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An Indigenous University Program Uses the Continuous Improvement Model to Build a Better Home Away From Home

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An Indigenous University Program Uses the Continuous Improvement Model to Build a Better Home Away From Home

Abstract

The Alaska Native Science and Engineering Program (ANSEP) at the University of Alaska (UA) is a program aimed at increasing the representation of Indigenous People in science, technology, engineering, and mathematics (STEM). The program started with one university student and now provides a longitudinal pipeline for engaging and retaining thousands of Native Students in STEM from kindergarten through to the doctorate (K-PhD). University Success, the college component of the ANSEP pipeline, provides scaffolding and support to advance Alaska Native and rural students' success through a dedicated building and community space, scholarships, weekly team-building meetings, mandatory study groups, and paid internships with industry, state, and federal partners.

This immense growth is because ANSEP follows the models of a learning community and continuous improvement. It has included multiple studies that explored the university students' perspectives on which supports contribute to their success for prioritizing future programmatic improvements. These studies have shown that the home away from home environment ANSEP has created has successfully engaged and retained students through graduation. However, there have been many improvements within ANSEP since the last study conducted in 2018, namely the suite of pre-college components has been greatly expanded, making it a vast pipeline. The question is: Which specific supports did the students indicate most contributed to ANSEP developing the home away from home environment and what improvements have been made that affect future improvement cycles and studies? The answers will help ANSEP improve its University Success component and also help ANSEP to continue to grow its pre-college components. ANSEP will also target funding support based on the findings and launch a new study in 2025.

Introduction

Alaska consists of 22% Indigenous People, the highest of any state in the United States (US) [1]. However, Alaska Native People are drastically underrepresented in science, technology, engineering, and mathematics degree programs and professions. At the University of Alaska (UA), Indigenous Students only represent 15% of its enrollment [2]. To improve this underrepresentation, the Alaska Native Science and Engineering Program (ANSEP) at UA aims to increase the representation of Indigenous People in science, technology, engineering, and mathematics (STEM).

ANSEP was founded in 1995 as a scholarship and retention program for Alaska Native Students in engineering. Increasing the participation and success of Alaska Native Students in STEM degrees and professions requires systemic change. To effect this systemic change, ANSEP employed the continuous improvement model in education which includes years of effort, everyone's involvement, and data collection to stimulate learning and improvement [3]. The continuous improvement model that ANSEP employed included multiple studies that explored the university students' perspectives for prioritizing future programmatic improvements [4]–[6]. These studies focus on which parts of the ANSEP University Success component best support their continued success in college. These studies have also explored which pre-college components supported Alaska Natives' development into successful engineering and science students.

The longitudinal pipeline ANSEP has developed engages and retains Native Students in STEM from kindergarten through to the doctorate (K-PhD). The pipeline includes inspirational and educational components for university and pre-college students. These various ANSEP components aim to get students engaged and motivated early on, adequately prepare them to thrive in STEM degrees, and support university students by providing them a home on campus. This will lead to increased Alaska Native representation in the fields that are making critical decisions about the future of the state. The ANSEP components relevant to the research presented in this paper are highlighted next.

ANSEP University Success

University Success is the college component of the ANSEP pipeline that directly supports STEM university students once they are enrolled in college at one of the UA campuses. It provides scaffolding and support to advance Alaska Native and rural students' success through a dedicated building and community space, scholarships, weekly team-building meetings, mandatory study groups, and paid internships with industry, state, and federal partners. The home away from home environment that ANSEP has created has proven successful in engaging and retaining students through college graduation [4], [5], [7]. At UAA, the first and largest ANSEP location, University Success students are engaged with focused undergraduate academic living and learning communities, organized student cohorts with access to a network of peer and professional mentors, community-based learning, scholarships, professional internships, and undergraduate and graduate research.

ANSEP Pre-College

In the past 30 years, ANSEP identified a fundamental issue, pre-college preparation, that drastically limits students' potential [5], [7]. Native students coming from rural communities often do not have early exposure to science and engineering which is known to improve

participation [8]. Many remote communities also lack access to rigorous or advanced science and math courses which leaves rural Alaskan students unprepared for the recommended first-year engineering or science degree programs [5], [7]. The result is remedial classes that put these students behind, requiring more time till graduation and additional tuition and fees.

Implementing changes based on the previous studies has allowed ANSEP to expand so Alaska Native students now go to college more prepared through hands-on middle and high school educational outreach initiatives, and rigorous summer bridging components that include paid work experience. A significant portion opt to continue to study in the state of Alaska at one of the UA campuses.

ANSEP Middle School Academy

ANSEP Middle School Academy is for students enrolled in sixth, seventh, and eighth grade from all across the state to travel and live in the University of Alaska Anchorage (UAA) dorms for two weeks. Students complete STEM hands-on engagement activities and are required to complete algebra at their schools before high school. This motivates them to be more prepared for and successful in their science and mathematics courses.

ANSEP Acceleration Academy

Acceleration Academy started as a summer program where students from across the state are brought to the UAA campus to live and study together while completing two college courses for dual high school and college credit. On average, about 70 students participated in one of the two sessions they provided. The program is designed to familiarize students with the university and urban environments and provide access to advanced courses that are often unavailable to students in their home communities. Previous participants have completed all of the math required for their bachelor of science degrees before enrolling in college.

ANSEP Summer Bridge

Summer Bridge is a college and career visioning opportunity for students who are graduating high school. The program jump starts students' academic and professional development by bringing them to UAA to complete paid summer internships with industry, state, and federal partners and a college course. The program is completed the summer between their high school graduation and their first year of college. Students are familiarized with the university and urban environment while completing an advanced course that might previously have been unavailable to them. Through the internship, students gain professional experience which helps them decide on their future academic and professional goals. By completing the program students become

eligible for a scholarship when they enroll at UA. There has been an average of 20 to 25 participants each summer.

Next, the results from these surveys are presented to show the key supports for ANSEP University Success and its home away from home.

UAA ANSEP University Success Survey

The research presented here will take an updated look at the key findings from a 2018 survey with comparisons to results from surveys conducted in 2007 and 2010 [4]. The results will now be presented from the perspective of how they contributed to the strategic improvements of ANSEP University Success and pre-college components. The 2018 survey used a single-institution, mixed-model approach to collect quantitative and qualitative data. The research objective was to study and better understand the possible effects of the Alaska Native Science and Engineering Program (ANSEP) University Success and pre-college components on the academic success and social engagement of current Alaska Native students and students of other races and ethnicities in the University of Alaska Anchorage (UAA) ANSEP University Success program pursuing STEM degrees at UAA. The results of the survey have been used to strategize the programmatic improvements presented in this paper and will be used to develop a 2025 survey.

Participants

Potential participants were ANSEP University Success students in good standing currently enrolled at UAA during the spring semester of 2018. Students could be of any race, ethnicity, or gender identity. There were 103 students eligible to take the survey with 91 of those ultimately completing it. The number of participants exceeded the threshold of 82 for a 95% confidence level in the results with a +/- 5% error margin [9].

As part of the survey, students could self-identify as Alaska Native or another race or ethnicity. The Alaska Native group included those identifying as Alaska Native alone and those Alaska Native in combination with another race or ethnicity. Of those who chose to self-identify, 50 (55%) survey participants identified as Alaska Native and 38 (42%) as another race or ethnicity. ANSEP students include engineering and other Bachelor of Science majors. In this paper, we will report on the results from the Alaska Native engineering student population.

Among the Alaska Native engineering participants, 2018 marked the first time survey participants had previously participated in the ANSEP pre-college components while in middle school (24.4%). It also marked the first time more than half the students had previously

participated in ANSEP components while in high school (65.9%) and had participated in ANSEP Summer Bridge (75.6%).

Quantitative Survey Data

Table 1 shows Alaska Native engineering student outcomes from participating in the ANSEP University Success component in terms of improved academic skills and student participation. Students were asked to identify how much they had engaged in particular activities related to student success and social engagement since starting with University Success. The students responded using a 5-point Likert scale ranging from 'Almost never' to 'A Lot.' Students also had the option to select 'Does Not Apply.' The results in Table 1 report the percentage of students that selected the affirmative options of 'Quite A Bit' and 'A Lot' while the rest would have selected 'Almost Never', 'A Little Bit', or 'Somewhat' or indicated it did not apply.

Table 1. How often Alaska Native engineering students learned about college success topics or engaged in these particular activities [4, p. 85].

	Percent of Students		
Statement	2007	2010	2018
Learned how to be more successful in my classes	81.4	88.9	90.3
Learned how to navigate the UAA system more successfully	72.1	77.8	90.3
Made friends with other ANSEP students	74.4	86.1	87.5
Learned how to manage my time better	76.7	77.8	85.4
Got to know ANSEP faculty/staff	86.0	86.1	80.5
Had opportunities to work in STEM-related jobs	81.4	83.2	75.6
Participated in ANSEP social and recreational activities	65.1	72.2	73.2
Learned ways to find funding for my educational expenses	90.7	80.6	61.0
Help figuring out what type of job I want when I graduate	81.0	72.2	53.7

Notes: Eight of nine 2018 statements were rated "Quite a Bit" or "A Lot" by 60% or more of the 2018 Alaska Native respondents, which was the level set for an important finding in the 2007, 2010, and 2018 studies. Percentages are rounded to the nearest 0.0%.

Table 2 shows the results of asking students to identify how often they had particular feelings. The student indicated how often they experience the corresponding feeling using a 5-point Likert scale from 'Nearly Never' to 'Almost Always'. There is no 'Does not apply' option for this question. The results in the table show the percentage of students that selected the strictly affirmative responses of 'Quite Often' or 'Almost Always,' with the rest of the students selecting 'Nearly Never', 'Not Very Often', or 'Sometimes.'

Table 2. Alaska Native engineering student attitudes and the frequency they had each feeling or attitude [4, p. 90].

	Percent of Students		
Statement	2007	2010	2018
ANSEP provides resources to help me be more academically successful	93.0	97.2	92.7
I feel confident that I will earn a STEM bachelor's degree	97.7	94.4	92.7
ANSEP helps motivate me to continue studying STEM courses	93.0	97.2	87.8
I feel like the ANSEP faculty/staff care about my success as a student	97.7	100.0	87.8
I feel comfortable being a university student at UAA	93.0	91.7	85.4
I enjoy what I am studying	83.7	74.3	78.1
I feel confident that what I am studying will lead to the job/career I want	93.0	88.9	75.6
I feel like other ANSEP students care about my success as a student	81.4	75.0	70.7

Notes: Eight of eight 2018 statements were rated "Quite Often" or "Almost Always" by 60% or more of the 2018 Alaska Native respondents, which was the level set for an important finding in the 2007, 2010, and 2018 studies. Percentages are rounded to the nearest 0.0%.

Table 3 shows the results of asking Alaska Native engineering students to identify the experiences that were important contributors to their success. This question asked students to select all options that applied from a list characterizing different parts of ANSEP University Success or pre-college components. There were 22 options. The options that at least 60% of students selected are presented in the table. The only result reported not meeting the threshold is "participating in ANSEP Pre-College in high school." As noted, the number of students who

participated in ANSEP pre-college components is increasing over time as they have time to move through the ANSEP pipeline. This result, while still not statistically significant, indicates the importance of the pre-college components among the portion of students who have completed those programs.

Table 3. Experiences that were important contributors to Alaska Native engineering students' success as students [4, p. 87].

	Percent of Students		
Respondent Choice	2007	2010	2018
Attending ANSEP study group/ recitation sessions	95.4	91.7	90.3
Taking classes with other ANSEP students	90.7	91.7	87.8
Studying with ANSEP students outside of class	83.7	88.9	80.5
Developing friendships with ANSEP students	88.4	91.7	80.5
Receiving funding from ANSEP	83.7	86.1	78.1
Attending ANSEP weekly meetings	95.4	100.0	75.6
Socializing with ANSEP students outside of class	86.1	94.4	73.2
Participating in an ANSEP summer internship	74.4	66.7	61.0
Participating in ANSEP Summer Bridge	44.2	36.1	65.9
Having contact with ANSEP faculty/staff	74.4	75.0	46.3
Participating in ANSEP social/recreational activities	65.1	75.0	51.2
Participating in ANSEP Pre-College in high school	18.6	22.1	58.5

Notes: Nine of twelve 2018 experiences were rated as "Important Contributors" by 60% or more of the 2018 Alaska Native respondents, which was the level set for an important finding in the 2007, 2010, and 2018 studies. Percentages are rounded to the nearest 0.0%.

The students were also asked to rank the top 7 experiences that had the most positive impact on their success as students. While there was not a statistically significant top selection, two options were statistically important in terms of the frequency they were included in the top 7 rankings. 'Participating in ANSEP Summer Bridge after high school' (60%) and 'attending ANSEP study group/recitation session' (60%) were included in the top 7 most important contributors among the Alaska Native engineering students in the 2018 survey.

Table 4 shows the results of asking students the related question of who had the most significant positive impact on their success in college. Students were asked to choose one from the provided list. The results from this question are reported as the percentage of students that made the corresponding selection. Looking at the collective impact of the ANSEP learning community (more broadly made up of the students, faculty, and staff), it made up 66.7% of responses in 2007, 58.3% in 2010, and 60.0% in 2018 which are all a majority of the students.

For Table 4, it is worth noting that there were differences between the 2007 and 2018 surveys. In the 2007 survey ANSEP faculty and ANSEP staff were two options that were combined in the 2018 survey. The choices of 'family member or significant other in ANSEP' and 'friend in ANSEP' were also two separate options in the 2007 survey which were combined in the 2018 survey as 'another ANSEP student'. The results reported here use the selections from the 2018 survey by combining the appropriate options from the 2007 data. The differences between the 2007 and the 2018 results were determined to be significant.

Table 4. The person Alaska Native engineering students indicated had the most significant positive influence on their academic success [4, p. 95].

	Percent of Students		
Respondent Choice	2007	2010	2018
Another ANSEP student	28.6	22.2	40.0
Family member not in ANSEP	23.8	33.3	22.5
ANSEP faculty or staff member	38.1	36.1	20.0
Significant other not in ANSEP	2.4	2.8	5.0
Friend I knew before coming to UAA	2.4	2.8	5.0
UAA student not in ANSEP	0.0	0.0	5.0
Another UAA faculty or staff member	4.8	2.8	2.5

Notes: n=41 in 2007; n=36 in 2010; n=40 in 2018. Percentages are rounded to the nearest 0.0%.

Students were separately asked to identify who helped them the most to stay in college. In the 2007 survey, the top three people selected were: ANSEP faculty or staff 41.5%, a family member not in ANSEP (34.2%), and another ANSEP student (17.1%). In the 2018 survey, the same three options were also the top choices but the order was: family member not in ANSEP (40.0%), another ANSEP student (27.5%), and ANSEP faculty or staff member (17.5%). In the 2007 survey, the broader ANSEP learning community made up 58.6% of the responses, while in 2018 it was 45%.

Qualitative Data

Study participants were given six free-response prompts or qualitative questions. The first of these prompts was "One thing I recommend that middle school or high school students from my community do to prepare for studying STEM (science, technology, engineering, and/or mathematics) in college is (and state why)." Below are three of the responses from Alaska Native students [4, pp. 17–18]. The last quote is from a student who participated in ANSEP pre-college. These responses highlight that pre-college preparation is recommended.

> "Attend ANSEP from an early age because you get a head start on STEM studies."
>
> "Continue taking STEM classes throughout middle school and high school, and get as far ahead as you can, in all subjects. If you don't get very far it adds to the expense of college and if you fully stop, it can get very difficult to get back into these topics in college."
>
> "I recommend you get a head start with taking college classes while you're in high school. This will give you a great head start on many other students and make it easier for you to finish your degree in 4 years or less."

The next prompt was "I first joined ANSEP because." Below are four responses from Alaska Native students [4, p. 19]. The last quote is from a student who participated in ANSEP pre-college. These responses highlight students' desire to be around other students and be part of a community.

> "I wanted to be a step ahead in college."
>
> "I was drawn to the science aspect of ANSEP my first semester in college. It wasn't until semester three that I joined, because I qualified with my newly changed degree, and felt at home. Other students I knew from my area of [Rural Alaska] and a part of ANSEP, they encouraged me to join so I did. There's something special about ANSEP that appeals to me. It could be the supportive atmosphere, the 'Nativeness', the science and math, and the comradery."
>
> "I met other students in my classes that encouraged me to join."
>
> "I joined ANSEP so I can be a part of a community that will help me continue my education in one of the STEM fields."

Another prompt was “I continue to be part of ANSEP because.” Below are three responses from Alaska Native students [4, p. 20]. The last quote is from a student who participated in ANSEP pre-college. These responses highlight that ANSEP is seen as a home away from home and family.

> “I love the community and support ANSEP offers. It's my second home!”
>
> “I met so many of my close friends who stayed with me for life here, it turned into my family.”
>
> “The community and my fellow classmates are my home away from home. The amount of support I gain from them cannot be compared to.”

The next prompt was “When I seek academic advising I typically go to (ANSEP faculty or staff advisor, academic department faculty or staff advisor, another student, family member, etc.) (and state why).” Below is one of the responses from an Alaska Native student who participated in ANSEP pre-college [4, p. 21]. This response also highlights that ANSEP is seen as a home away from home.

> “ANSEP is a place where anyone can feel at home, the aura of friendliness never fades. Help is always there when you need it, be the students or faculty.”

Another prompt was “What I think I will remember the most about ANSEP years from now is (and state why).” Below are two of the responses from Alaska Native students [4, pp. 22–23]. The last quote is from a student who participated in ANSEP pre-college. These responses highlight that ANSEP is seen as a place to interact with their fellow students, even late at night.

> “All the late-night study sessions, the kitchen procrastination with other students, the laughs and jokes we shared. Just all the friends I have made.”
>
> “The late nights at the ANSEP Building with other students as this is when we all did a lot of school work, goofing around, and generally connecting with each other and learning from one another.”

The last open-ended prompt was “Something about my ANSEP experience that has not been covered in this survey and that is important to me is (and state why).” Below are four of those responses from Alaska Native students [4, pp. 24–25]. The last two quotes are from students who participated in ANSEP pre-college. These responses again highlight that ANSEP is seen as a home away from home, like family, and helping them prepare for college.

> "I am glad ANSEP is here. It has truly helped me with my college experience. I would have been lost entering college, not knowing what to do it [sic] where to go if it weren't for ANSEP. I don't have family in Anchorage to help me but ANSEP has been a second family to me."
>
> "It's important for me to explain how ANSEP feels like a family. They really care about the students in their program. Not just their academics but the students as people as well."
>
> "ANSEP makes me feel welcomed and I can always come to the building and talk to people, ask them questions about classes and advice. It is a home away from home."
>
> "I was terrified about going to college for a large part of my middle school and high school life. The thought of leaving my small town and making new friends was intimidating, but ANSEP made the process seamless and I don't know where I would be without ANSEP."

Next, we will present the updated findings from taking a fresh look at the 2018 survey and the programmatic improvements that were implemented as a result of these findings.

Updated Findings & Programmatic Improvements

ANSEP has continuously improved the components that make up the pipeline from kindergarten to the PhD. The improvements in ANSEP demonstrate two important characteristics of the program. First, ANSEP is meant to be a home away from home for students. It is important for any home to provide the space, community, and support that meets the needs of the 'family'. ANSEP prioritizes improvements that contribute to a better home for students on campus. Second, the program continues to improve in a manner responsive to student needs - following the model of continuous improvement [3]. The program components and programs continue to be built up with formal input mechanisms like this survey, but also through informal feedback between students and ANSEP faculty and staff. This section of the paper reports on recent improvements in the ANSEP University Success and ANSEP pre-college component. The discussion will connect changes to student needs as identified from quantitative and qualitative data from the survey results.

<u>ANSEP University Success</u>

Updated Findings

The quantitative data included in Table 1 [4] indicated that Alaska Native engineering students

were frequently provided resources and activities to help them be successful in college. The success topics and activities students most often indicated engaging in included learning how to be successful in their classes, navigating UAA, and making friends within ANSEP. Items near the bottom of the list include having opportunities to work in STEM jobs (75.6%) and receiving help to figure out what type of job students want after graduation (53.7%). Both items relate to their summer internships, a requirement for students to complete to earn a scholarship.

The data in Table 2 shows that ANSEP successfully empowers students and provides them with a home on campus. Students overwhelmingly indicate that they are receiving resources that help them. They are comfortable, confident, and motivated, in their role as a UAA student in a STEM degree program. Students indicate that ANSEP provides a community where they frequently feel that ANSEP faculty, staff, and other students care about their success.

There are a number of different ways that ANSEP University Success supports students, some methods are structural while others are intentionally cultivated. Table 3 presents data on which supports, structural and cultivated, students see as important contributors to their success. Many structural component supports, the requirements the students are expected to complete, are used to help students with their classes and are included among those that students see as important contributors to their success. These activities included required weekly study groups, weekly team-building meetings, and paid summer internships with industry, state, and federal partners. Study groups and weekly team-building are done with other ANSEP students and are organized by the program. Students also indicated engaging with ANSEP faculty and staff who provide advising and mentoring to be important contributors. Many of these and other activities are hosted inside the ANSEP Building where students have dedicated spaces for quiet and group study. For satisfying the program requirements, students receive scholarships which are also indicated to be a major help.

While not structural to the program, the sense of community ANSEP intentionally seeks to develop among the students is frequently indicated to contribute to students' success. They indicated that taking classes together and studying together outside of classes are important. They also indicated that developing friendships and socializing together contribute to their success. Sometimes these are supported and encouraged through structural components such as social or recreational activities that are hosted by ANSEP. All of this explains the results from Table 4 which indicated that other ANSEP students and ANSEP faculty and staff are two out of the top three people having the 'most significant positive influence' on students' college success.

The qualitative data reinforces and makes more pointed the themes observed in the quantitative data. Many students reference ANSEP, its building, and the community it serves, as a home away from home or a second home. Students also express the great importance of community and the ANSEP 'family.' The ANSEP students, faculty, and staff, (especially the former) provide

students with a sense of comradery, support, and belonging.

Improvements

ANSEP's success at developing a home away from home for Alaska Native students in STEM persuaded other industries to want to utilize ANSEP's model and expand this success to other degree programs. Other industries have partnered with ANSEP to provide their student support resources for Alaska Native students pursuing business degrees. ANSEP also partnered with a business agency to supply scholarships for these students. This also opens the ANSEP STEM students to consider other degree programs outside of STEM but still be supported while exploring other possible careers. It might also serve as an avenue to build up entrepreneurial skills within our engineering and science students, while still providing them a learning community actively taking relevant business courses.

Paid internships with industry, state, and federal partners were listed in two locations near the bottom in Table 1 which was about the frequency of resources and activities provided to help students be successful in college. ANSEP, therefore increased the agreements with industry, state, and federal partners to accommodate a larger pool of students and a variety of STEM positions. To improve the diversity within the US Department of the Interior, they signed an agreement with ANSEP that allows for the direct hire of ANSEP students [10]. This included garnering industry and research laboratory positions, not only in remote locations of Alaska but also nationally. This increase gave students more options to explore multiple areas of their chosen STEM discipline and could help students discover more career possibilities. Internships are considered a way to have contact with one or more professional mentors [11]. Interns also have opportunities to learn from seasoned professionals, discover new areas of interest they had not considered, and possibly have a "foot in the door" for professional positions after graduation [11]. It also serves as a way of bringing more technical knowledge and expertise from across the country into the state of Alaska. ANSEP students are more competitive and the knowledge base within the state grows.

ANSEP Pre-College

Updated Findings

A major finding in the data from the survey was the importance students placed on participating in pre-college components. There is limited quantitative data on this trend since the survey itself was developed to evaluate the UAA ANSEP University Success component. The data that does support this trend is included in Table 3. The number of students who included ANSEP Summer Bridge as an important contributor to their success increased from 44.2% in 2007 to 65.9% in 2018. The number of students that included participating in ANSEP pre-college in high school

similarly increased from 18.6% in 2007 to 58.2% in 2018. In both cases, it is important to recognize that the percentage of students who included these options in their selections follows the portion of students who participated in the respective programs. This suggests that a majority of those who did participate see those pre-college components as important contributors to their success.

The true extent to which students value the ANSEP pre-college components are expressed in the qualitative data. Pre-college preparation was a major theme across different questions. When prompted to advise middle school and high school students from their community, taking advanced math and sciences classes including college-level courses was seen as important. The advice was to get as far ahead as possible and get involved with ANSEP as soon as possible. The desire to get ahead was also reflected in responses to the prompt about why students first participated in ANSEP. Multiple students indicated that to them ANSEP was an avenue to be successful in college by getting ahead.

ANSEP Middle School Academy Improvements

ANSEP and others have shown that early exposure to science and engineering improves STEM participation [4], [8]. ANSEP therefore expanded the Middle School Academy into K-6. They utilized their hands-on STEM activities to reach younger Alaska Native students to inspire them to consider STEM degrees and professions. The survey results also indicated that ANSEP faculty and staff were important contributors to their success in college. Much of ANSEP's faculty and staff are Alaska Native. Research indicates that having same-race role models helps students feel more confident about their success in the same careers [12]. The expanded academies therefore engage more students earlier in the field and expose them to Alaska Native role models that illustrate there is a place for them in STEM.

ANSEP Acceleration Academy Improvements

The survey indicated the importance of preparation and early exposure to science and engineering. Therefore, ANSEP has significantly expanded its Acceleration Academy. The most significant change to Acceleration Academy was adding a full-time program during the spring and fall semesters, in addition to its summer program. The full-time Acceleration Academy has been made available to students at three sites across the state: Anchorage, Matanuska-Susitna (MatSu), and Bethel. The latter of the three is in a remote community in Western Alaska that acts as a regional hub for Alaska Native communities throughout the southwestern part of the state. This improvement added about 150 students participating in the Acceleration Academy, in addition to the 70 students who participated in the summer session. This required ANSEP to hire year-round staff to accommodate the major increase in students. Now students can graduate high school with 100 college credit hours already completed.

From Table 3, four of the top six items students report as important contributors to their success are structured pieces of University Success. Many of the same structural parts have also been implemented to provide the same support for the Acceleration Academy students. These students are also required to participate in weekly study sessions for introductory science, engineering, and mathematics courses. They also are required to attend weekly lunch meetings where food is provided. During these meetings, students hear presentations on academic and professional topics or actively participate in team-building.

ANSEP Summer Bridge Improvements

As with ANSEP University Success, internships are a requirement of this component and pivotal in helping students explore their career options and motivate them to graduate. The increased internship partners extended from University Success to the Summer Bridge component. Now there are about 50 students who participate, which is double the amount in the previous 29 years of ANSEP. This also doubled the first-year cohort of students entering ANSEP University Success on all UA campuses. The increased participation provides students with a broader community which is crucial for their success as college students. As noted previously, fellow ANSEP students are one of the highest-ranked resources in the survey of University Success students. Starting to build these relationships before officially starting their degree programs gives Summer Bridge students a chance to form cohorts which eases their transition to the university in the fall.

Conclusion

ANSEP is effecting change in the makeup of the science, technology, engineering, and mathematics (STEM) workforce in Alaska by empowering Alaska Native and rural students to be confident and successful in STEM degree programs. The program has built a longitudinal pipeline that takes students from kindergarten through to their doctorate by creating homes away from home for students across the state. The development of this pipeline has followed from the expressed needs of students. ANSEP has followed a model of continuous and responsive improvement including research into the perspectives of students in 2007, 2010, and 2018 [4].

In this paper, we re-examined the findings from a 2018 survey in the context of improvements that have been made to ANSEP components throughout the pipeline. A major emphasis from the results of the survey was the importance of having a home away from home and pre-college preparation. The major efforts in improving ANSEP have therefore focused on making sure ANSEP has the home away from home feel for all of its components and expanding the capacity so more students from across the state have the opportunity to get engaged and to get ahead. All students should have an opportunity to access the same support and resources ANSEP has to

offer.

This paper presents ANSEP as a model for other programs seeking to support Indigenous Students in college. Programs need to focus on creating homes away from homes by finding dedicated spaces and intentionally building living and learning communities for students. Robust academic supports like mandatory recitations or group study sessions and weekly meetings with food provided also contribute to building that home which provides a refuge among other Indigenous Students but also teaches them strategies for academic and professional success.

The major contribution of ANSEP to the field of minorities in engineering, beyond the direct impact on thousands of Alaskan students, is the model for a longitudinal program to engage and empower students. A model that has been developed and improved in response to the needs and desires expressed by Alaska Native students. Programs that have the resources need to work to develop pre-college components that expose students to STEM. Indigenous Students can be successful if they are given the opportunity to see a path and place for them. Programs are encouraged to take the model of homes away from homes and introduce students at all levels to fun and engaging science and engineering experiences and make them feel at home on a university campus. Programs that allow students to get college credit early or co-enroll are highly effective as long as students have a community to lean on.

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