

Building Communities through the Creation of Dialogues

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Abstract

At the Office of Student Transition and Retention (STAR), engineering graduate students with an affinity for student affairs and program development are supported and fostered to be key stakeholders. Through conversations with college administration and staff, programs have been developed and implemented by graduate students throughout the years to meet student needs. With growing student populations in engineering, engaging student leaders in addressing existing gaps in programming is paramount to student success. The Women in Engineering Luncheon and the Engineering Undergraduate Research Panel were specifically designed by graduate students to support underrepresented populations. These programs represent how student affairs can nurture engineering graduate students' inherent problem solving skills to support building community, one of the Herbert Wertheim College of Engineering's strategic goals. This paper focuses on leveraging graduate student perspectives to enhance efforts towards inclusion and broadening participation in engineering.

Keywords

Student affairs, community building, administration.

Introduction

Community can be simply defined as a unified group of people. In the context of graduate programs, students are often grouped together in cohorts based on their year of entry or discipline. This may occur as part of a diversity initiative, or simply because students work for the same advisor. However, as one investigates the landscape of graduate programs, one often finds that students of similar backgrounds congregate together. Though graduate school can be an isolating time for many, finding like-minded peers can carry students to graduation. But oftentimes, graduate students are reluctant to become engaged in a group.

Pressure to achieve high grades, or complete certain research-oriented tasks can take students away from their cohorts. Often, graduate students have families and other obligations. So how can communities not only be created, but also sustained? Furthermore, if faculty advisors do not support extracurricular activities, how can graduate students find a way to connect with their campus and feel part of their campus community?

This paper discusses how the Herbert Wertheim College of Engineering (HWCOE) Student Affairs office gives graduate students the ability to create programs by allowing them to communicate directly with the administration. This communication not only provides them with the ability to be heard, but also to connect with students, faculty and staff who have similar interests, fostering and sustaining communities.

Background

The landscape of higher education is a constantly changing ecosystem, dependent on several factors outside the walls of the ivory tower. Since the start of the Great Recession, the economy has directly impacted public higher education, particularly as it relates to state budget cuts. Budget cuts not only led to the increase of tuition to cover the gap in education funding¹, but also led institutions to become leaner. Public colleges and universities cut faculty positions, eliminated courses, and reduced support staff among other cuts. Despite increasing tuition, students continued to enroll in baccalaureate programs across the country, with high expectations for their college experience both inside and outside of the classroom.

In engineering programs across the country, enrollment continued to increase with a steep jump of 7% in 2007 and 6% in 2009. Freshman enrollment continued to rise until 2012 where it peaked at 544,000 students^{2,3}. The number of undergraduate engineering students increased by 34% between 2006 and 2013, and the number of science and engineering undergraduate degrees awarded by United States (U.S.) institutions increased³. Yet during this time, many began to bring up concerns regarding the national competitiveness of the U.S. science, technology, engineering and mathematics (STEM) workforce.

From industry leaders, to policy makers, even to the current President of the U.S., conversations on developing more STEM talent for the future were consistently in the news. In particular, efforts from the Obama Administration focused on increasing public and private collaborations to support STEM education to improve STEM-learning experiences⁴. The Administration created a White House Science Fair, providing additional funding from private investments for STEM education. In addition, an initiative was specifically dedicated to systematic reform in STEM education, with over \$4 billion to support teachers and students nationwide^{4,5}. Over the last decade, several organizations and initiatives were developed to help address the need for more students interested in STEM. Programs like Girls Who Code, Black Girls Code, Introduce a Girl to Engineering Day, Code Academy, STEMWorks and more have been created to support education in the STEM fields. These efforts directly support pipeline issues in engineering, many of which directly target women and under-represented populations in engineering.

The Gator Engineering Model

With national attention on educating future engineers, colleges and universities worked to bolster academic and extra-curricular activities to enhance student learning, in spite of state-imposed budgetary restrictions and lack of industry support. For over twenty-three years, the HWCOE at the University of Florida (UF), has been involved in these efforts through its Student Affairs office. One of its foundational tenets is that every student has the potential to succeed if provided the proper support system, academic resources and environmental climate. With this as the cornerstone of its function, the mission of engineering Student Affairs includes:

- “Facilitating successful student transition into the University/College,

- Promoting the commitment of the HWCOE to fostering a college and campus climate that supports diversity as a whole, and the success of our underrepresented student populations in particular,
- Engaging students in Academic, Personal and Professional development programs and activities that promote their individual and collective growth as future engineers⁶.”

As a departmental unit within the Office of Undergraduate Student Affairs, the Office for Student Transition and Retention (STAR) has a pipeline focus that starts with K-12 outreach, and supports students through successful transition and retention in engineering⁶. This is done through its various programs and events, in addition to advising.

Prior to 2013, the Student Affairs office within the HWCOE functioned in a vastly different manner. Figure 1 shows the prior structure of Student Affairs in 2008. Dr. Jonathan Earle, who served as Associate Dean for Student Affairs from 1992-2007, created the Engineering Student Services Center, the predecessor to the STAR office, which provided advising and academic support to students. Within this unit were eight employees who supported all undergraduate students in the college. Of the eight employees, four served as Program Coordinators and each coordinated a particular summer bridge or transition program, and were also responsible for advising students in the fall/spring.



Figure 1. 2008 HWCOE Student Affairs Structure

By 2008, student enrollment had more than doubled and it became apparent that the preceding staff structure would not support the growing student body. In 2012 a new organizational arrangement was developed to provide additional support for incoming students, and alleviate the burden of the existing staff, in spite of the aforementioned effects of the downturn of the economy (Figure 2). This new structure not only involved restructuring existing staff, but the hiring additional staff and student assistants. In 2013, the STAR office was created. To date, the office has continued to grow to 20 full time faculty and staff, as well as student assistant support.

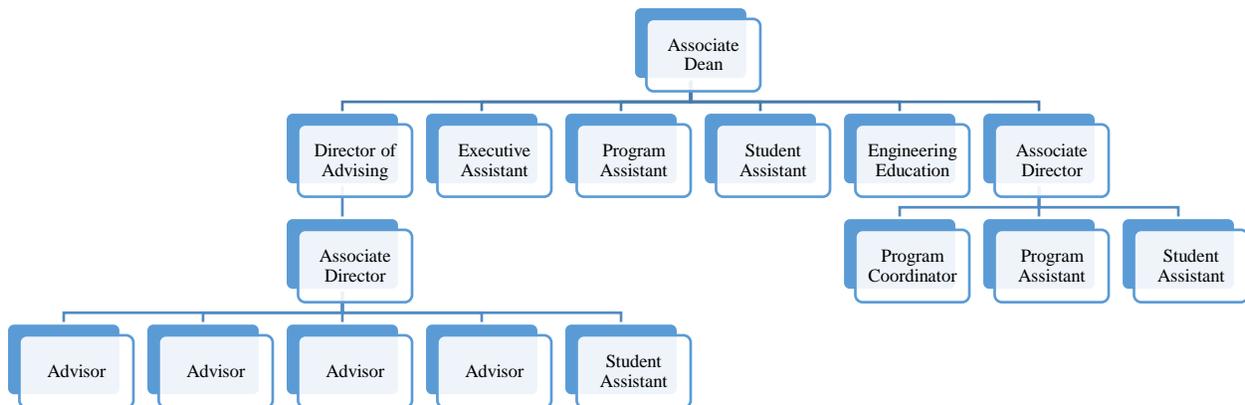


Figure 2. 2012 HWCOE Student Affairs Structure

As the structure of engineering Student Affairs changed, so did its efforts towards student engagement of students outside of the classroom. Though primarily focused on issues directly related to undergraduate students, all have been welcomed through its doors. However, the methods used to engage students evolved in order to meet student needs.

Dean Earle was most widely known for the innovative development of the STEPUP program (Successful Transition through Enhanced Preparation for Undergraduate Program), which has been modeled across the country at several institutions. The program, still in existence today, is a 6-week residential program for incoming freshman students and involves peer mentoring, academic preparation, student success, industry exposure, and design competitions. It involves the incoming freshman, faculty, staff, graduate students, existing undergraduate students and alumni and industry professionals to ensure its success. This model, a connected-collaborative program model, is a hallmark of the HWCOE Student Affairs.

Conversations were encouraged between each echelon of academia to enhance student experiences. Student groups were created to encourage direct dialogue between student populations and engineering administration. The Engineering Student Advisory Council (ESAC) and the Multicultural Roundtable are two examples of this work. ESAC was comprised of select student leaders from engineering societies. The Multicultural Roundtable was formed to bring together underrepresented graduate students in engineering. Each group was tasked with developing a support network for each other, and presenting the administration with concerns from their respective populations. These groups also provided administration the opportunity to communicate directly with student leaders and underrepresented groups. These communications were crucial in understanding students perceived needs, yet only directly involved a limited number of students when compared to the overall student population.

In 2009, Town Hall forums were introduced to gain more student perspectives with the growing engineering student population. These forums often included S.W.O.T. (Strengths, Weaknesses, Opportunities, Threats) analysis. Both undergraduate and graduate students were invited to attend. Students from ESAC were tasked with supporting the events, helping to encourage participation and collect data. Students had become intently aware of the gaps in support they needed and desired from administration. With Town Hall forums, students were able to express areas in which the college could improve, knowing the administration would use the information to improve-and it did. S.W.O.T. analysis data led to the addition of more academic advisors, additional forums, reworking engineering sections of core courses, student surveys, a heightened focus on diversity and inclusion and more. ESAC students were involved along the way, helping them become better student leaders as they implemented similar efforts within their respective organizations.

Unlike ESAC, the Multicultural Roundtable did not survive over time. However, graduate student groups for the National Society of Black Engineers (NSBE) and the Society of Hispanic Professional Engineers (SHPE) were ultimately developed with support from the Associate Dean for Student Affairs, maintaining graduate student relationships with the Student Affairs office. In addition, through collaboration with the Associate Dean for Academic Affairs, department specific advisory councils for graduate students were also formed, and members of this council were selected to participate on a college-wide council as well. Graduate students can now be found participating in several capacities within the STAR office and across the college.

Overall, the primary engagement of both undergraduate and graduate students came from a top-down approach where the administrator in Student Affairs created opportunities for students to participate in shaping the college. While undergraduate student leadership opportunities were abundant in the college, graduate students opportunities were limited. Once engaged, graduate students began to make a significant impact on addressing student needs as their ability to develop legitimate programming changed the landscape of student affairs. Involvement came directly from conversations with administration and staff within the STAR office. As graduate students showed interest, their ideas were nurtured and ultimately developed into programs, events, and activities within the college.

Community Building

One of the objectives of the newly established HWCOE Strategic Goals is community building. Though designated by college administration, community building requires the members of a community to be involved. Therefore, involving students, faculty and staff within the Gator Engineering community is paramount to the success of this strategic goal. Community-building programming is markedly different from the traditional program development model. According to the authors of *Student Services-A Handbook for the Profession*, “By engaging students and involving them in addressing their own concerns not only enhances the capacities of the individuals in the group but also builds community among those working together.”⁷ Not all student affairs program development will require a focus on community building, but it is an important concept to implement with the diversification of student populations. Acknowledging that we are a part of a global community and exposing students to the diversity of thought,

opinion, and environment provides student affairs administrators with a meaningful way to improve students' cultural competencies.

Community building requires conversation. In the case of higher education, engagement with students must occur in order to understand the desires and needs of the target population to develop programming aimed at that specific community. This engagement can ultimately increase the social capital of the community, enhancing and supporting the relational interactions of students through programming. In order to implement this method of program development, identifying students with a passion for their community will allow administrators the understanding of a given community's shared expectations and values. Working through their lens to develop programming can remove competing perspectives, and the complexities that often prevent programs from moving out of the planning stage (identifying someone to plan the event, financial support, time, etc.) to being executed.

Thus, the STAR office looked to integrate some of the tenets of community building based on conversations with key stakeholders in the Gator Engineering community. Starting with conversations with key stakeholders in various communities, programs were developed from the ground up and implemented into the fabric of the college by facilitating coordinated action.

Best Practices

Graduate students represent an untapped resource within most colleges. Though often disengaged from college activities due to their research obligations, many have an affinity for student affairs related work. Students often bring ideas to address student needs to the STAR office, where staff work with them to create programs and events. In many ways it is a grassroots effort towards addressing student needs that oftentimes would not reach the ears of the administration. The HWCOE serves as the soil, nourishing students' talents and abilities, helping them grow their skillsets. To date, several programs have been created through the STAR office (Figure 3).

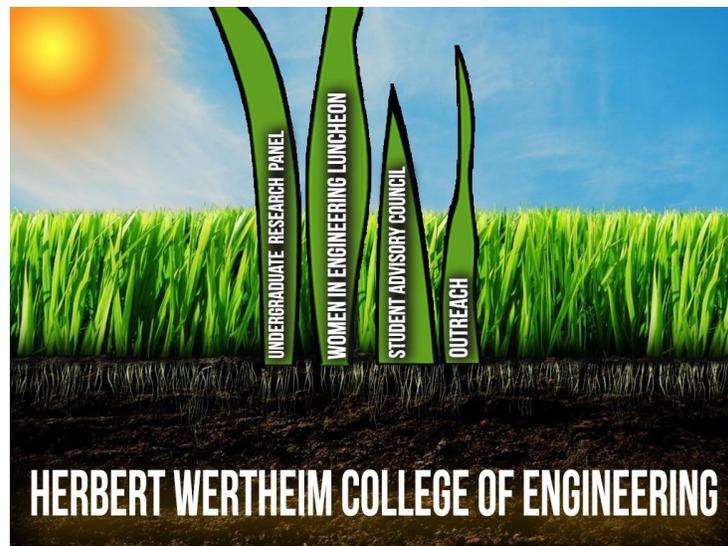


Figure 3. Grassroots Model

The STAR office utilizes a connected-collaborative program model that incorporates students at every stage to participate in the activities provided through its programs. A connected-collaborative program involves more than one segment of the engineering pipeline to support and/or facilitate a new or existing program. An example of this is inviting undergraduate and graduate students to show projects to K-12 students at outreach events. This not only provides K-12 students with exposure to a variety engineering projects and role models, but also engages engineering students in service activities and provides an opportunity for them to enhance skills like technology transfer and science communication. Through interactions like these, the STAR office has become a hub for all students interested in student affairs and engineering education related activities.

With engagement of undergraduate and graduate students alike, many of the financial burdens of supporting a program are eased. Staff can focus on their primary activities, while students are given stakeholder positions within the college to develop and manage supporting activities. To highlight successful programs developed by graduate students through the support of the STAR office, the Women in Engineering Luncheon and the Undergraduate Research Panel will be discussed further.

Women in Engineering Luncheon

The Women in Engineering Luncheon was developed in 2014 to support incoming female freshman students participating in summer bridge programs. This program was developed by graduate student conversations with the Associate Dean for Student Affairs. Conversations centered on the overall lack of female engineering role models in academia, and scholarly articles about the effects of imposter syndrome and campus climate in small group settings. Ultimately, by looking at examples within industry and at other institutions, the idea for a new program was developed. The hope was to empower female students as they entered their first year by specifically targeting women-specific issues found in literature.

This program aligns with the university's desire for pre-eminence, and our goal to be a top ten engineering program. Of the institutions the HWCOE compares itself to for metrics, each has an existing program to support women in engineering. Some incorporate student organizations into their programs, while others are fully organized by full time faculty and staff.

Rates of female student enrollment in engineering at UF have slowly increased over the last decade (Figure 4), reaching 26.5% in the spring 2016 semester. For the first time in the history of Gator Engineering, female enrollment outnumbered male enrollment in fall 2016. In spite of this historical event, gender parity in academia and industry are far off goals. In addition to gender inequality, rates of enrollment for ethnic minorities are also not representative.

HWCOE Percent of Fall Enrollment by Gender

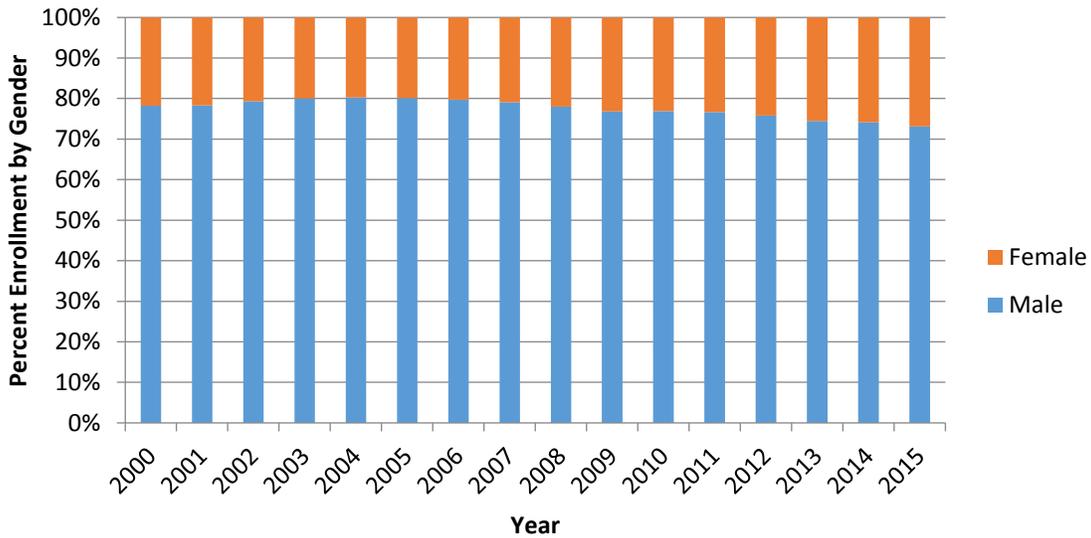


Figure 4. HWCOE Fall Enrollment Data by Gender

With financial support from the STAR office, the program was launched. Female students at a joint graduate NSBE/SHPE meeting discussed the topic and suggested ideas for each session. Topics were then selected from literature that aligned with the ideas from the graduate student meeting. They included an introduction to graduate school, imposter syndrome, work life balance, and perceptions of women in academia and industry to name a few. The luncheon was built into the summer bridge schedules, in order that no student would miss out on any of the other activities in their respective programs. Female faculty and graduate students were invited to serve as facilitators, again creating a connected-collaborative program within the college.

Freshman female students participated in five luncheons during their summer bridge program, each with a different topic. The program began with lunch being delivered and a time for students to mingle with each other. After 15 minutes, the formal program began, facilitated by a female graduate student. Faculty, staff and other graduate students served as panelists. Time was devoted to a series of questions developed by the facilitator, and subsequently the participants asked their own questions of panelists.

In 2015, the inaugural year, average student attendance was 15 students. In 2016, 24 students regularly participated in the program. Now approaching its third year, the program will be expanded to not only support female students in summer bridge programs, but also all female students within the college during the fall and spring semesters.

Though participants were evaluated with pre and post test data, the information was only used to inform the direction of the program. Plans are in place to formalize evaluation to adequately assess any outcomes of the program. Students who participated in the program expressed the desire to have additional luncheons throughout the year, prompting the expansion of the program. On December 1, 2016, the inaugural Women in Engineering Reception was held for freshman students in the college, along with Faculty involved in the summer component of the

program. Registration caps were set at 100 participants, and 80 students registered to attend, along with 8 faculty and/or administrators. The invitation was unintentionally sent to some non-freshman students. Each of the non-freshman who responded hoped that the program would be expanded to involve their class level. Some registrants were actually not freshman who bypassed registration by electing to be an engineering organization representative. 48 attendees ultimately participated in the inaugural event.

Ultimately the program has been successful, as attendance was maintained throughout the summer, and students requested more opportunities to meet in the future. Ideas for the future include developing an early faculty related track of the program, expanding luncheons to all students during the fall/spring semesters using evidence-based topics and more. As a program entirely developed by one particular female graduate student, this program only requires minimal involvement from STAR office (i.e. support for funding the luncheons and reserving space). This graduate student is also working towards developing research questions to present at future conferences based on this work, which will help her further her knowledge of the topic area for future research, in addition to developing her program development portfolio.

Undergraduate Research Panel

In 2011, Black engineering graduate students at UF engaged in a dialogue about how to address their needs. Isolation affected minority graduate students and, despite being connected outside of their respective disciplines, several students were leaving their programs. During the gathering, the group suggested hosting regular meetings to help each other persist through the rigors of their programs. Though each student came from a different department, they realized the commonalities in their experiences and the desire for additional support and guidance. As a result, GradNSBE was formed.

It began as a very informal group with the idea to leverage an already existing organization, the National Society of Black Engineers (NSBE) to become a connecting point for incoming students and to reach graduate and undergraduate students. Students would meet together in the evenings to share ideas on how to successfully transition from coursework to research, or how to develop a dissertation topic, among other things. Faculty and staff with diverse backgrounds were invited to share their thoughts and wisdom.

As the group began to diversify, members from the Society of Hispanic Professional Engineers (SHPE) learned GradNSBE's best practices and developed a GradSHPE group to address needs specific to their community. Soon, the group was noticed by administration, and by 2014 funding was allocated by the Associate Dean for Student Affairs to support its efforts. As GradNSBE and GradSHPE continued to meet both separately and jointly, ideas on how to encourage minority undergraduate students began to develop. This spurred the creation of the Undergraduate Research Panel.

For the first Undergraduate Research Panel event, 13 undergraduate students registered, but 26 attended the event. Of the 13 students who registered, 6 indicated that they were not confident finding a research mentor, despite the amount of information UF provides to students about undergraduate research. Of those who attended, 33% were freshman, 21% were sophomores,

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6.1% were juniors, 21.2 % were 4th year seniors, 15.2% were 5th year seniors and 1 person registered as other. The primary attendees were students from NSBE and SHPE, two of the minority engineering student organizations on campus. There were 33 participants in total, including undergraduate and graduate students, faculty and staff.

Graduate students from different fields, at various stages of their programs volunteered to speak to undergraduate students about graduate school. In addition, faculty and undergraduate students were invited to sit on the panel. Questions were anonymously submitted for the panelists to answer. After the panel, undergraduate student posters were on display during a reception for students to ask questions about their research. Resources to get connected with faculty in need of undergraduate student researchers were also made available including connections to UF's Center for Undergraduate Research and the Ronald E. McNair Scholars Program.

An event email account was created for students to submit questions anonymously. Some of the questions that were sent in by students include:

- Does research have to be under the College of Engineering?
- Do companies care where you conduct your research (i.e. College of Engineering vs. College of Medicine)?
- Is it too late to get involved with research in your last year?
- Does a low GPA play a huge role in getting involved with research?
- How do research leaders select students to join projects and how important are grades in the process?

Questions asked directly by the participants included:

- Can you get course credit or payment for doing undergraduate research?
- Are there opportunities to do research in the summer?
- Can you finish graduate school in 4 years? If so, how?
- How do you approach a potential mentor? Is having a developed proposal a good idea?
- What is a typical day like for research?
- How many hours are required to work in a lab?
- How do you find a balance between research and course work?

These questions indicated that students of all classifications need more opportunities to learn about undergraduate research. Though our college has worked towards being more transparent with research opportunities, these efforts have been ineffective at reaching all of the undergraduate students in the college. As a result, this event now occurs every fall and spring semester, and incorporates the involvement of the NSBE chapter to coordinate the event. GradNSBE contributes to the planning process, and helps identify panelists to participate in the program. The college also identified a Director of Undergraduate Research who is working to improve students' knowledge of undergraduate research opportunities.

With NSBE's involvement, there has been a paradigm shift within the local organization. Though previously the undergraduate component of the organization focused on helping students obtain jobs after graduation by encouraging students to find internship opportunities, they have now begun a more concerted effort to help their members pursue research opportunities. Undergraduate research opportunities are sent via their listserv, and they offer students the

opportunity to be mentored by graduate students. In addition, leaders of UF undergraduate research programs were invited to share research opportunities at meetings. Through interactions with graduate students and faculty, the group was exposed to opportunities in academia because of the conversations that arose from the panel event. As previously mentioned, these types of interactions with the organization resulted in them taking the event and making it their own, exposing the entire college to research opportunities. Though college administration and staff is a part of the planning process, they only function as support to the planning committee, allowing the STAR office to focus on other projects.

Conclusions

As engineering student populations continue to increase across the country, the need exists to develop more strategic ways to engage students. As institutions fill with more and more students, staff may not have similar growth. Untapped resources can bolster student affairs efforts to promote successful retention and attention. Empowering student leaders with support from administration and staff to develop and facilitate new programs to address student needs can positively impact student experiences. This helps students develop a sense of community, by allowing them to not only voice the concerns within their respective communities, but also proactively do something about them. Not only does this support student affairs, but improvements in students' mentoring and leadership skills be achieved. By creating opportunities, through advisory groups and organizations that directly report to administration, student leaders with an affinity towards student affairs programming can be identified and leveraged by the college to be positive change makers.

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