop-in course assistance in the Bronco Study Zone. Various professional development workshops, tours of

campus, Kalamazoo field trips and other integrated activities would be held in the evenings and on weekends. Only select evenings (two to three times per week) will have designated extracurricular experience time.

Personnel involved in this initial pilot bridge program will include two different faculty members to teach the two courses and a graduate student to teach the laboratory. Because of the rigorous and fast-paced course work, these instructors will implement group discussions, transparent learning and active pedagogy throughout the course. Each course period will have a daily objective-based application problem to be solved with the use of all 20 peers. Peer coaches in the program will play an integral role in aiding student success outside the classroom. There will be three peer coaches who will each commit to 20 hours of work per week. The program director, Katie Easley, Director of Student Success Services at WMU, will oversee program long-term logistics, but will not be present in all instructional and academic skills sessions. A graduate assistant, who will be more present than Katie, will have more of the day-to-day jobs of running the program, like assisting the professors, overseeing peer coaching work, organizing community field trips and planning workshops. Resident Hall Assistants will reside in the students' dorms throughout the program. Graduate students in educational leadership who are seeking to complete their required fieldwork could provide additional support as needed. There will also be a Learning Assistant, an undergraduate biology or similar STEM major-student, who will attend class and hold weekly review sessions to cover class material as needed.

These initial 20 students will be admitted into WMU for the fall of the 2018 academic year. These students will have declared one of the four discussed biology majors. The only academic criteria for student selection will be mathematics ACT or SAT score. The score

must reflect placement into Pre-Algebra based on ACT score of 16 or less or an SAT score of 459 or less. In the fall of 2017, there were 84 WMU students who would have been eligible to participate in the program under these criteria. Pre-Algebra at WMU is a remedial course, which is non-credit bearing, but is a prerequisite to subsequent math courses. The math department is currently working to formulate a combination math course that includes Pre-Algebra and Algebra I that will be piloted summer 2017. That way, they will be eligible to enroll in Algebra II, a credit-bearing course, during their fall semester. Algebra II needs to be completed before entry into any other higher-level math courses, and is also a prerequisite for General Chemistry I, a common requirement of many science majors, including all biology majors. Ideally, bridge program students will reach this math course prepared after their summer coursework and will add to the pass rate of this historically high-fail rate class.

Additionally, the program would consist of a diverse group of students from any and all backgrounds. The model cohort for the bridge program would include students from underrepresented minorities, first-generation college students, low socioeconomic status, and also students from none of the described, but had the low-placement math scores based on their ACT/SAT. This diverse group of students, with aspects similar to that of a highly successful bridge program at Indiana University Purdue University, Indianapolis, will ideally resemble the freshman 2018 class at WMU in its entirety. According to IUPUI, with a growing bridge program of now over 500 students, having a diverse group of bridge students allows the data to be compared to an entire first-year entering class (King & Masterson, 2011).

Methods of Assessment

The proposed bridge program will consist of 20 students majoring in biology, biomedical sciences, biochemistry or secondary education in the fall of 2018. This sample size will be small enough to accommodate for the initial budget and resources, but large enough to compare longitudinally against biology students not enrolled in the program. Students will begin the program in the summer II session of summer 2018 and the program will go for seven and a half weeks up until the students move into their housing locations prior to the start of the fall semester. Post-program success will be measured by: student retention rates, study skills progress, first and subsequent year grade point averages, letter grades in introductory biology courses, student involvement in extracurricular activities (on and off campus), and any efforts made in self-development.

In order to accurately assess and evaluate program impact on retention rates, a longitudinal study will follow each program participant until they graduate or leave the university. Retention can be measured by whether or not the participant reregisters for classes the following semester and will then be compared to retention rates amongst non-participant biology majors of the same academic class with similar backgrounds and academic experiences. To determine whether study skills were improved during a student's time in the bridge program, the student's peer coach will administer the LASSI (Learning and Study Strategies Inventory) at the beginning and end of the program. The LASSI is an online exam that prompts students to answer 60 questions regarding 10 different areas of academic skills. The job of a peer coach, who is also an undergraduate biology (or similar STEM) major, is to use the student's pretest LASSI score to build a strong, academically skilled student familiar with current practices in 10 parameters such as time management, concentration and

information processing. Throughout the program, the student will apply these strategies to their summer bridge coursework. To assess academic skill improvement, the LASSI will also be administered at the end of the program and the subsequent pre- and post-program results will be compared.

Grade point average data of each participant will be obtained each semester following the bridge program and then compared to those non-participants biology majors of the same academic class. To account for variance in class load and to focus on the academic impact the program had on performance in biology classes, letter grades assigned to program and non-program students will be compared in the following introductory biology courses: BIOS 1600, Biological Form and Function; BIOS 1610, Molecular and Cellular Biology; and BIOS 1620, Ecology and Evolution. Bridge program participants will be enrolled in three credit-bearing courses throughout the duration of the program, and grades in these courses will also be analyzed. Students will earn credit for Biological Form and Function, the first biology course in a student's pathway to major completion; Biomedical Ethics, a writing-intensive course equipped with current events and arguments in the field of science and healthcare; and the combination math course comprised of both Pre-Algebra and Algebra I learning objectives. Faculty-to-student engagement will be high, with active learning strategies (activities such as group tasks that include dynamic critical thinking requirements in order to complete) continually taking place in and outside of the classroom. Research has shown that an absence of these types of activities, which is normally what occurs in classic lecture-based courses, increases the failure rate 1.5 times when compared to those students enrolled in courses that use active learning strategies in the classroom (Freeman, et al., 2013).

A bridge program student's performance in math will be assessed using the ALEKS Placement, Preparation and Learning Exam (ALEKS PPL). This exam assesses coursework from basic math skills to Calculus I, and will be administered at the beginning and end of the bridge program to determine their fall semester math placement and to assess mathematical progress made throughout the program.

Success amongst social sectors of the university will involve surveying bridge participants of their involvement in Registered Student Organizations (RSOs), clubs, academic societies and/or other social groups on campus at the end of each semester. The Office of Student Engagement (OSE), formerly known as the Student Activities and Leadership Programs, will be conducting various professional development seminars and workshops one to two times weekly throughout the program. Within these workshops, representatives from OSE will introduce the various RSOs there are at WMU, in hopes of sparking interest amongst program students. These involvement efforts will bring extracurricular activities to the same forefront as academics. These survey responses, conducted amongst all bridge program attendees, will then be compared to the average student involvement amongst non-program attendees of the same major and year in college.

The results of the above parameters within the 2018 pilot bridge program cohort will then be compared to all students entering WMU in 2018 studying biology. It is hypothesized that the students who were enrolled in the summer bridge program for the summer II semester of 2018 will score higher on the above measurements than those who did not participate, but qualified. This will support the ongoing implementation of summer bridge programs for other STEM majors within the university, and also for all students entering the university.

Sustainability

The parameters listed above will aid our understanding of what impact the bridge program made on academic and social success amongst students involved. In addition to the qualitative and quantitative data described, the program will include numerous features to warrant not only first year, but also sustained, overall college success. For example, following their summer housing on campus during the program, the entire student cohort will move directly into the Science Scholars hall (a Living Learning Community), in the fall semester to ensure long-lasting, academic-centered living communities amongst bridge program participants. Peer coaching will also continue into the students' first year. Additionally, presentations and visits from employment departments on campus, like BroncoJOBS and the Career Zone, will take place throughout the program. In this effort, we will guarantee a reliable, on-campus fall job for all participants eligible for work-study to increase the likelihood of being retained, as many studies have found that on-campus employment aids in increasing college retention rates (Astin, 1999).

Other Bridge Programs: Evidence of Success

ACT College Readiness Benchmarks have been used to assess college preparedness in high school students who take the ACT. In 2011, only 25% of the 1.62 million high school students who took the ACT met the benchmark indicator for college readiness in all four subjects: English, mathematics, reading and science (Kallison & Stader, 2012). Of these, the lowest score was in science, with only 30% of all students reaching the benchmark indicator. To address this concern, in 2007, the Texas Higher Education Coordinating Board worked to provide grants to institutions planning to build summer bridge programs. Their efforts were then analyzed to see if summer coursework, mimicking that of what the fall semester (and

subsequent semesters) would feel like, would improve college readiness for program attendees when compared to non-program attendees. This bridge program covered remedial coursework in order to ensure a student would begin taking credits toward their degree during their very first fall semester at a university. Overall, a total of 14 postsecondary institutions in Texas, seven public community colleges and seven public universities, participated in this implementation and the subsequent analysis (Kallison & Stader, 2012).

Students enrolled in the bridge program took standardized pre and post-testing exams was administered to students enrolled in the bridge program to gather information on improvements made in the skill areas of reading, writing, and mathematics. Out of the six institutions that had viable quantitative data, the mean reading scores increased in four institutions, stayed the same in one and decreased in one. After using a t-test data analysis, two of the institutions resulted in statistically significant improvements in mean reading scores. Mean objective writing scores increased in four institutions and decreased in one, with two of the institutional increases being statistically significant. Essay writing skills scores increased in four out of five institutions, with three institutions being statistically significant (two having a p-value less than 0.01). Due to smaller sample sizes, no mathematical skills tests showed statistically significant improvements, but two out of four did show an increase in mean scores.

According to post-program surveys, more than 80% of students who attended the various bridge programs made possible through the Texas Higher Education Coordinating Board found it extremely helpful in: improving their study skills, learning about academic resources, understanding how college would further their career goals and improving their reading skills (Kallison & Stader, 2012). Based on this data, the study concluded that it is

imperative to include aspects of professional development, pre and post program surveys and skill evaluations (for data collection purposes), academic support activities, study skills, mentoring and advising, peer support and enrichment activities. We plan to incorporate all aspects of the above parameters into our biology summer bridge program at WMU to ensure lasting success for program attendees.

In the year 2050, 40% of the US population will consist of underrepresented minorities (URM) (National Action Council for Minorities in Engineering), and in 2005, only 15.3% of first-year students enrolled in some sector of engineering programs were URM students (Murphy et al., 2010). In a large study conducted on Georgia Institute of Technology's summer bridge program, longitudinal data was gathered from a 2,200 underrepresented student cohort. The Challenge Summer Bridge Program at Georgia Tech was implemented to increase success amongst URM students prior to beginning their first semester at the university. Implementing summer bridge programs made its way onto the list of Minority Engineering Programs for best practices due to its influence on student persistence to graduate because of the student support and university integration- largely influencing the reason why GTU decided to take on such a task implementing the program into its curriculum (Murphy et al., 2010).

Students in the program take non-credit bearing courses in areas of STEM (science, technology, engineering and mathematics) and English composition, conducted at the exact same rigor as fall and spring classes they will take in the subsequent years (Murphy et al., 2010). Peer coaches, or Challenge Coaches, are undergraduate academic leaders in the program who then persist throughout the students' years at GTU as a helpful peer resource. A unique part of this program goes above and beyond to recognize individual student success at

a post-program banquet and awards ceremony, where students, families and faculty attend to acknowledge the hard work that the program goers have put in throughout the summer. This offers another implementation worth exploring for the bridge program at WMU.

After controlling for varying demographic student data throughout the program, statistically significant p-values were obtained in various parameters of the study to see what factors influence graduation rate. It was found that enrollment in the Challenge Summer Bridge Program does, in fact, play a statistically significant role in determining whether or not a GTU student will graduate (Murphy et al., 2010). Underrepresented students in higher education tend to come from lower socioeconomic statuses and a high school education that may have been behind others (Engle & Tinto, 2008). Georgia Technical University made a change in the way URM students enter college by building a nurturing, yet rigorous, climate for its bridge participants. We hope that our biology summer bridge program will have similar impacts for the underrepresented minority students enrolled.

Despite the lack of abundant research on increased GPAs amongst bridge program students compared to non-bridge program students, one particular study found a significant difference in retention rates between the two cohorts: by the fall of their junior year in college, the program student college retention rate was higher than that of the non-program student retention rate (Walpole et al., 2008). This study, unlike many others, utilized the application of a control group to study the direct impacts of bridge program attendees compared to non-attendees. Additionally, this specific bridge program targeted students from underrepresented minorities, low socioeconomic status or students who performed poorly in high school. The program consisted of a 5-week, academically intensive schedule, with classes in the morning (consisting of mathematics, English and writing), academic counseling and support in the

afternoon and "campus life" activities in the evening (Walpole et al., 2008). A longitudinal study over the course of the beginning of the bridge program up until the spring semester of the students' junior year was conducted and analyzed on the basis of academic aspirations, academic activities, campus activities and academic progress.

Due to the longitudinal nature of the data collected, the sample size decreased from the initial bridge summer cohort, to the fall of the students' first year and again to the spring of their junior year. In order to combat this decrease in data, starting with an initially small cohort of 20 students will allow us to monitor and gather data from the bridge students more easily throughout their time in college. Regardless of the decreased survey responses, the overall percentage of students who participated in the bridge program progressively increased their aspirations of obtaining a master's degree, with 43% of students in the summer reporting as such and 49% of students in the fall of their junior year saying so (Walpole et al., 2008). Additionally, when comparing the fall of freshman year responses to the spring of junior year responses, the percentage of students who *felt bored in class 1-5 times* decreased from 55% to 38%, and the percentage of students who *visited a professor during office hours at least once* increased from 51% to 85% (Walpole et al., 2008). Perhaps the most compelling data collected from this study was the fact that student retention rates for program students was higher than that of non-program students by their junior year in college, with percentages of 72% retention for program students and 69% for non-program students (Walpole et al., 2008). Overall, in an effort to prepare students for success in college by increasing retention rates, ultimately increasing the amount of students earning a bachelor's degree, this study showed that implementation of a summer bridge program may be what underrepresented students need to succeed.

Small Implementations Already Making Big Changes

To address the problem of retention in higher education, educators at Michigan State University are working to achieve a better way of testing a student's conceptual understanding and application of scientific material, instead of testing a student's ability to memorize and regurgitate (Laverty, et al., 2016). This aims to integrate the overarching themes in science that will later assist them in succeeding in upper-level science coursework. At WMU, six courses within the College of Arts and Sciences have been identified as being "gateway" courses: courses that have a high chance of impeding one's ability to obtain a degree in their desired major because of the course's high DFWI rates. One factor that has been implemented thus far, the use of undergraduate learning assistants in gateway courses, has already made a dramatic impact on student learning (see Table I). Learning Assistant-led review sessions held three times a week drew 458 students to take advantage of this resource, and in the end, users compared to non-users had an overall increase of 0.12 on the ending letter grade earned in the course.

Additionally, the department of Student Success Services has begun offering one-on-one Peer Academic Success Coaching to interested students. Results from meeting with a success coach are shown in Figure IIX, where it was found that having a peer mentor in a student's similar discipline vastly increased the student's chance of being retained the following year. A similar implementation took place at a university where degree obtainment in biological sciences among underrepresented minorities was consistently less than 30%. In their Biomentor Program, students enrolled in a gateway biology course were matched with a higher-level undergraduate biology student and participated in small group discussions based on coursework from the class (Mayer, R.E., Christofferson, R., & Fiorella, L., 2017). Even

when assessing differences between commonly academic performance-determining factors such as income and minority status, any student who took advantage of the Biomentor Program had increased success in the course compared to students who did not engage in the program (Mayer, R.E., Christofferson, R., & Fiorella, L., 2017). This shows that vast improvements can be made through the use of peer-assisted learning for all students pursuing postsecondary education.

Fall 2016 Learning Assistant Data for Six Gateway Courses at WMU	
Total Visits	1,680
Unique Student Users	458
Average Course Grade of Users	2.69
Average Course Grade of Non-Users	2.57
Overall Course Grade Impact	+0.12

Table I: Fall 2016 data retrieved from students enrolled in a gateway course at WMU and their final grade received in the course. These six gateway courses implemented the use of an undergraduate Learning Assistant throughout the entirety of the semester (Katie Easley, Student Success Services at WMU). Usage of Learning Assistant-guided review sessions throughout the duration of a gateway course increased success across all six courses with an increase of 0.12 in the ending letter grade obtained.

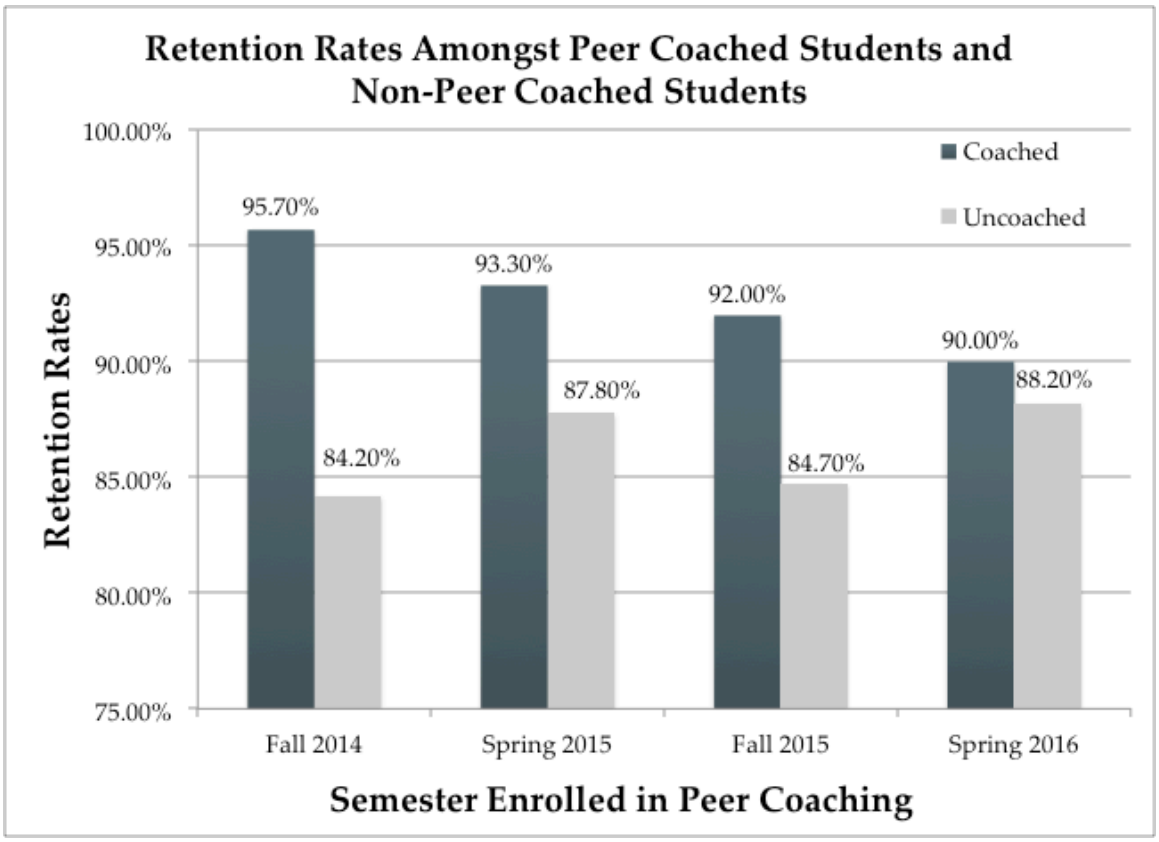

Figure IIX: Student retention data from 2014-2016 comparing students who were asigned a Peer Academic Success Coach versus a student not assigned a Peer Academic Success Coach throughout the duration of the semester.

Conclusion

The proposed biology summer bridge program would make a smoother transition for incoming WMU students from high school to college, hopefully raise retention of biology majors, and promote academic and personal success for each student involved. Ideally, this program will add to the number of students obtaining a degree in STEM fields, solving the problem of this nationwide "students in STEM" shortage. Many universities have adopted such programs, and they have been highly effective. By introducing students to the rigorous coursework they will experience during their time at WMU, the program will confidently instill the necessary work ethic, academic skills and persistence it takes to obtain a degree in higher education. It is clear that underrepresented minorities, low-income and first generation

college students are at an increased risk of dropping out of college. If steps are not taken to bridge this success gap, the nation is at risk of losing potentially thousands of capable and skilled students interested in STEM careers. The College of Arts and Sciences, in addition to WMU as a whole, would greatly benefit from the implementation of this program. A successful bridge program will emphasize the fact that what this population of underprepared students needs is early intervention to equip them with the necessary means to succeed as a student in higher education.

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