

# Boosting Professional Participation in Computing Through Greater and Wider Conference Access

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## ABSTRACT

In this paper, we describe efforts of an alliance to increase Pell-grant eligible and first-generation student access to active conference participation by systematically including considerations for student basic needs as well as developing professional science skills and knowledge that aligns with industry and graduate school pathways in computer science. We describe how an alliance creates the structure and flexibility for systematic care for student needs and local innovation to improve educational practice regarding conference participation. We describe our lessons learned for improving access to conferences as well as provide recommendations for increasing student access to professional conference benefits.

## CCS CONCEPTS

• Social and Professional topics • Professional topics • Computing profession • Employment issues

## KEYWORDS

**Conference Participation, Student Basic Needs, Career Advancement, First generation student populations**

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## 1 Introduction-Statement of the Problem

First generation college students may not have access to the professional and extracurricular activities that are supportive of computer science job attainment based on their tendency to live off campus at home, work for pay, and hold familial commitments that decenter college going in their list of priorities[1], [2]. A national alliance supporting successful computing pathways for first generation college students has developed a series of systemic practices and local innovations to promote conference success among students. The alliance's emphasis on care for basic needs and deliberate, intentional development of science capital[3], [4], [5] are vital to student success at professional conference venues, which, we contend, can lead to positive career outcomes. In the words of a student participant facing financial barriers in college:

"I think just growing up, struggling, I think I just knew I needed to work hard and get myself a job that would bring me a lot of money, and you're not to say that that's all that matters, but growing up poor, it's like the most disturbing thing was not having enough money, not having another pair of shoes or not having food if I was hungry or something. So it's just like I need a job that's going to bring me enough money to feed me, my family, my kids. I need to be well off, and that's really what just pushed me to do college in general and study something in STEM."

## 2 Literature Review

A recent study suggests that 37% of college students are food insecure and 40% of students are housing insecure [6]. Evidence suggests that food and housing insecurity are more prevalent among first generation college students than among their continuing generation peers [7]. Among students who are also parents, 68% reported housing insecurity in the past year, and 53% were food insecure in the past 30 days [8]. Student basic need attainment is a consideration when promoting conference attendance, as students may or may not see the long-term value of

a conference when balancing concerns to earn funds for housing, food, and transportation.

Research indicates the importance of extracurricular activities in obtaining a high quality job after graduation [9], [10], [11]. Studies show that, following GPA and prestige of institution, work experience, evidence of leadership, and major-related extracurricular activities are important factors in a job candidate. [12] Conferences in particular can benefit students as they embark on their career search [13]—conferences that lead to internships and other work-related experience or practice may be particularly valuable in supporting professional career development in computing [14]. As first-generation college students navigate professional career paths, they often falter based on their lack of experience with the hidden curriculum, or the implicit rules, norms, and understandings about college success that continuing generation students bring to their college experience through relational or familial knowledge sharing [15]. In this paper, we describe the practices of an alliance in computing to support first generation students' professional pathways in computing through guided conference experiences.

### 3 Positionality statement

The authors of this paper are primarily faculty members and staff who serve in H.S.I. computer science departments. Staff members identify as Hispanic and as Latine—two of the three staff authors attended the higher education institution at which they currently work. Faculty members (both women, one Caucasian and one Hispanic) entered graduate school after forging STEM careers in education and the technical workforce. The social scientist author is a Caucasian woman who is a second-generation college graduate. Authors have been engaged in the work of the alliance for 2-18 years. Staff are typically most deeply engaged in the practices described in this paper.

### 4 Description of Practice: Supporting First Generation Student Success Through Nationwide Alliance Initiatives

The organization described in this experience report developed in 2006 with a mission to support student recruitment, retention, and advancement in computing. Originally an alliance of 7 institutions across the south and west, it has grown to over 80 institutions strong, with regional hubs in the north, southeast, southwest, and west. All member institutions are minority serving, and originating alliance institutions are also broad access institutions. The use of a conference as a professional development feature for students and an opportunity for faculty and staff collaboration has evolved over time- in fall of 2024 the alliance managed funding for 583 registered individuals to attend the professional conference, the majority of them undergraduate students in computing.

(Organization) utilizes a collective impact organizational structure to support change in computing education. Collective impact is particularly useful as a strategy when problems are

complex, involve multiple stakeholders, and are long standing issues. Specifically, domestic students, particularly first-generation college students, have not persisted in computing higher education at rates that would support industry need for computing professionals.

The Collective impact model creates a collaborative structure that allows for top-down programmatic action as well as local innovation to address social problems. The alliance described in this paper has developed a set of shared values related to student success in computing, and takes a “grass-top” approach to student success at the institutional level, where leadership are engaged in using data to understand student retention, recruitment and advancement while students and faculty are empowered to take on roles of leadership in making change. The backbone, an organization with infrastructure to facilitate networking and activity facilitation, develops national level programming to support the activities of the distributed alliance members.

Regionally situated staff support the activities of the alliance, under the supervision of alliance leadership. Stakeholder members, from student leaders, staff, faculty and administration in computing, collaborate to achieve objectives through mutually reinforcing activities. The collective impact model has created the conditions under which organizational partners promote greater access to transformative experiences at professional conferences. In the following sections, we describe the structure for supporting students' basic needs and professional career knowledge via national alliance activity as well as via local innovation and resource leveraging.

### 5 Support for Student Access, Success at Conferences

Alliance actions that guide student experiences at conferences begin with opportunity awareness campaigns and creating an expectation for participation in conferences for professional learning. To ensure broad access to professional conferences, the alliance takes care to demonstrate provision of basic needs throughout the conference experience. The social engineering of student networks and deliberate counseling regarding professional skills also are vital to students' successful conference participation.

#### Awareness of Opportunities

Students at each institution of the alliance serve as “advocates” and receive a modest stipend for spreading the word among their peers about professional opportunities, including a local research experience program funded by the national alliance as well as additional scholarships to attend a professional conference in STEM. Advocates at each institution are overseen by regional staff, who spread information from the national backbone to faculty and student populations in their region of the U.S. and its territories. Backbone staff organize payment of advocates, and hold a training for supporting their local efforts at the professional conference each year.

Locally, alliance staff, faculty points of contact, and student advocates work together to develop events to showcase the impact of conference attendance on students' career readiness and related

work opportunity. Specific examples of local actions that increase awareness of opportunities are the following:

- Departmental visuals (full color posters of attendees, displays of posters utilized in research poster competitions) adorn the walls in classroom hallways and other student- traffic spaces.
- Informal, social meetups developed in concert with student-led groups (e.g., ACM student chapters, coding club chapters) designed as Q and A sessions about conference attendance. In these sessions, participants are encouraged to bring up the worries they had before attending (e.g., some had never flown in planes before, or traveled without family members) that were managed during the conference.

These practices have been highly effective in educating students about the opportunities available through research. As a result, students begin to recognize programs that support their professional growth and develop a greater interest in pursuing them.

### **Expectations to Attend**

A nationwide alliance program that funds 70-90 students per semester has developed an expectation in which participants in the local research experience are obligated to attend the partnering professional conference, as well as present a research paper in a research poster competition. The program is managed through the backbone, and funds are allocated for each participant to receive a research stipend as well as full travel funds to attend the conference with their peers. The development of this contractual obligation is supportive of expanding professional conference access—rather than opting into an extracurricular activity as a student, participation is mandatory. In the same way, additional undergraduate students who earn academic scholarships and are Pell-grant eligible are expected to attend the conference as well as part of their scholarship program. Selection bias is no longer an obstacle to conference access within the alliance.

### **Providing Basic Needs Before, During and After Conferences**

Students who are accepted to attend the professional conference receive a virtual orientation by the backbone via online conferencing software to prepare them for the event. In addition, students are provided prepaid hotel, registration, and airfare. Prepayment of these costs is vital to student attendance, as reimbursement policies assume students have disposable income and/or access to lines of credit, which may or may not be a part of students' or their families' financial practices or circumstances.

Local staff have developed additional methods for attending to basic needs during the conference, based on their knowledge of students' lived experiences with financial strain. For example, institution or region-organized group meals can alleviate cashflow issues students may experience with funding their own meals at a conference and waiting for reimbursement. Some staff have adjusted travel payment to provide cash advances to support conference meals—they ensure all students traveling in the group receive the meal cash advance, rather than creating special arrangements for students who request the advance or appear in need to staff and faculty. This practice can improve access to conference participation in equitable ways without “outing” students with particular financial hardship. Other proactive ways in

which staff consider the needs of their students include advocating for student placement at the time of conference registration in hotels that offer complimentary breakfast and afternoon snacks.

Implementing a messaging platform enables continuous communication between students and faculty/staff, allowing for real-time support, guidance throughout the conference, and timely announcements of new opportunities. This can also help alleviate students' concerns about traveling alone, as they will always have a direct line of contact for assistance.

Business attire is required for elements of the professional conference the alliance attends together, yet professional clothing is not an asset available to all first-generation college students, particularly when conference travel may require business attire appropriate for different weather conditions than one faces at home. Before the conference, students are made aware of the requirements for wardrobe, with images and descriptions of what to wear and what not to wear in professional environments. Staff describe multiple ways they support students in their clothing acquisition—from communicating to all students about clothing sales at discount department stores to making students aware of clothing “pantries” available within career services and institutional student offices. Scholarship students who are required to attend the conference are reminded of their need for professional clothing when their money is distributed and are encouraged to put some aside for the expense.

### **Science Career Development**

The alliance holds an orientation at the national level to support students who attend the conference as part of alliance activity- this occurs online and provides logistics and tips to students to prepare for conference activities and travel. Additionally, staff and faculty locally develop workshops to coach and mentor students in career-related tasks they may need to perform at the conference itself- for example, upper classmen may prepare a resume for a job or internship placement, and student researchers are expected to bring a poster based on their research progress in undergraduate and graduate research opportunities. Pre-conference learning typically included past attendees as near peer mentors who described what they did to succeed in securing an internship, for example. Conference workshops developed in collaboration with the alliance address technical skill development, cooperation, communication skills, and relationship building.

### **Facilitating Social Networks**

Conference attendance in cohorts has often been a catalyst for building student cohorts who care for one another—in past years, faculty describe how after a conference, the open social spaces in the department get busier with students studying and socializing together. These social networks are promoted before the conference through formal and informal planning sessions, conference roommate meetups, and logistics meetings held with all attendees. One institution is intentional in pairing returning students with new conference attendees in hotel room shares, with an expectation that the mentor ensures the new student has a plan for being productive at the conference each day based on his or her professional goals.

## **6. Conference Outcomes for Students**

Students who attended the conference as part of alliance participation were asked to complete a survey three weeks following their experience. The delay in implementation of the survey is designed to provide an opportunity for students to follow up with peers, faculty, and industry contacts. Responses were

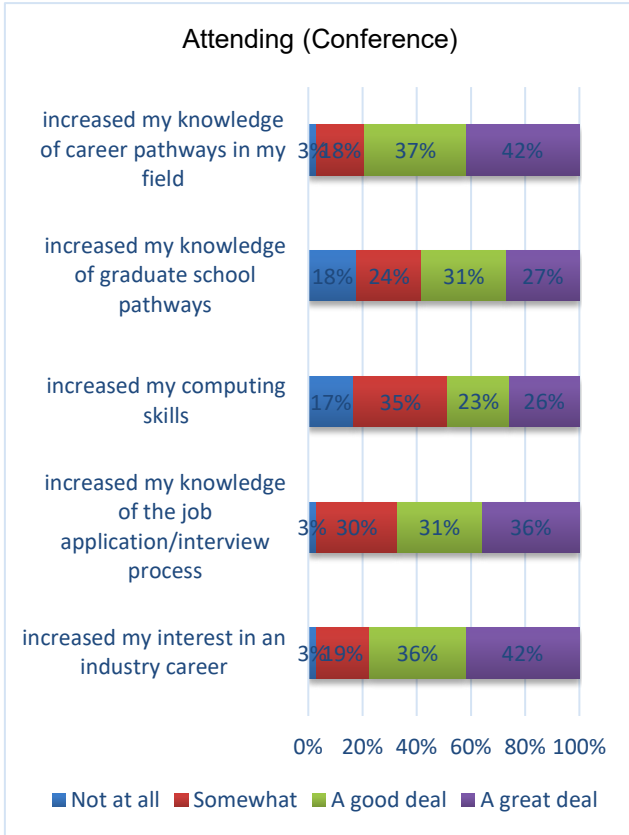


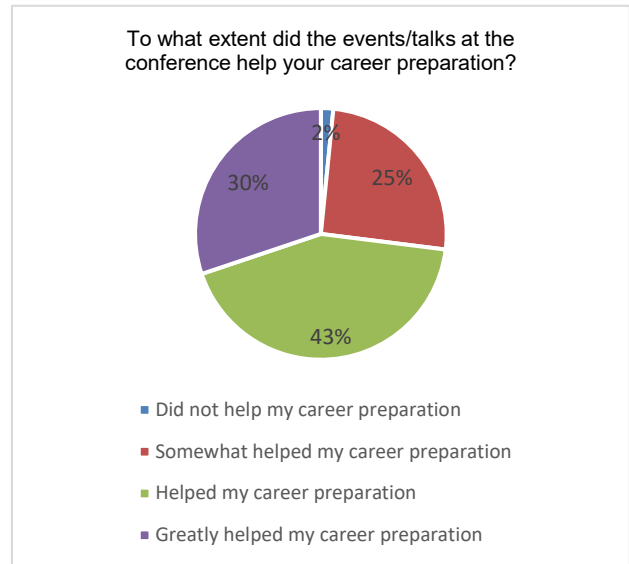
Figure 1: Impact of Conference

obtained from 67 student attendees. According to their responses, 97% increased their interests in an industry career, with 78% reporting their interest increased “a good deal” or “a great deal.” Most conference attendees report the conference increased their knowledge of the job application and or interview process (97%, with 67% reporting the conference influencing their knowledge “a good deal” or “a great deal”). Nearly all students (97%) stated the conference increased knowledge of career pathways, with 79% reporting the conference influenced their knowledge of career pathways “a good deal” or a “great deal.”

Conference participation is intended to improve student networks in computing, creating opportunity for first generation undergraduates to develop social relationships that can support their integration into the computing field and support their deep involvement in computing career pathways. Nearly all students reported meeting peers in computing at the conference (98%), and most met faculty members they did not already know at the conference (84%). Job interviews declined during the 2024 career

fair, yet nearly a third who responded to the survey did have an interview at the conference (31%). Following the conference, students are continuing or planning to continue their relationships with those they met at the conference—45% had contacted students they met at the conference, while 18% planned to contact students following their conference. Similarly, 45% of students had

Figure 2: Conference Career Preparation



Please list the activities you engaged in at the conference.

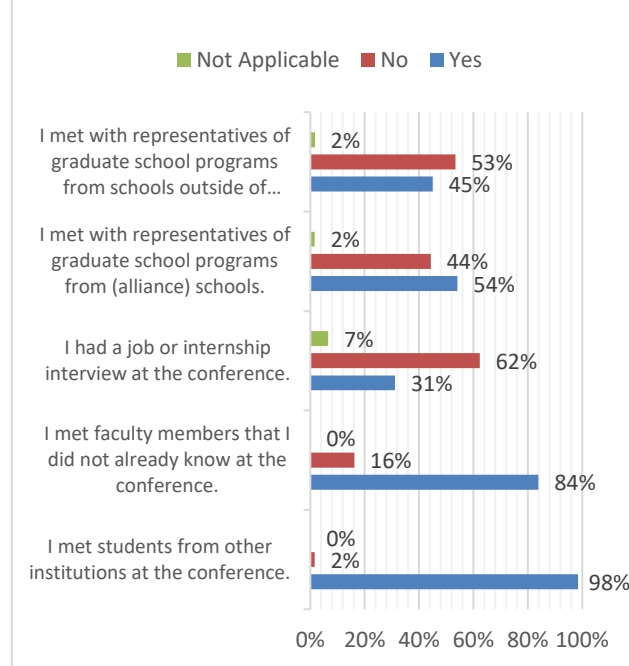


Figure 3: Conference Actions

contacted industry professionals following the conference, while 18% had plans to contact industry professionals. Fewer were contacting faculty they met at the conference (21% had contacted, 21% planned to contact). These social connections may support student persistence in computing, as social networks are known to expand job opportunities.

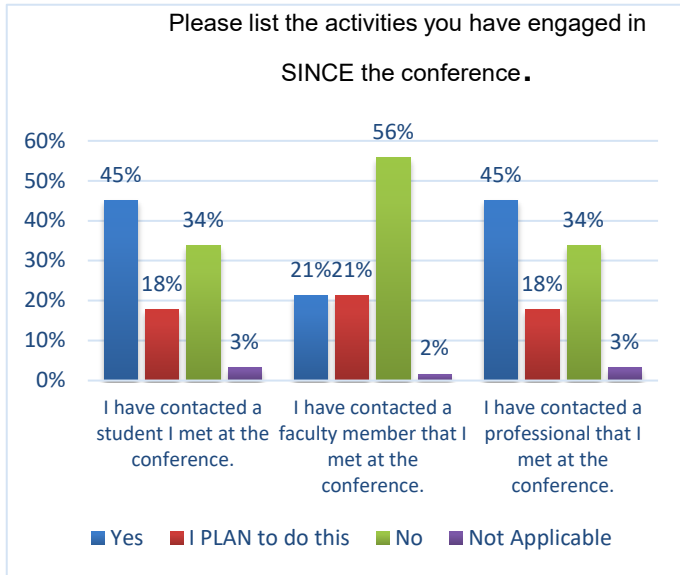


Figure 4: Conference Actions Following Event

In interviews, Pell-eligible students who earned a merit-based scholarship and attended the conference as part of the alliance describe the ways in which they were supported to participate at the professional conference through preparatory activities at their institution.

“Last semester (they had a workshop) they talked about, that was the one where they brought conference students and they talked about how they got jobs and they were just explaining what you need to do to get an internship and how to advance your career.”

The conference created opportunities for students to build connections to support their career development. For example, one student indicated that industry networking was beneficial and nurturing, while another noted the ability to learn more about specific careers through networking at conferences.

“Being able to go to the conference was really nice because I learned a lot. I was able to go to the career center, talk to a lot of people, go to workshops, and then also meeting other people from other Hispanic universities and also workshops we've been able to attend from companies that they recruit for to come to the university to talk to us. I feel like those experiences have been very nurturing.”

“I want to say the main way it's influenced me is I would say being able to go out to the conference was a major influence just because I was able to not only learn how to network professionally, but also I was able to learn how to talk to different people in my field in regards to learning about the different career paths I could take in my field. Because at the career fair, I was able to just go out and meet a whole lot of people. I was there for four hours just talking to people and learning about, not just asking about internships, but asking about what is it they do at their jobs. I've learned a lot about different cyber jobs, different software engineering, machine learning, and I think that was a very valuable experience. Also, the graduate school part too was pretty eye opening too.”

Students identified the relaxed, collegial approach the conference took to technical competition was favorable- creating a positive learning environment.

“I enjoyed the hackathon-cyber security training is not my interest, so I think that, but I like the hackathon vibes are nice to all of us, and then they bring food. It's nice. It's like a very big hangout – a coding party.”

Another student described how attending graduate student poster competitions better prepared the student for considering research and graduate school opportunities.

“I met a couple of grad students that kind of just were telling me their experience and why they think graduate school is important. And I think a big thing about graduate school, I would say, is research. So I was never properly introduced to what research is like. So I think going and seeing the people present those posters and their posters was a good, how would I say, a good way to expose me to research. Definitely. And the importance of research, especially if you want to go to grad school. And it actually encouraged me to want to do research, and I'm actually going to start doing research next week with one of my professors. And we're going to present at that conference too, actually.”

## 7 Limitations and Assumptions

Assumptions made in this experience report include: a) the notion that all students can and should be successful at conference activities and through them, can increase their job opportunities in computing, b) faculty and staff have a role in promoting experiences and advocating for student needs to conference staff, institutional offices, and faculty peers, and c) even with expansive recruiting efforts, student lived realities may not always allow for travel to conferences, and as such other extra-curricular professional activities may be necessary to broaden access to high-quality computing jobs.

Case study work draws on thick description, data source and method triangulation, and analyst triangulation to support trustworthiness [16]. As in most qualitative and mixed methods research, the reader is cautioned to consider similarities of the case described with the reader's context to best judge transferability.

## 8 Recommendations

Conference participation has expanded based on the concerted effort of the alliance to fully and proactively fund students' conference attendance. The practices of the alliance in the

experience report indicate that proactive efforts to attend to students basic needs can support broad access to conference travel, and that the details of these funding mechanisms should be communicated to prospective student participants and their families to broaden access to professional conference attendance. Benefits of supported conference attendance include expanded social networks in computing, improved job and internship prospects, greater access to faculty mentors, and staff relationship building which can lead to additional departmental opportunity-all of which could be better communicated to prospective student conference attendees. Structuring learning opportunities among peers can support leadership of students while bolstering student confidence in their ability to participate and thrive in professional conferences.

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## REFERENCES

- [1] A. Burger and L. Naude, "Success in higher education: differences between first- and continuous-generation students," *Soc Psychol Educ.*, vol. 22, no. 5, pp. 1059–1083, Nov. 2019, doi: 10.1007/s11218-019-09513-6.
- [2] A.-M. Nuñez and V. A. Sansone, "Earning and Learning: Exploring the Meaning of Work in the Experiences of First-generation Latino College Students," *The Review of Higher Education*, vol. 40, no. 1, pp. 91–116, 2016, doi: 10.1353/rhe.2016.0039.
- [3] J. L. Ferraro and G. S. Heck, "Science capital: A systematic review of research between 2015–2021," *Rev. Ibe. Est. Ed.*, pp. 1389–1416, Jul. 2022, doi: 10.21723/riace.v17i3.15633.
- [4] H. King, E. Nomikou, L. Archer, and E. Regan, "Teachers' Understanding and Operationalisation of 'Science Capital,'" *International Journal of Science Education*, vol. 37, no. 18, pp. 2987–3014, Dec. 2015, doi: 10.1080/09500693.2015.1119331.
- [5] T. Vrieler and M. Salminen-Karlsson, "A Sociocultural Perspective on Computer Science Capital and Its Pedagogical Implications in Computer Science Education," *ACM Trans. Comput. Educ.*, vol. 22, no. 4, pp. 1–23, Dec. 2022, doi: 10.1145/3487052.
- [6] J. M. Frank, K. Rice, and C. D. Thomas, "Beyond Academics: Exploring the Food, Housing, and Wellbeing Needs of College Students," *Journal of Poverty*, vol. 28, no. 1, pp. 58–71, Jan. 2024, doi: 10.1080/10875549.2022.2113592.
- [7] R. M. Crutchfield, J. Maguire, C. D. Campbell, D. Lohay, S. Valverde Loscko, and R. Simon, "'I'm Supposed to Be Helping Others': Exploring Food Insecurity and Homelessness for Social Work Students," *Journal of Social Work Education*, vol. 56, no. sup1, pp. S150–S162, Jun. 2020, doi: 10.1080/10437797.2020.1741478.
- [8] S. Goldrick-Rab, C. R. Welton, and V. Coca, "Parenting While In College: Basic Needs Insecurity Among Students With Children".
- [9] S. J. Lunn, E. Zerbe, and M. Ross, "You're Hired! A Phenomenographic Study of Undergraduate Students' Pathways to Job Attainment in Computing," *ACM Trans. Comput. Educ.*, vol. 24, no. 1, pp. 1–29, Mar. 2024, doi: 10.1145/3636514.
- [10] N. Roulin and A. Bangerter, "Students' use of extra-curricular activities for positional advantage in competitive job markets," *Journal of Education and Work*, vol. 26, no. 1, pp. 21–47, Feb. 2013, doi: 10.1080/13639080.2011.623122.
- [11] S. Hu, M. Hood, P. A. Creed, and X. Shen, "The Relationship Between Family Socioeconomic Status and Career Outcomes: A Life History Perspective," *Journal of Career Development*, vol. 49, no. 3, pp. 600–615, Jun. 2022, doi: 10.1177/0894845320958076.
- [12] A. Mansi, "The Effects of Extracurricular Activities & GPA on Employability Chances of College Students," *MSA-Management Sciences Journal*, vol. 2, no. 1, pp. 138–156, Jan. 2023, doi: 10.21608/msamsj.2023.185151.1005.
- [13] E. A. Flaherty et al., "A Framework for Mentoring Students Attending Their First Professional Conference," *Natural Sciences Education*, vol. 47, no. 1, pp. 1–8, Dec. 2018, doi: 10.4195/nse2017.10.0022.
- [14] P. Silva et al., "The million-dollar question: can internships boost employment?," *Studies in Higher Education*, vol. 43, no. 1, pp. 2–21, Jan. 2018, doi: 10.1080/03075079.2016.1144181.
- [15] J. A. Yang, J. D. Towles, S. D. Sheppard, and S. A. Atwood, "'BARBED-WIRE BOUNDARIES': HIDDEN CURRICULUM, FIRST-GENERATION AND LOW-INCOME ENGINEERING STUDENTS, AND INTERNSHIP ACQUISITION," *J Women Minor Scien Eng.*, vol. 30, no. 5, pp. 97–121, 2024, doi: 10.1615/JWomenMinorScienEng.2023046383.
- [16] Y. S. Lincoln, E. G. Guba, and J. J. Pilotta, "Naturalistic inquiry," *International Journal of Intercultural Relations*, vol. 9, no. 4, pp. 438–439, Jan. 1985, doi: 10.1016/0147-1767(85)90062-8.