Transfer Success: A Qualitative Approach to Understanding Transfer Student Experiences at a Teaching-Focused Institution

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Community colleges serve a diverse student body in terms of race, ethnicity, gender, age, socioeconomic status, and nationality. They are critical access points in post-secondary education for first-generation students, veterans, and working parents. Community college students who seek to transfer to a 4-year school often struggle with social and academic interactions that are important factors in building a sense of belonging to the receiving institution. Existing research on the transfer student experience mostly focuses on large research universities, while a majority of community colleges are smaller in comparison and have student-focused environments.

This study focuses on community college transfer students who graduated from the Electrical and Computer Engineering (ECE) Department at Seattle University, a teaching-focused four-year institution in the Pacific Northwest Region, between Spring 2012 and Spring 2022. Seattle University has received national recognition among four-year institutions for its work in attracting and supporting community college transfer students. The percentage of transfers among students admitted to the ECE program has varied from 25% to 79% in recent years.

The goal of this study is to contribute to the body of knowledge on factors that influence the success of community college transfer students, while filling in a knowledge gap that exists in the role that the size of receiving institutions play in this context. For this exploratory study, we use data from senior exit surveys and senior personal statements (also known as reflection papers) to capture in-depth and rich descriptions of transfer student experiences. Thematic analysis is used with an inductive approach to allow themes to emerge from the data collected. For the next phase of this study, we aim to further probe these themes by conducting targeted surveys and focus groups to better understand factors that influence the transfer student experience.

Background

The community college pipeline has played an important role in providing access to higher education for students whose circumstances may have precluded their enrollment at four-year institutions for the entire duration of their undergraduate education. This is especially true for women, members of marginalized communities, non-traditional students over the age of 24, and individuals of low socioeconomic status, all of whom continue to be underrepresented in STEM fields. Roughly 40 percent of first time in college (FTIC) students pursuing higher education in the United Stated start in community colleges [1] [2]. Out of 632,051 students who first enrolled at a community college in the fall 2015 term, 31.6 percent (199,913) transferred to a four-year institution within six years (before fall 2021) [3]. Among those students, about 44 percent transferred after receiving either a certificate or associate degree, and 49 percent earned a bachelor's degree within six years of starting in the community college. It must be noted that only 16 percent of the fall 2015 cohort earned a bachelor's degree.

While national community college enrollments saw a steady decrease (total of 14.4 percent) between 2010 and 2017 [4], the COVID-19 pandemic triggered a steep two-year loss of 296,200 (13.5 percent) transfer students between fall 2020 and fall 2022 [5]. Consequently, vertical transfers to four- year institutions also experienced steep declines (9.7 percent). Nationally, community college enrollment in engineering pathways is running below pre-pandemic numbers, with a total three-year decline of 19.15 percent since fall 2019 [6]. The critical need for improved transfer pathways between community colleges and four-year institutions cannot be overstated. As the economic and social disruptions caused by the pandemic continues to disproportionately impact community colleges and the communities they serve, it is more important now, than ever before, to create structures that support, rather than inhibit, upward transfer students.

In order to develop effective strategies for enabling transfer student success, it is important to first understand their experiences and needs. Among the many factors that have been shown to positively impact the transfer student experience and persistence, clear and consistent credit transfer policies, planning and orientation, integrated academic advising, mentoring, and social networks take precedence [7] [8] [9]. A large majority of studies in this area are conducted in the context of large research institutions or state university systems [10] [11] [12] [13] [14]. While findings and best practices generated from these studies are nonetheless valuable, a glaring gap remains in the role that the size and nature of receiving institutions play in transfer student success. This study aims to explore in-depth and rich descriptions of transfer student experiences, captured over a period of 10 years at a teaching-focused institution.

The Department of Electrical and Computer Engineering at Seattle University offers undergraduate-only programs in Electrical Engineering and Computer Engineering. Seattle University is dedicated to educating the whole person, to professional formation, and to empowering leaders for a just and humane world. Seattle University has the largest transfer student population of any private university in Washington State. The percentage of transfers among students admitted to our department has varied from 25% to 79% in recent years, as shown in Table 1. Transfer students typically have a greater range of life and work experience than do those students who enroll as FTIC. With their determination, resilience, and camaraderie, they enrich our department in immeasurable ways. Transfer students are usually highly motivated, and their retention rate is high (nearly 100%). Full-time junior transfer students typically complete their studies in six to seven quarters (nominally two years). A prior study showed that, based on their GPA at graduation, students who transferred to our department are no less successful than students who enrolled as FTIC.

Method

For this study, information was extracted from two assignments that all ECE undergraduate seniors are expected to complete: senior exit surveys and personal statements. Exit surveys are one of our ABET continuous improvement assessment tools and personal statements are meant to get student feedback on the department's success in meeting its objectives and outcomes. Since this study focuses on transfer students who graduated between 2012 and 2022, only responses relevant to transfer student experiences within this period were extracted.

Table 1. Percentage of transfer students who were admitted to Seattle University and expressed their desire to study Electrical and Computer Engineering

Year	Total Number of Students Admitted to ECE	Number of Transfer Students	Transfer Students (%)
2012	43	34	79.1
2013	47	33	70.2
2014	43	27	62.8
2015	54	27	50.0
2016	33	20	60.6
2017	30	20	66.7
2018	34	15	44.1
2019	25	11	44.0
2020	17	6	35.3
2021	19	9	47.4
2022	20	5	25.0

While exit surveys were examined to probe factors that influenced students' choice of Seattle University as their transfer school, personal statements were analysed more holistically to probe factors that also contributed to their transfer student experiences.

All the extracted data were uploaded to MAXQDA, a software program designed for qualitative data analysis and mixed methods research. Due to the exploratory nature of this study, thematic analysis was chosen to identify and report patterns or themes within the open-ended survey responses and personal statements. Thematic analysis is a powerful yet flexible method for describing qualitative data, while also interpreting it by selecting codes and constructing themes [15] [16]. We use an inductive approach that is data-driven, or in other words, we allow themes to emerge from the data. Subsequently, we allow the research question to evolve through the coding process. For thematic analysis, we draw on Braun and Clarke' framework (2006) [16], which includes six phases (a) familiarizing/reading all data, (b) generating initial codes, (c) identifying initial themes, (d) reviewing and refining themes, (e) defining and naming the themes, and (f) producing the report.

Analysis and Discussion

Thematic analysis of the data that captured transfer student experiences generated 17 initial codes (548 coded text segments), from which four major themes emerged: university characteristics, department academics, department support services, and student affective elements. Figure 1 illustrates the percent distribution of coded segments among the four themes. It can be seen that the theme of department academics has the highest coding frequency, closely followed by university characteristics, followed by department support services, with student

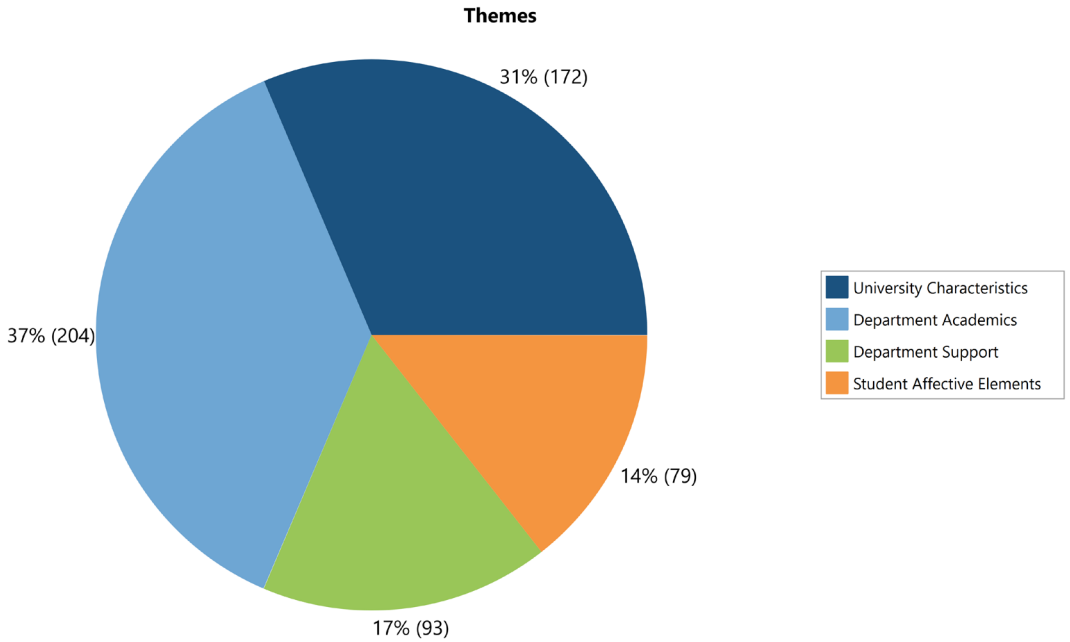

Figure 1: Pie chart illustrating coding statistics for the four major themes, displaying corresponding percentage of coded segments (number of coded segments)

Table 2: Coding statistics for the four major themes and underlying codes

Theme	Codes	# of code segments	% of code segments/theme
University Characteristics 31% (172)	Small class sizes	90	52
	Financial aid	26	15
	Location	25	15
	Mission	21	12
	Transfer process	10	6
Department Academics 37% (204)	Faculty	101	50
	Senior design project	42	21
	Learning environment	28	14
	Junior labs	19	9
	Programming courses	11	5
	Electives	3	1
Department Support Services 17% (93)	Networking, technical, and social activities	44	47
	Humanitarian engineering	25	27
	Internships	16	17
	Academic advising	8	9
Student Affective Elements 14% (79)	Sense of community	52	66
	Student satisfaction	27	34

affective elements having the lowest coding frequency. Table 2 lists the themes, the underlying codes, and corresponding coding statistics.

The subsequent sections investigate each theme in detail by describing the underlying codes and interpreting student responses.

Theme 1: University Characteristics (172/551 code segments – 31%)

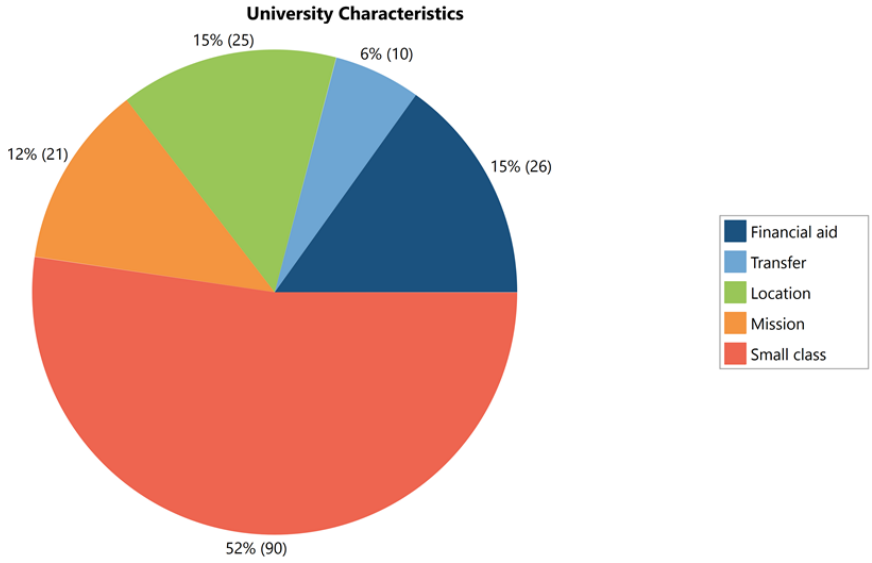

Figure 2: Pie chart illustrating coding statistics for underlying codes of Theme1: University Characteristics, displaying corresponding percentage of coded segments (number of coded segments)

- ***Small class sizes*** – Seattle University prides itself on small class sizes that provide opportunities for individualized instruction and personal attention. The average class size is 18 students, with all classes taught by faculty. While some science and engineering classes tend to be slightly larger than average, the focus is still on student-centered learning.

  Student responses indicate that small class size was a significant factor that influenced their choice of transfer school. Students reported experiencing a welcoming environment, greater classroom engagement, and meaningful interactions with faculty and peers, all of which were attributed to small class sizes. This is especially true for neurodivergent and introverted students who may have more opportunities to discover their true potential in smaller learning environments.

- ***Financial aid*** - Seattle University offers merit-based scholarships for all transfer students, in addition to college and department-specific funding opportunities. Our department received an NSF grant (2013 – 2018) that provided scholarships to 32 academically talented and financially needy junior-year students who transferred to the department from two-year colleges. It is no surprise that our transfer student enrollment was at its highest during that period.

Student responses indicate that the availability of financial aid and scholarship opportunities was a deciding factor in their choice of transfer school. For some students, the option of choosing a personalized education, at a price point that is comparable to that at larger public universities, was an obvious choice.

- ***Location*** – Seattle University is located in an urban neighborhood in the heart of Seattle, Washington. Its proximity to a major tech hub makes the location attractive to prospective students.

  Student responses indicate location as one of the popular factors that influenced their choice of transfer school. A large majority of our transfer students come from eleven community colleges, all within 45 miles from Seattle University. Most of them are local to Washington state and they commute to campus. For others, the desire to live in one of the fastest growing regions in the nation draws them to Seattle.

- ***Mission –*** Seattle University is a mission-driven institution that focuses on educating the whole person. The University's commitment to social justice, environmental sustainability, and community engagement resonates with prospective students who desire a well-rounded education.

  Student responses show a deep connection to the mission and values of Seattle University. Some students experience community-engaged service learning in the core courses they choose, giving them an opportunity to connects concepts in the classroom to service experiences in the community. Students who are initially skeptical about the required core courses, later describe them as transformative experiences that change their view of the world.

- ***Transfer process*** – An inter-institutional transfer agreement articulates the applicability of transfer credits from community colleges to baccalaureate institutions in the state of Washington. In addition, Washington state has a council that facilitates communication, cooperation and coordination between engineering transfer coordinators in community colleges and faculty in 4-year institutions. As a result, students at community colleges are aware of the type of general education and introductory ECE courses they should take before transferring to Seattle University. To bridge any potential gaps in information, interested transfer students are encouraged to meet with the department chair to have their transcripts evaluated. They are given a draft plan of studies, so they know how long it will take them to complete their degree after they transfer in. Once transfer students are admitted and confirm their desire to study at Seattle University, they have an advising appointment with a professional College Advisor who works in collaboration with the department chair on creating a detailed plan of studies based on the latest information from the student's transcript.

  Student responses indicate that advising at both levels, the community college and Seattle University, ensures a smooth administrative transfer process. Student experiences with

the actual transition and preparedness, however, has room for improvement. Students report feeling overwhelmed with the course load in their junior and senior years. Due to the nature of Seattle University's core curriculum that embodies the university's mission of educating the whole person, transfer students are expected to take a wide range of core courses, in addition to some required ECE freshman- and sophomore-level courses. This combined with the rigorous junior- and senior-level courses results in a laborious undertaking. Amidst all this, some students could experience challenges with adjusting to the new environment, thus affecting their performance. Some students expressed concerns about the cognitive overhead required when transfer students who primarily have programming experience with Java are expected to code in Python and/or C++. While they do appreciate the opportunity to diversify their programming knowledge and toolkits, the steep learning curve associated with this transition is undeniable.

Theme 2: Department Academics (204/551 code segments – 37%)

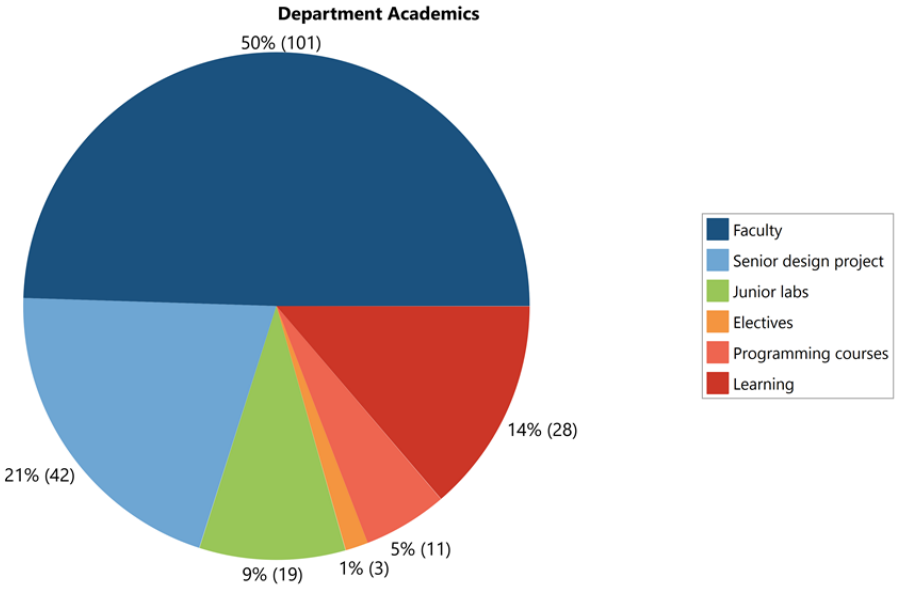

Figure 3: Pie chart illustrating coding statistics for underlying codes of Theme 2: Department Academics, displaying corresponding percentage of coded segments (number of coded segments)

- ***Faculty*** **-** At Seattle University, faculty are at the very heart of the student experience. We strive to create a collaborative, inclusive, and stimulating learning environment that emphasizes care for the whole person. Faculty and staff in our department offer student support that goes beyond the classroom and extends to career counseling and mentorship. Course outcomes are regularly examined and adjusted to respond to the needs of our constituents. Faculty are committed to practicing continuous improvement through professional development activities and pedagogical research that broaden our spectrum of teaching and learning strategies.

Student responses indicate that faculty-student relationships was by far the most influential factor that contributed to a positive experience for transfer students. Students recognized and appreciated the care, support, and education they received from faculty. Some students shared concerns about inconsistencies in the quality of instruction, particularly when courses are taught by adjunct faculty, or when multiple sections are taught by different instructors. Figure 4 shows a word cloud that illustrates positive word associations that capture the essence of interactions with faculty as experienced by transfer students. The larger a word's size in the cloud, the more frequently it is used.

Figure 4: Word cloud illustrating word frequencies associated with transfer student-faculty interactions

- ***Senior design project*** - The hallmark of the engineering curriculum at Seattle University is our senior design (capstone) project, an academic year-long design project sponsored by local industry, government agencies, or nonprofit organizations. The Project Center at Seattle University interfaces with sponsors to find real-world assignments for design teams typically comprised of 4 students and supported by a faculty advisor, an industry liaison, and a department project coordinator. Over the course of the academic year, teams are responsible for both technical aspects of the project including designing, building, and testing a prototype (if applicable), and project management aspects such as budgeting and scheduling. As part of the senior design sequence, students are introduced to various project management and engineering design tools, frameworks for engineering ethics, and technical standards and regulations. Teams are given frequent opportunities to hone their oral and written communication skills through team presentations and deliverables such as a project proposal, technical report, and final project report. Projects Day, the culminating event for senior design, is held at the end of the academic year.

Teams showcase their projects through PowerPoint presentations, participate in a poster session, and demonstrate the prototypes of their solutions.

Student responses indicate that Seattle University's model for senior design is an important factor that influences the choice of transfer school and subsequent satisfaction with the program. While employment by a sponsor is not guaranteed, yet many of our sponsors have hired students after completion of the project. More importantly, students have emphasized the impact of this experience on their professional formation. Having the opportunity to work in a diverse team, on a real-world problem, prepares them for the workforce in an unparalleled way.

- ***Learning environment***- The department strives to create an inclusive learning environment that can be best described as challenging but supportive and personalized but collaborative. Our curriculum has gone through two major redesigns in the past decade, in response to the needs of industry and graduate schools, while facilitating the implementation of the latest pedagogical innovations in engineering education. Our most recent redesign focused on integrating opportunities for active learning by adding more lab experiences to our already very hands-on curriculum. We believe that student engagement, active learning, and collaboration go hand in hand. Because students are admitted directly into the department, they never compete against each other. On the contrary, they see value in collaborating with each other by organizing study groups and working on team projects.

  Student responses indicate a strong alignment with the attributes stated above. There are repeated references to interpersonal relationships with peers that last beyond graduation. Students recognize that the department's grading structure does not inhibit collaboration and informal peer tutoring, rather it is encouraged. Students noted that they could always ask their instructors and peers questions without being made to feel ignorant. The culture of interconnectedness and inclusion was appreciated, as was the department's efforts to fostering a welcoming and open environment.

- ***Junior labs:*** The ECE curriculum at Seattle University includes, in the junior year, a series of laboratory experiences with emphases in Circuits (Fall Quarter), Electronics (Winter Quarter), and Signals and Systems (Spring Quarter). This lab sequence is structured in a way that helps students learn by connecting new knowledge with concepts and skills they acquire in the previous lab and corresponding lecture courses. Students are trained on skills necessary to successfully complete a year-long junior design project that has a unique theme each year, with an emphasis on teamwork and communication. This project prepares students for a more rigorous senior design experience in their senior year.

  Student responses indicate that the junior lab sequence provides a valuable experience with skills related to circuit design, troubleshooting, and testing, all in the context of a larger design problem. This opportunity for hands-on learning has helped students

develop a stronger sense of professional identity and often piques the interest of interviewers at hiring companies.

- ***Programming courses:*** As part of a curriculum redesign that was implemented four years back, and in response to evolving industry needs, the department decided to teach Python and C++ in the context of physical computing. The goal was to train students on using software to control hardware, which is an essential knowledge for electrical and computer engineering majors. Prior to this change, students had to take a MATLAB course offered by the ECE department and a C++ course offered by the CS department. In addition, students are exposed to programming at various levels in courses such as programmable devices, microprocessor design, embedded systems, and the junior lab sequence. Student responses indicate that the opportunity to pursue a computer engineering degree (specialization prior to 2019) was a major factor in their choice of transfer school. The wide breadth of programming skills that they acquired over the duration of their program gave them a competitive edge in the workforce. There were concerns about the transition to advanced computer science courses being rough, given that our focus was on teaching computing in a hands-on manner. To address any gaps in knowledge, we created a *Bridge to Data Structures* course that will be offered for the first time this year.

- ***Electives:*** The two curricular tracks offered by the department are electrical engineering and computer engineering. The former offers a traditional but flexible curriculum that gives students the opportunity to explore some major subfields of the profession through five elective courses, while attaining a good foundation in the topics of circuits, systems, and electronics. The latter has a heavier concentration of courses in computer science and digital hardware with an option to take two electives in related areas. Often, we survey our students to determine their preferences for elective topics. Being a small program, it is especially important to offer electives that reflect the availabity and expertise of the faculty, the interests and enthusiasm of the students, and the current needs of industry.

  Students responses show a mixed reaction to electives offered by the department, which is expected given that the electives offered each year vary widely. While some students indicate satisfaction with the elective topics offered, others expressed displeasure with the frequency and limited range of topics.

Theme 3: Department Support Services (93/551 code segments – 17%)

- ***Networking, technical, and social activities:*** The department prides itself on the wide range of activities that are organized each year to support student engagement and development. Most of these activities are organized by student clubs that are active within the department, in collaboration with the ECE Industry Advisory Board (ECEAB).

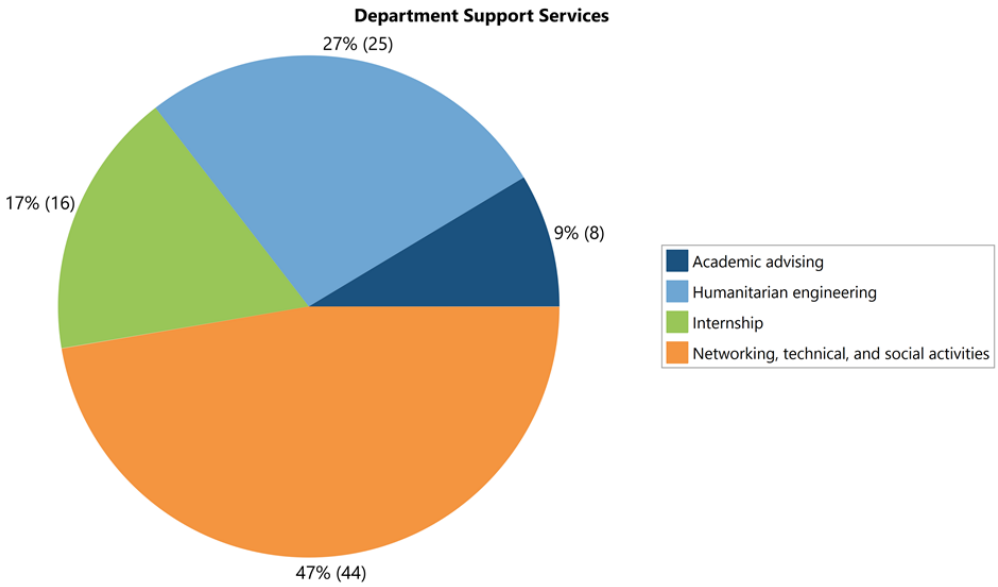

Figure 5: Pie chart illustrating coding statistics for underlying codes of Theme 3: Department Support Services, displaying corresponding percentage of coded segments (number of coded segments)

Examples of networking events include Networking Night hosted by the IEEE student chapter, Mentor Night hosted by the IEEE-HKN student chapter, Resume Review Night hosted by the SWE student chapter, and Career and internship fairs hosted by the Career Engagement Office (CEO). Technical events include the ECE seminar series, makerspace workshops, and industry field trips. Social events include a fall welcome party, a holiday party, and an end-of-year BBQ party. In addition, the department hosts weekly ECE Tea, an informal gathering of the department community to facilitate social connections over fun conversations, games, and snacks. In addition to student chapters of professional organizations, the department has ECE Ambassadors, a group of 13 students selected to represent the department at outreach and recruitment events. In addition to participating in such events, ECE Ambassadors are responsible for maintaining a community within the department. They celebrate faculty and staff members' birthdays and help organize social events. They solicit feedback from other students about potential improvements that they would like to see implemented in the department.

Students responses indicate a strong agreement on the positive impact of these opportunities on their personal and professional development. Students organizing these events have reported gaining tremendous leadership skills, and students participating in these events have benefited both personally and professionally. For transfer students, the newly constructed social and professional relationships impact their acculturation process.

- ***Humanitarian engineering***: In alignment with the mission and values of Seattle University, students have the opportunity to engage with student chapters of organizations such as Engineers for a Sustainable World (ESW) and KiloWatts for Humanity (KWH), a non-profit organization co-founded by a faculty member from our

department. As parts of these efforts, ECE students have participated in humanitarian engineering projects in Thailand, Peru, Zambia, and Kenya. These initiatives enrich the student academic experience, while empowering them to be global citizens.

Student responses indicate that Seattle University's focus on humanitarian engineering was a selling point in their choice of transfer school. Some students even chose to volunteer for these organizations after graduating.

- ***Internships:*** The ECE curriculum is designed in a way such that students acquire an impressive set of technical skills (Python, C++, Digital Design, VHDL, Circuits, and Microprocessor Design) by the end of their sophomore year. Transfer students acquire these skills, among others, by the end of their junior year. This opens the door for internship opportunities that often pave the path to full-time job offers. Career and internship fairs hosted by the CEO provide a platform to students seeking these opportunities.

  Student responses indicate overall satisfaction with the preparation and support services provided by Seattle University in helping students reach their professional goals. Some students shared that watching their peers land internships and jobs enhanced their confidence as well. This is a testament to the collaborative nature of our department community.

- ***Academic advising:*** Advising is an important student support service offered at Seattle University, and faculty serve as advisors in the ECE department. Students are required to meet with their faculty advisor at least once per quarter before they are allowed to register for the upcoming quarter. During the meeting, advisors review student progress and create an individualized plan that balances potential for student success, student interests and professional goals, and timely graduation. Advisors monitor student performance in the previous and current quarters, identify the need for extra support services such as tutoring, create plans for the following quarter, and offer career advising. This is especially crucial for transfer students who have a rigid and intensive course schedule.

  Student responses indicate that having advisors who are department faculty helped create mentoring relationships that went beyond basic course scheduling. Faculty advisors provided valuable insights related to technical interests and opportunities, as well as strategies for effective study skills, time management, and school-life balance. It is heartwarming to see that advisees consider their faculty advisors as partners in their undergraduate journey, while advisors see themselves as advocates for their advisees.

Theme 4: Student Affective Elements (79/551 code segments – 14%)

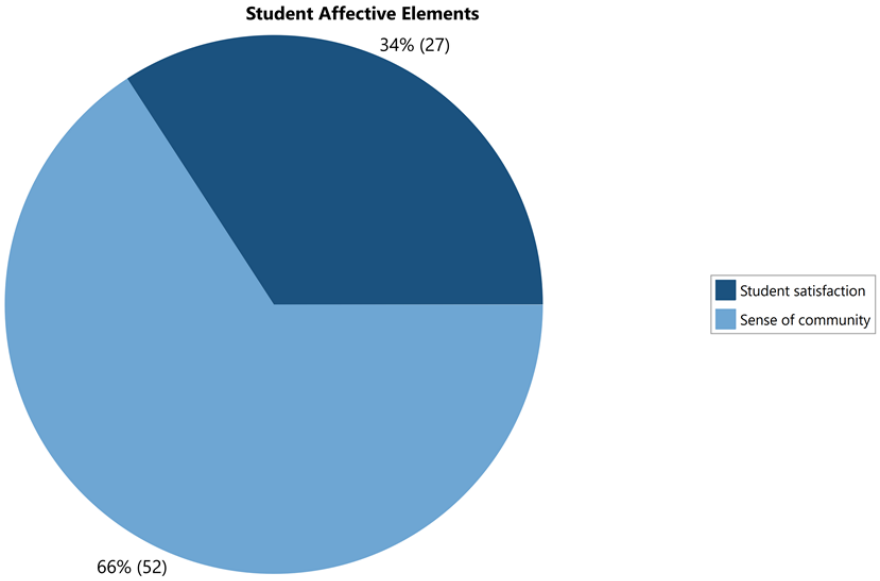

Figure 5: Pie chart illustrating coding statistics for underlying codes of Theme 4: Student Affective Elements, displaying corresponding percentage of coded segments (number of coded segments)

- ***Student satisfaction:*** In the personal statement, students are asked to share their goals for the future and to comment on how the ECE program and the university as a whole is helping them achieve their goals.

  Student responses indicate an overall satisfaction with their professional formation. Most students expressed confidence in their ability to solve real-world engineering problems, with a lens of social justice. Some students expressed apprehensions about a lack of confidence in their professional abilities, primarily attributed to the disruption in their learning caused by the pandemic.

- ***Sense of community:*** Over the years, the faculty, staff, and students of our department have helped to create a collaborative community that is open and welcoming to all. Through social and networking events mentioned earlier, students are given the opportunity to engage in activities that are designed to promote their positive adjustment. An example of this is our weekly ECE tea, an informal gathering of the department community to facilitate social connections over fun conversations, games, and snacks. During the pandemic, ECE tea was held over Zoom, helping us create a sense of normalcy, when the world around us was falling apart.

  Student responses attest to a tight-knit community that they have experienced as students in the department. Some students characterize this as the strongest trait of the department. Others attribute their academic success to the supportive community which helped them overcome social and emotional challenges and build their sense of self-efficacy.

Conclusion

The presence of transfer students has enriched engineering programs across the nation by bringing individuals with a wide range of lived experiences. Institutions, on the other hand, have a shared responsibility of ensuring the success and social mobility of transfer students. Among several factors that have contributed to the success of transfer students in the Electrical and Computer Engineering department at Seattle University, characteristics such as small class sizes, faculty-student relationships, an experiential curriculum, and student engagement through social and networking events, have stood out. All of the above, along with a tight-knit community that our department has worked very hard to create, continues to create a welcoming environment that helps our transfer students strive. The factors identified in this work could be considered best practices for institutions of similar size and a strong focus on community and teaching, for both transfer and FTIC students alike. There is potential for institutions that serve a larger student body to adapt some of these best practices to create a more welcoming environment for transfer students.

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