

## First-Year Bridge Program at Western Teaching University

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**Abstract:** Universities in the United States experience high attrition rates, which are even higher among first-generation college students, students from economically disadvantaged backgrounds, and academically underprepared students. Many universities have sought to address disproportional dropout among these demographics by creating summer bridge programs intended to increase student confidence, address knowledge gaps, and inform students of on-campus resources. These programs, which have been implemented at a large number of differing institutions, have largely been successful. This paper briefly outlines efforts from other institutions to inform the creation of a STEM-focused summer bridge program at Weber State University, a western teaching university in the Rocky Mountain region. Program goals are defined as well as proposed methods for program assessment.

## INTRODUCTION

### **Summer Bridge Programs: Background and Prior Research**

In spite of efforts to remove barriers and support students [1], a large number of individuals seeking a college education do not reach their final goal. From 1968 to 2018 nearly half of the individuals who enrolled in a two or four-year university did not complete their degree. The problem does not appear to be improving when we consider that in the year 2016, only 60 percent of college students completed a bachelor's degree they started four years prior [2,3]. First-generation college students (students whose parents do not have a college degree), and students from economically disadvantaged backgrounds ("at risk" students), are significantly more likely to withdraw from the university without receiving a diploma [4,5,6]. Additionally, attrition has been shown to be even higher among students pursuing a degree in a STEM discipline [7,8]. In order to combat the difficulties specific student groups face, several colleges and universities have created programs aimed at improving college preparation for at risk student populations; these programs take a variety of shapes, forms including: bridge programs, boot camps, summer programs, and college prep programs [9,10].

Bridge programs are a high-impact practice that many universities have adopted to improve the transition of students to college [11]. Prior research indicates that such programs profoundly benefit students aiming for STEM undergraduate studies [12]. Previous literature has revealed that students who excelled in math during the summer bridge program also demonstrated higher first-fall semester GPAs and improved retention rates compared to their peers in other groups [10]. The approaches of these programs vary, but they are generally designed to increase academic readiness, promote inclusion and integration, and introduce students to various support services that are available on campus. The effectiveness of programs

depends on how instructors enhance participants' cognitive skills and how well they link them to social and academic support systems during their initial year of college [11].

Most summer bridge efforts are typically multi-week programs that occur the summer before a student's first year in college. Recently these programs have become more targeted, focusing on a particular student demographic, a targeted set of academic programs, or both [9]. As national attention and efforts have focused on STEM education, an increasing number of bridge programs are STEM-focused and often aim to help students prepare for the anticipated rigor of these programs as well as high attrition rates that are inherent in STEM programs.

### **Summer Bridge Program Guiding Principles & Goals**

The college of Engineering, Applied Science & Technology at Weber State University (WSU), a regional teaching university in the western United States, is in the process of developing a STEM-focused tuition-free summer bridge program to benefit students in the local community who have been historically underrepresented in STEM fields. This program specifically aims to help first-generation students, students from academically disadvantaged backgrounds, and those who are academically underprepared. We have chosen to model our summer bridge program after a successful program that has been implemented at Utah Valley University (UVU) for the past twelve years. In this program, 85% of students completing the program enroll in UVU after high school graduation. Both UVU and WSU are open enrollment, predominantly teaching institutions within their state with missions to serve the local community.

Aligning with successful efforts at other bridge programs [9,13,14], Weber State University's summer bridge program will allow high school students of any high school grade level to participate in the program, rather than students who have just graduated high school.

This model will increase our engagement with students and their families throughout their time in high school helping students to 1) build and foster a connection with college faculty, staff, and mentors, 2) increase their postsecondary readiness, 3) be aware of and excited about STEM degree options, 4) benefit from and understand the support offered by the university, and 5) provide motivated students the opportunity to make significant progress toward their degree before graduating high school. High quality, intentional summer bridge programs can promote a successful transition to college while enhancing retention and social integration for first-generation, low-income, and academically unprepared high school students [13].

The following goals will guide the design and implementation of our new Summer Bridge Program:

- 1) Create an environment where at least 70% of students finish and earn college credits
- 2) Increase student's perceived sense of belonging on our college campus
- 3) Increase student's perceived student confidence in ability to perform academically in rigorous STEM courses
- 4) Increase student's awareness of STEM-disciplines and employment opportunities
- 5) Increase student's awareness of on-campus student resources at WSU, and
- 6) Increase student's persistence and college GPA relative to similar demographic group.

## **PROPOSED METHODS**

### **Detailed Program Summary**

As outlined above, a primary aim of WSU's summer bridge program is to attract future high school age students from our local area, to help them and their families become familiar with our campus, and to help them to gain confidence in their ability to succeed in a college

setting. We plan to recruit high school students from our local community, working to target prospective first-generation students, students from economically disadvantaged families, and academically underprepared students. The program will consist of the students taking college-level classes on campus at an accelerated pace (7 weeks). Classes have been carefully selected that will either prepare students for a wide range of possible STEM fields, that count toward general education if the students decide to change majors, or both. The program will be delivered in a controlled space to facilitate an environment where students will have specialized support – from instructors, mentors, and tutors – to support them in learning and processing the content being delivered. The program will have 30-40 students who will participate in two courses that will provide a head start on an education in the engineering and/or technology fields. In addition, students will participate in several career exploration activities and presentations that will introduce them to the details of college life and the benefits of attending college. These additional activities will be designed to increase students' sense of belonging on a college campus, help students develop college success habits to increase academic performance, and increasing awareness of on-campus resources.

### **Assessing the Summer Bridge Program**

Understanding the effectiveness of STEM summer bridge programs can help future program directors improve their own programs [15]. As prior research suggests [5], we aim to comprehensively understand student outcomes in the program, as measured through pre- and post-program data collection that is measured relative to a control group of students that do not participate. Accordingly, we will use a collection of qualitative and quantitative data collection strategies to systematically assess and evaluate this new summer bridge program and its impacts on student success. First, we will assess our outreach efforts to recruit students for the Summer

Bridge program by analyzing students' demographic characteristics (e.g., socio-economic status, race, gender, current/prior high school) to understand how we serve underserved students. We will gather course-specific feedback for each summer bridge course including student grades, artifacts for student learning outcomes, course evaluation data, and formative student feedback collected by faculty throughout the course. Using surveys, focus groups, and/or interviews, we will gather summative and reflective feedback from students before, during, and after they participate in the program. Surveys and interviews will primarily focus on assessing outcomes directly linked with our program goals: 1) student sense of belonging in a college setting, 2) student confidence in performing academically, 3) student awareness of STEM programs and employment opportunities, and 4) student awareness of on-campus resources.

As suggested by Grace-Odeleye & Santiago [13], "...there is still a great need for research focused on longitudinal and quantitative assessments on summer bridge programs." To address this recommendation, we will also engage in longitudinal assessment, tracking students after graduation from high school to understand and compare their postsecondary outcomes and career outcomes (data permitting) and compare them with a similar group of students who did not participate in the summer bridge program. This will include data like student's GPA, retention/attrition rates, graduation rates, and ideally eventual career outcomes.

## **CONCLUSION**

Summer bridge programs, when implemented effectively and designed purposefully, lead to a more successful transition to college and increase retention among first-generation and underserved college students [1,2,3,4,5,6]. The college of Engineering, Applied Science & Technology at Weber State University, is in the process of developing a STEM-focused summer bridge program to benefit students in the local community, particularly first-generation students,

and traditionally underserved students. Program goals include increasing: student's sense of belonging in a college setting, student's confidence in performing academically, student's awareness of STEM programs and employment opportunities, and student's awareness of on-campus resources. A combination of data collection strategies, including surveys, focus groups, interviews, and student outcomes data will be used to assess student impact and the extent to which the program is meeting its defined goals and help us systematically improve the program into the future.

### REFERENCES

- 1) Simmons, Denise R., and Susan M. Lord. "Removing Invisible Barriers and Changing Mindsets to Improve and Diversify Pathways in Engineering." *Advances in engineering education* (2019).
- 2) US Department of Education, <http://nces.ed.gov/pubs2010/2010205.pdf>.
- 3) Kondratjeva, Olga, Elena V. Gorbunova, and Joshua D. Hawley. "Academic momentum and undergraduate student attrition: Comparative analysis in US and Russian universities." *Comparative Education Review* 61.3 (2017): 607-633.
- 4) Radunzel, Justine. "Examining retention and transfer in relation to incoming student data for first-generation and continuing-generation students: What differences exist?." *Journal of College Student Retention: Research, Theory & Practice* 23.2 (2021): 214-242.
- 5) Ishitani, Terry T. "Studying attrition and degree completion behavior among first-generation college students in the United States." *The Journal of Higher Education* 77.5 (2006): 861-885.
- 6) Latif, A., A. I. Choudhary, and A. A. Hammayun. "Economic effects of student dropouts: A comparative study." *Journal of global economics* 3.2 (2015): 1-4.

- 7) Whitcomb, Kyle M., and Chandralekha Singh. "Underrepresented minority students receive lower grades and have higher rates of attrition across STEM disciplines: A sign of inequity?." *International Journal of Science Education* 43.7 (2021): 1054-1089.
- 8) Chen, Xianglei. "STEM Attrition: College Students' Paths into and out of STEM Fields. Statistical Analysis Report. NCES 2014-001." *National Center for Education Statistics* (2013).
- 9) Ashley, Michael, et al. "Building better bridges into STEM: A synthesis of 25 years of literature on STEM summer bridge programs." *CBE—Life Sciences Education* 16.4 (2017): es3.
- 10) Raines, Joan M. "FirstSTEP: A preliminary review of the effects of a summer bridge program on pre-college STEM majors." *Journal of STEM Education: Innovations and Research* 13.1 (2012).
- 11) Cabrera, Nolan L., Danielle D. Miner, and Jeffrey F. Milem. "Can a summer bridge program impact first-year persistence and performance?: A case study of the New Start Summer Program." *Research in Higher Education* 54 (2013): 481-498.
- 12) Gleason, Jim, Karen Boykin, Pauline Johnson, Larry Bowen, Kevin W. Whitaker, Celina Micu, Dheeraj Raju, and Carter Slappey. "Integrated Engineering Math-Based Summer Bridge Program for Student Retention." *Advances in Engineering Education* 2.2 (2010):
- 13) Grace-Odeleye, Beverlyn, and Jessica Santiago. "A Review of Some Diverse Models of Summer Bridge Programs for First-Generation and At-Risk College Students." *Administrative Issues Journal: Connecting Education, Practice, and Research* 9.1 (2019): 35-47.



- 14) Ghazzawi, Dina, Donna Pattison, and Catherine Horn. "Persistence of Underrepresented Minorities in STEM Fields: Are Summer Bridge Programs Sufficient?." *Frontiers in education*. Vol. 6. Frontiers Media SA, 2021.
- 15) Bradford, Brittany C., Margaret E. Beier, and Frederick L. Oswald. "A meta-analysis of university STEM summer bridge program effectiveness." *CBE—Life Sciences Education* 20.2 (2021): ar21.