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Building a Summer Bridge Program to Increase Retention and Academic Success for First-Year Engineering Students

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Abstract

This paper reports on a grant-funded summer bridge program developed for first-year engineering students who were not academically prepared to start Calculus 1 in the fall of their freshman year. The primary objective of the program was to increase retention and success of first-year engineering students by 1) allowing students to enter their freshman year on-track academically and gain exposure to college-level coursework, 2) providing the information and support necessary to ensure a smooth transition into college, 3) enhancing student interest in and commitment to the engineering field, and 4) helping students build community on campus. The summer bridge program was first offered during the summer of 2014, and had 11 participants. Students took two college-level courses, including Pre-Calculus II, participated in co-curricular workshops, and lived in campus residence halls. Three types of assessment were administered during the program; one survey at the outset of the program to assess student expectations and academic backgrounds, a second survey at the conclusion of the program to gather quantitative data on student satisfaction, and a focus group on the final day of the program to gather qualitative information on student satisfaction. Data from the three assessments indicated that students felt that their expectations had been largely met, and that after completing the program they had improved in their math and writing skills, learned about the field of engineering, and had been successfully oriented to college. Although it is too early to determine the long-term academic trajectory of the 11 participants, based on assessment data already collected, it appears as though the summer program was successful in many of its stated goals.

Introduction

The summer bridge program was developed in conjunction with a multi-year, grant-funded retention program at the Shiley School of Engineering at the University of Portland, a private, Catholic institution. The most recent 10-year average 1^{st} – 3^{rd} semester retention rate for engineering and computer science students at University of Portland is 78.5%, and the average 3^{rd} – 5^{th} semester retention rate is 86%. The average four-year graduation rate is 47%, and the average five-year graduation rate is 60% (based on data from 2000-2010). Most students who do not complete their degrees in the Shiley School of Engineering stay at the university, but pursue a different major.

The University of Portland's engineering and computer science degrees are designed as four-year, cohort-based degrees; as a result, students who are behind in their degree progress (either because they were not calculus-ready when they entered the university, or because they fell behind in credits after beginning their degrees) face many challenges that can impact their academic success and likelihood of persistence in their degree. Indeed, data from the University of Portland's Shiley School of Engineering reveals that sophomores who are on track in their degrees have a 17% higher 3^{rd}-5^{th} semester retention rate than students who were behind in credits at the start of their sophomore year.

National data supports this assertion – studies indicate that engineering students are most at-risk during their first two years of college[1]. Therefore, it is particularly important to support students during this critical period in their education, and help them build the skills necessary to ensure their continued success in engineering.

To help combat this problem, the University of Portland introduced a retention program specifically to assist 1st and 2nd year students who are behind in their degrees, and who are considered at risk of leaving engineering. During the year-long program, students work with a counselor to explore tactics for academic success, and to discuss educational planning (particularly with regards to getting on track to graduate in four years). For many of these students, the perceived inability to graduate in four years, and the financial, emotional, and social complications that go along with being behind in their degree, are barriers to their academic success and desire to persist in engineering. By helping them understand the steps needed to get on-track in their academics, as well as counseling them through the difficulties of feeling "behind" their peers, the retention program hopes to help prevent the attrition of engineering students who have the potential to be successful in the field, but who are deterred because of obstacles in their degree progress.

The summer bridge program, which is one component of the retention program, plays an important role in overall student success by facilitating a smooth high school-to-college transition for first-year students, and offering key courses that will help them start their degree one course ahead rather than one course behind. While the year-long retention program and the summer bridge program certainly work in conjunction with one another to improve student retention, the remainder of this paper will focus solely on the summer bridge program.

Institutional Context

The University of Portland is a private, four-year, Catholic institution serving approximately 3700 undergraduate students; of those 3700, approximately 700 are engineering students.

The School of Engineering at University of Portland offers three engineering degrees (civil engineering, electrical engineering, mechanical engineering) and one computer science degree. The school is teaching-focused, meaning class and lab sizes are relatively small, and faculty members have both teaching and advising responsibilities. In addition to faculty, there are numerous other engineering staff members available to support students, both within the classroom and outside of the classroom. Students also have access to campus-wide offices intended to assist with student development and support.

Background

The retention program started in the 2013-2014 academic year, as the result of a federal grant focused on retention for 1st and 2nd year students. The program is available for freshman and sophomore engineering students who are considered at-risk, and is aimed at improving student success and persistence (in the context of this retention program, "at-risk" is defined as students who are behind in their degree progress. This includes first-time freshman who are not calculus ready, and sophomore students who do not have enough credits to be considered on track

towards graduating in four years). As mentioned above, the program has two distinct components: a year-long retention program, and a summer bridge program for incoming first-year students who are not prepared for Calculus I. Both programs are optional to those who qualify.

In the year-long retention program, students have one-on-one meetings with an academic counselor to discuss academic concerns, personal and professional goals, campus resources, opportunities for engagement, and degree progress. In addition to one-on-one advising, students also participate in academic workshops, including workshops on time management, test taking strategies, effective writing, and reading comprehension.

The summer bridge program at University of Portland was designed as a six-week program for incoming engineering students who were not calculus ready (as determined by a math placement test that all engineering students take prior to entering the university). Substantial research was done in designing the summer bridge, taking into account both pedagogical theory and best practices from other institutions and departments that had implemented similar bridge programs.

Theoretical Basis & Related Work

A considerable amount of research has been published on retention in engineering; as a whole, the body of research that exists on retention in engineering forms the foundation from which the entire retention program, including the summer bridge program, has been developed.

The literature points to a wide variety of reasons that students leave engineering, ranging from student-specific issues to degree-related issues to institutional challenges. Mayer and Marx[7] found two major themes behind student attrition in engineering: individual factors (lack of integration into culture, low academic performance, and loss of motivation) and institutional factors (lack of high school preparation, dissatisfaction with teaching/advising, unwelcoming culture, program difficulty, and financial pressures). Hutchison, Follman, Sumpter, and Bodner[6] found that student retention was greatly impacted by students' self-efficacy, which in turn was impacted by factors such as motivation, understanding of material, and social influences (including peers and faculty). Finally, Bernold, Spurlin, and Anson[3] found that persistence in engineering is related to both student learning styles and study habits, as well as teaching methodologies.

Adding to the existing body of literature, ASEE's publication on best practices in engineering retention[1] highlighted the wide range of programs that universities have developed in reaction to the various issues that affect student persistence. Almost half of the universities profiled in the publication had some form of summer bridge programming available for engineering students, indicating that many institutions recognize the importance of summer bridge programs in the effort to increase retention. The development of the University of Portland's summer bridge was influenced by the best practices that have arisen out of other institutions' summer bridge programs. Two programs that were particularly important in the designing of the summer program were Oregon State University's LSAMP Summer Scholar Program[9] and University of Southern California's Discover Engineering course[14].

OSU's program is a 3-week program for underrepresented STEM students. During the program students learn about the STEM field, participate in leadership development, and connect with peers and faculty. USC's program is a 4 week program for engineering students (by participating in the program students can actually earn college credits). During the program students participate in lectures, fieldtrips, and projects, and learn about the field of engineering as a whole.

Though most of the summer bridge programs that were researched are significantly shorter, and don't require students to complete college-level courses, much of the co-curricular programming, such as workshops, team building activities, and field trips, proved to be useful in designing the University of Portland summer bridge program.

In addition to existing best practices, there were two pedagogical and student development theories that influenced the design of the summer bridge: Vygotsky's theory of social constructivism[15] and Tinto's theory of retention[13].

Vygotsky's theory of social constructivism asserts that learning is collaborative, and relies upon the structure of the community in which the learning takes place. As Vygotsky theorizes:

> The level of **actual** development is the level of development that the learner has already reached, and is the level at which the learner is capable of solving problems independently. The level of **potential** development (the "zone of proximal development") is the level of development that the learner is capable of reaching under the guidance of teachers or in collaboration with peers.

Similarly, Tinto's theory of retention suggests that both academic and social fulfillment play a role in student success. While academic integration is integral to degree completion, social integration reinforces students' commitment to their institution, which in turn influences their overall commitment to their education.

In light of both Vygotsky and Tinto's work, specific aspects of the summer bridge were meant to facilitate students' social development in addition to their academic development. These aspects included maintaining a small cohort size for a more intimate classroom experience, and offering team-building activities and events that would help students get to know one another outside of a their academic environment.

In addition to the research and theories listed above, a host of other student development theories, including Baxter-Magolda's theory of self-authorship[2], Perry's theory of intellectual and ethical development[10], and Seligman's work on flourishing[12], provided another important theoretical underpinning. These theories influenced the big-picture design of both the retention program and the summer bridge program, particularly in understanding what skills students may need to develop as they transition into college and what factors affect college students' growth and success.

Program Information

As mentioned above, the summer bridge program is a six-week program offered for new freshman engineering students who are not prepared for Calculus I. The primary objectives of the program are:

1. Allow students to enter their freshman year on-track academically and gain exposure to college-level coursework
2. Provide the information and support necessary to ensure a smooth transition for new engineering students
3. Enhance student interest in and commitment to the engineering field
4. Help students build community on campus

At University of Portland, all incoming engineering students must take a math placement exam prior to their first semester. The math placement test determines if a student is calculus-ready or if the student needs to take Pre-Calculus II. Because the target population of the summer bridge was a specific one (all those who did not place into Calculus 1 on their math placement exam), it was relatively easy to identify qualifying students after viewing all math placement scores.

In May 2014, after the math placement test deadline had passed, the retention counselor began contacting all eligible students and their families regarding the summer bridge program. Because there was a tight turn-around between the math placement deadline (May) and the deadline to register for the program (June), it was important to advertise the program as efficiently and effectively as possible. It was also important to target both students and parents, since students were busy finishing their senior year in high school, and may not have immediately recognized the benefits of an academic summer program prior to their first official semester of college. Therefore, eligible students received emails regarding the summer bridge, and families of eligible students received informational brochures by mail.

In the Fall of 2014, there were 240 first-year engineering students who accepted admission to the University of Portland. Of those 240, 42 did not place into Calculus 1, making them eligible for the summer bridge program. 9 of the 42 students who did not place into Calculus I participated in the summer bridge program (there were two students who did place into Calculus 1 but decided to participate anyway, bringing the total number of participants to 11). Of the 11 participants, 7 were male and 4 were female.

During the bridge program, students took Pre-Calculus II and Intro to Theology, allowing those who completed both courses to enter their first year not only on track, but one course ahead. While Pre-Calculus II was a necessary course offering, due to the fact that students are expected to be in Calculus I at the start of the engineering program, Introduction to Theology was selected in order to a) provide a balance in course work for students in the program, b) to give students the opportunity to hone their writing skills, and c) to help students complete one of their required university core courses.

Outside of their two courses, students attended presentations by various student support offices on campus, and participated in workshops on topics such as effective writing and “surviving

engineering." These co-curricular activities were intended to introduce students to different resources on campus that could be valuable to them, and to call attention to some of the common challenges that students face during their first year. Students also went on site visits to local engineering companies, in order to familiarize them with the local engineering community, and give them an overview of the various career opportunities available within the field.

Throughout their time in the program, participants stayed in a residence hall together and had the support of a peer mentor, a sophomore engineering student who provided assistance with homework and test preparation, and served as a resource for navigating the transition to college.

Because participants in the program were first-year students, and were new to both college and to campus, their time in the program was relatively structured. The counselor arranged various non-academic activities, such as movie nights and team building exercises. The goal was to organize the program in such a way that students would be able to take full advantage of their six weeks, and would never feel isolated or bored. Appendix A contains a sample weekly schedule from the 2014 summer bridge program.

The entire cost of the summer bridge, excluding meals, was subsidized by the federal grant (funding from a local engineering company also played a role in subsidizing the program for participants). The low cost of the program was a key feature of the summer bridge, not only because it provided access for students with high financial need, for whom the cost of the program may have been a prohibitive factor, but also because it helped provide motivation for students who may not have otherwise considered participating in the program. In addition, because students who start in Pre-Calculus II must, at some point, take a summer course to catch up in their degree, the summer bridge provided an avenue for students to start their degree on track, without the financial burden of having to pay for a summer course later on.

Methods

The initial method of program assessment was through student feedback. There were three types of IRB-approved assessment conducted during the summer bridge program: a pre-assessment survey at the beginning of the program (to gather information on students' college preparedness and expectations of the program) (Appendix B), and a post-assessment survey and focus group after the conclusion of the program (to gather quantitative and qualitative data on the overall satisfaction with the program, and identify areas for improvement) (Appendix C and D). The pre-assessment was distributed in paper form, and was completed by students on the first day of the program. The post-assessment was also distributed in paper form, while the focus group was conducted by an external evaluator. Both the post-assessment and focus group were done on the final day of the program. All 11 students completed the pre-assessment survey and post-assessment survey, and 10 students participated in the focus group.

In addition to student feedback, we will also track participants' grades over the course of their first year, as well as their retention rates and 4-year graduation rates. Doing this type of long-term tracking will help shed light on the benefits of the summer bridge program, and expose areas in which the program's impact could be expanded. Because the first year's participants are currently in the middle of their freshman year, this data is not yet available.

Results

Summer grades: Of the 11 bridge participants, all 11 passed their theology course, and 9 of 11 passed their Pre-Calculus II course (the remaining 2 students did not get the C- required to move on to Calculus I, and had to retake Pre-Calculus II in the fall of their freshman year). The average GPA for participants was 2.86 (taking into account only the two courses that students took as part of the bridge).

Fall grades: Of the 9 bridge participants who passed Pre-Calculus II in the summer and took Calculus I in the fall, all 9 (100%) passed Calculus I with a grade of C- or better (3 C-, 1 C, 2 C+, 1 B-, 1 B, 1 B+). As a point of comparison in fall 2014, 15.8% (33 of 209) of students earned a D or F or withdrew from Calculus I. The two students who had to re-take Pre-Calculus II passed in fall 2014 (one earned a B and one earned a C). As of mid-semester of the spring of the first year, all 11 bridge participants are still majoring in engineering or computer science. Ten of the 11 are in academic good standing with a fall semester GPA above 2.0. One bridge participant is on academic probation due to a fall 2014 GPA below 2.0.

In the qualitative portion of the pre-assessment survey, student expectations were varied: 3 students said their expectation was to build fundamental math skills, 3 students said they hoped to learn more about the engineering field, 3 students wanted to get acquainted with University of Portland, 1 student wanted to make friends, and 1 student was excited about the site visits. Regarding mathematical preparation, 10 students had taken calculus in high school, while one student had only gotten as far as pre-calculus. Regarding interest in pursuing engineering, 5 students mentioned family, 4 students mentioned a general interest in STEM, and 2 students mentioned a pre-college program.

In the quantitative portion of the pre-assessment, 9 students reported having a limited to moderate understanding of the engineering field, and 10 students reported having a moderate level of confidence in math and writing. A summary of the quantitative results from the pre-assessment survey is below in Table 1.

Table 1: Quantitative results for pre-assessment survey (1=low, 5=high)

Question	No of 1 star ratings	No of 2 star ratings	No of 3 star ratings	No of 4 star ratings	No of 5 star ratings	Other ratings
Did you like your math courses in hs?			3	4	4	
What is your level of confidence in math?		1	3	6		3.5
What is your level of confidence in writing?		1	7	3		
How rigorous were your hs courses?		1	3	4	3	
What is your level of knowledge of the engineering industry?	2	2	5	1	1	
What is your level of knowledge about college life?	1	5	4	1		
Do you see yourself becoming an engineer?			3	2	5	3.5

Data from the qualitative portion of the post-assessment survey demonstrated that students widely felt that the program met their expectations, and that the program was a good balance of coursework and co-curricular activities. Students also enjoyed the cohort-like model of the program, and building relationships with other first-year engineering students. In response to the question regarding how students' expectations were satisfied, 4 students mentioned coursework and development in academic skills, 2 students mentioned site visits and other non-academic activities, 3 students mentioned acclimating to college, 2 students mentioned building friendships, and 1 student mentioned learning about the field of engineering. Similarly, in response to what students felt like they accomplished during the program, 6 students mentioned learning about college life, 6 students mentioned academic development, 3 students mentioned learning about engineering, and 2 students mentioned building friendships. Finally, in response to the question regarding suggested improvements, 6 students suggested different field trips and activities, 2 students wanted fewer activities, 1 student mentioned changes to housing arrangement, 1 student mentioned changes to the timing of the program, and 2 students said they had no suggestions.

Comments from the post-assessment survey include:

- "My confidence in math increased, I feel ready to start college!"

- "[The program] opened my eyes to what engineers do and to their work environment."
- "I accomplished: understanding and getting to know the 'real' college life, making new friends, refreshing my brain on math, and becoming introduced to theology."

Data from the quantitative portion of the post-assessment survey indicated that most students were leaving the program with a moderate to high level of confidence in math, and felt that taking Pre-Calculus II helped improve their math skills. In addition, ratings for the site visits were consistently high (with the exception of one site visit that most students ranked lower), while ratings for the workshops were more evenly distributed.

A summary of the quantitative data from the post-assessment survey is below in Table 2.

Table 2: Quantitative results from the post-assessment survey (1=low, 5=high)

Question	No of 1 star ratings	No of 2 star ratings	No of 3 star ratings	No of 4 star ratings	No of 5 star ratings	Other ratings
Current level of confidence in math?			1	6	1	3.5, 3.5, 4.5
To what extent did MTH 112 help your math skills?			2	3	4	3.5,4.5
What is your current level of confidence in writing?			3	5	3	
To what extent did taking THE 105 help your writing skills?	1		6	2	1	2.5
What is your level of knowledge of engineering industry?		2	4	1	2	2.5,3.5
What is your level of knowledge of college life?			1	4	5	3.5
Do you still see yourself becoming an engineer?			2	3	4	3.5,3.5
Do you recommend the program to others?				3	8	

Some of the pre/post survey questions were the same to indicate change in confidence and knowledge due to participation in the summer program. Figure 1 shows the histograms of responses for the five questions. The differences in the weighted averages in the pre/post

assessments were calculated to measure change. The results show that the summer bridge, overall, increased students' confidence in math (+0.77) and writing (+0.82) and increased their knowledge about college life (+1.86). There was a slight increase in students' knowledge of the engineering industry (+0.55). There was no substantial change with regard to students' seeing themselves as becoming an engineer (-0.05).

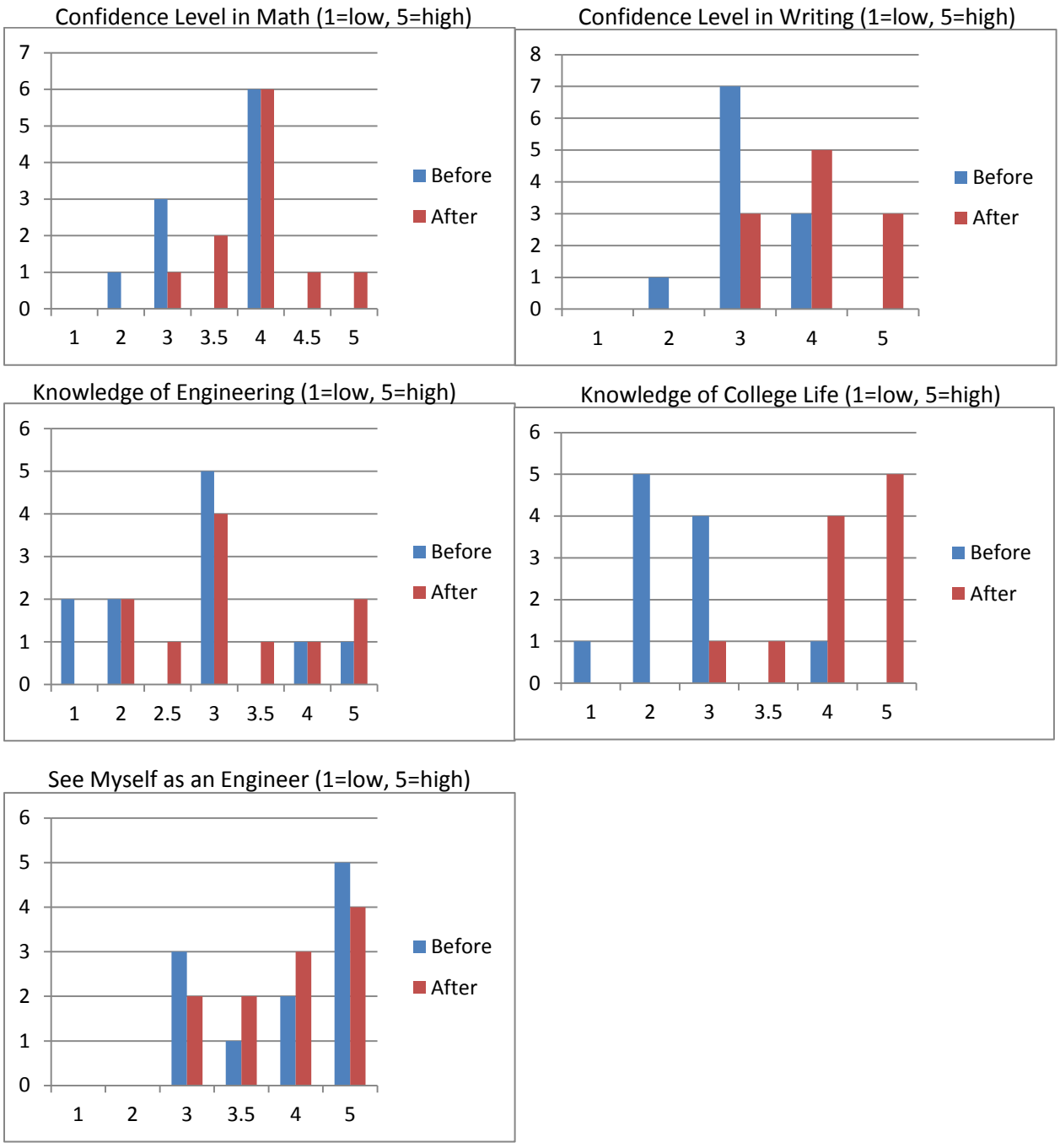

Figure 1: Before and after histograms of survey questions.

Responses from the focus group reinforced that students felt that the program's goals had been achieved, and that those who came into the program with distinct expectations had those expectations met. Responses also reinforced that after completing the program, students felt that they had improved in their math and writing skills, learned about the field of engineering, and felt supported in their transition to college.

According to student feedback gathered at the focus group, the benefits of the summer bridge program were varied: one student highlighted the wide-ranging benefits of the program, saying "My expectations have been met; I met people, adjusted to college life, and learned time management skills." Another student pointed to progress in math as being an important aspect of the program, saying "This experience really strengthened my math skills and confidence." Overall, participant feedback indicated that the primary goals of the program had largely been satisfied.

Students did acknowledge, however, that the amount of co-curricular events, including workshops and presentations, was slightly overwhelming. They suggested that going forward, there should be more free time for studying and relaxation built into the schedule.

Discussion

From the information gathered, the immediate impact of the program seems to be positive and wide-ranging. Students got a chance to acclimate to college-level academics, get caught up in their math coursework before starting their engineering degree, improve in their math and writing skills, familiarize themselves with campus structure and resources, and develop friendships with one another.

Based on participant assessments, the latter benefit proved to be one of the most valuable. Many students noted that by the end of the program, they felt that had developed strong friendships with the other participants, and that this process helped facilitate their social transition into college. This sense of community is notable for two reasons: 1) it seemed to help ease students' anxiety about starting college, as it made them feel like they already had a support system they could rely on, and 2) understanding how to build relationships with peers is incredibly important in engineering, since teamwork is emphasized both inside and outside of the classroom, and, as Vygotsky theorizes, peer support can be a major factor in academic development.

Students' positive feedback regarding the social benefits of the program indicated that the social transition is just as important to students as the academic transition, and is something to be fostered in future summer bridge programs.

Future Improvements

Despite the largely positive feedback from students, there were some constraints that emerged during the 2014 summer bridge program that needed to be addressed. These constraints included: the timing of the math placement test, which left only a small window of time between the placement test deadline and the beginning of the program, challenges with advertising to new students who are not yet finished with their final year of high school, and lack of commitment of

new students to the engineering field. After considering these constraints, and revisiting the program's stated goals, we plan to alter the program for future summers, in order to eliminate many of these challenges and to bring the program even more in line with retention objectives. The new model will be implemented in Summer 2015.

The primary proposed change is that the grant-funded program will no longer be offered to incoming engineering students, but instead to engineering students who have just completed their first year. Rather than take Pre-Calculus II and Intro to Theology, students will take Calculus II and Fundamentals of Interpersonal Communication. The Fundamentals of Interpersonal Communication course satisfies a core curriculum or professional elective requirement. Co-curricular programming will be focused on professional development and career discernment rather than the high school-to-college transition (which, it was discovered, is largely duplicative of the information students receive during fall orientation).

The reasons for altering the program are varied, and include the following:

1. **Advertising and garnering interest in the program:** Because the new summer bridge will only be open to students who participate in the year-long program, the retention counselor will be able to advertise the program to students directly. In addition to alleviating concerns regarding advertising, the new summer bridge provides incentive for students to participate in the year-long program. So far, our hypothesis seems to be correct – we have 15 applicants for the 2015 summer bridge from the same entering cohort of 240, and students seem to be very excited and motivated to participate in the bridge.
2. **Commitment to engineering:** Rising sophomores have already completed one year of their engineering coursework, and therefore have more of an understanding of the field and the degree than pre-freshmen. Offering a program for rising sophomores, who by that point are (hopefully) fairly secure in their decision to major in engineering, may ultimately have more of an impact on overall retention than offering a program for students who are still in the degree discernment process.
3. **1st to 3rd semester retention:** The transition into the sophomore year is a challenging one for students – for most it is the first time they are taking engineering courses (rather than math and physics), and many students in the retention program struggled during their sophomore year. Our data supports the fact that the freshman-to-sophomore year transition is a difficult one: the average 1st to 3rd semester retention rate for students that start in pre-calculus (students behind in their degrees) is 53.8%, compared to the 78.5% average retention rate for all engineering students. In addition, students who begin their sophomore year behind in credits have a 17% lower 3rd-5th semester retention rate. Hopefully, the new summer bridge can help prepare students for their second year, and make the transition a smoother and more successful one.

The hope is that by taking Calculus II prior to their sophomore year, students who participate in the summer bridge will be more academically prepared for the coursework they will encounter during their second year, and will not suffer the emotional tolls of feeling "behind" their peers in terms of their degree. Ideally, the new bridge will also help create a stronger pipeline between students' first and second years, since last year's data revealed that many students who

participated in the retention program during their first year did not continue their participation during their second year.

After a year of working on the retention program, it has become evident to those involved with the program that there are multiple leaks in the retention pipeline. Traditional summer bridge programs target students in between high school and college, which is certainly a critical transition and a time in which students could benefit from extra support. However, it has become clear that the freshman-to-sophomore transition is also a difficult transition, particularly for students who are at-risk. Indeed, Schaller's (2005) research on sophomore students indicates that they face quite a number of challenges, including concerns about their academics and their professional futures. The hope is that the new summer bridge will not only help students in their career discernment, but will also prepare them for the coursework that they will face in their second year, which will in turn contribute to overall persistence in engineering. In addition, by implementing two different versions of the summer bridge program, we will be able to analyze both programs and evaluate which program seems to be more impactful for the students. Ideally, we want to support both pre-freshmen and rising sophomores by offering distinct summer programs to help prevent leaks at both stages in the pipeline.

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Appendix A: Weekly Schedule

Week 1

Monday

8:00am – 8:45am	Breakfast
9:00am – 10:40am	THE 105 Introduction to Theology – BC 110
10:50am – 12:30pm	MTH 112 Pre-Calculus II – Franz 015
12:30pm – 1:30pm	Lunch
1:30 – 2:00pm	Open time – Purchase Books and supplies at the Bookstore
2:00pm – 5:00pm	Team Building with Synergo – meet on the Quad Lawn near Y
5:00pm – 6:00pm	Moodle Orientation with Peer Mentor
6:00pm – 7:00pm	Dinner
7:00pm – 9:00pm	Study Tables, Homework and Tutoring

Tuesday, Wednesday, Thursday

8:00am – 8:45am	Breakfast
9:00am – 10:40am	THE 105 Introduction to Theology
10:50am – 12:30pm	MTH 112 Pre-Calculus II
12:30pm – 1:30pm	Lunch
1:30pm – 2:30pm	Coursework Review
2:30pm – 4:00pm	**Tuesday** - Freshmen Resource Center Presentation **Wednesday** – Library Resources and Explore Campus/Tour – **Optional Mass @ 6pm with Pizza Social after** **Thursday** – Writing Workshop
4:00pm – 6:00pm	Study Tables
6:00pm – 7:00pm	Dinner

7:00pm – 9:00pm	Homework and Tutoring

Friday, June 27, 2014

8:15am – 8:45am	Breakfast
9:00am – 9:45am	Industry field trip transportation
10:00am – 11:30am	Company tour
11:30pm – 1:00pm	Lunch with engineers, Downtown
1:00pm – 4:00pm	Explore the downtown area
4:00pm – 6:00pm	Walk to store for groceries and other supplies after arriving back to campus
6:00pm – 7:00pm	Dinner
7:00pm	Movie Night or Open Time

Appendix B: Pre-Assessment Survey

Engineering Summer Bridge Program
June 23rd-August 1st, 2014
Program Pre-Assessment

On a scale from 1-5, with 1 being low and 5 being high:

1. Did you like your mathematics courses in high school?	1	2	3	4	5
2. What is your current level of confidence in mathematics?	1	2	3	4	5
3. What is your current level of confidence in writing?	1	2	3	4	5
4. How rigorous did you regard your high school courses to be?	1	2	3	4	5
5. What is your level of knowledge about the engineering industry?	1	2	3	4	5
6. What is your level of knowledge about university life?	1	2	3	4	5
7. Do you see yourself becoming an engineer?	1	2	3	4	5

Write a brief summary to answer the following questions.

1. What was the highest level of math available at your high school?

2. How much time did you spend studying in high school?

3. Who or what influenced you to become and engineer?

4. When did you know you wanted to be an engineer?

5. What engineering or computer science courses did you take in high school, if any?

6. Describe your favorite course or project in high school?

7. Describe he most challenging course or project you worked on in high school?

8. Did you take Physics in high school? If so, what grade level?

9. What are your expectations for the Engineering Summer Bridge Program?

10. What do you hope to accomplish during the Engineering Summer Bridge Program?

11. Do you have any concerns about the Summer Bridge Program we should be aware of?

Appendix C: Last-Day Survey

Engineering Summer Bridge Program
June 23rd-August 1st, 2014
Program Post-Assessment

On a scale from 1-5, with 1 being low and 5 being high, after completing the Summer Bridge:

1.	What is your current level of confidence in mathematics?	1	2	3	4	5
2.	To what extent did taking MTH 112 help increase your math skills?	1	2	3	4	5
3.	What is your current level of confidence in writing?	1	2	3	4	5
4.	To what extent did taking THE 105 help increase your writing skills?	1	2	3	4	5
5.	Now having taken 2 college courses, how rigorous were your high school courses?	1	2	3	4	5
6.	What is your level of knowledge about the engineering industry?	1	2	3	4	5
7.	What is your level of knowledge about university life?	1	2	3	4	5
8.	Do you still see yourself becoming an engineer?	1	2	3	4	5

On a scale from 1 – 5, one being low and 5 being high, I found the following activities valuable to my transition from high school to college:

1.	Field Trips	1	2	3	4	5
2.	Tour of the Recreation Center	1	2	3	4	5
3.	Meetings with Retention Counselor	1	2	3	4	5

4.	Experiences with Peer Mentor	1	2	3	4	5
5.	Team building Workshop	1	2	3	4	5
6.	Visit with Computer Science Chair	1	2	3	4	5
7.	Living experience	1	2	3	4	5
8.	Meetings with Freshmen Resource Center	1	2	3	4	5
9.	Writing Workshop	1	2	3	4	5
10.	Multicultural Programs Workshop	1	2	3	4	5
11.	Engineering Lab Tour	1	2	3	4	5
12.	Meeting with Program Counselor	1	2	3	4	5
13.	“Surviving Engineering” Workshops	1	2	3	4	5
14.	Career Services Workshop	1	2	3	4	5
15.	Designing Circuits Presentation	1	2	3	4	5
16.	Presentation on Community Service	1	2	3	4	5
17.	Meeting with the Dean	1	2	3	4	5
18.	Would you recommend the Summer Bridge Program to others?	1	2	3	4	5

Write a brief summary to answer the following questions.

12. In what ways, if any, were your expectations for the Summer Bridge Program met?

13. What did you accomplish during the Engineering Summer Bridge Program? If you don't feel that you can point to any accomplishments, why do you think this is the case?

14. What other suggestions do you have for making the Summer Bridge Program even better?

Appendix D: Focus Group Questions

Purpose of the Summer Bridge Program

1. Think back to when you first learned about the summer bridge program. What went through your head? What did you expect the program to be? Positives/negatives/intellectual/emotional.

2. Now that you've been a part of the program, how would you describe it? Were your initial expectations too high? Too low? Right on? Any pleasant surprises? Disappointments?

3. The summer bridge program aims to help you ben on track to achieve an engineering degree on time – in which of these areas would you say the program has made the most positive impact? In what ways did the program influence you?
    a. Completing coursework in math and theology
    b. Supporting your transition into college life
    c. Expanding your understanding of engineering as a career
    d. Building your sense of confidence and building community among students

4. Which of these areas were not affected by the program? Why? How, if at all, could the program activities have helped you in that area?

Summer Bridge Program Elements

5. The summer bridge program offers pre-calculus during the summer to support participants in entering the engineering program on track to take calculus in the fall. Thinking about the differences between high school and college math – how did this experience influence your knowledge and skill as a college math student?

6. The theology course you took this summer engaged you in college level reading, writing, and thinking. Reflect on this experience – what will you draw from this course as you move forward as a college student?

7. Thinking back to the activities that your group participated in outside of your academic classes, which activities were the most influential and should be repeated?

8. Which activities did you not find as influential? Why?

Program Recommendations

9. If you could tell the program organizers of the summer bridge program ONE thing to change/improve, what advice would you give?

10. If you could tell the program organizers of the summer bridge program ONE thing to continue doing or do even more, what advice would you give?

11. If you had been given two programming options – one the six wee summer session you just completed or two, a four week “boot camp” session that would end just before fall semester started, which would you have chosen and why?