

## **Dilemmas in Co-Curricular Support: A Theoretical and Pragmatic Discussion on Current Practice and Future Challenges**

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# **Dilemmas in Co-Curricular Support: A Theoretical and Pragmatic Exploration of Current Practice and Future Challenges in Engineering Education**

## **Abstract**

Colleges of engineering seeking to promote equity, diversity, and inclusion often do so through co-curricular support, scholarships, and supplemental instruction. To date, substantial education research has focused on documenting the structure and effectiveness of such practices, primarily from a pragmatic perspective grounded in highlighting programmatic features or documenting assessment results. Building on these efforts, our research team is working towards clarifying and critiquing the strategic aims and nuanced choices involved with crafting such initiatives. The purpose of this paper is to identify key dilemmas associated with enhancing the accessibility of institutional support practice. To address this purpose, we used collaborative inquiry methodology to reflect on various issues related to program participation, structure, advertisements, messages, recruitment, etc. The results of our study highlight subtle ways that well-intentioned educators and student-support practitioners can further marginalize students from underrepresented populations in the engineering and computing professions by not fully considering dimensions of inclusion, including gender identity and expression, race and ethnicity, disability, LGBTQ+, first-generation status, and socio-economic status.

## **Motivation**

Within conversations addressing equity and inclusion in engineering higher education, a major focus has been and continues to be on a collection of institutional efforts termed co-curricular support [1]–[4]. By co-curricular support, we are referring to institutional efforts to better support students through the offering of out-of-class efforts (e.g., mentoring programs, summer bridge programs) specifically geared towards students in a specific discipline [1]. In the context of engineering, these efforts are often achieved through student support centers embedded within colleges of engineering, such as Minority or Multicultural Engineering Programs (MEPs) and Women in Engineering Programs (WIEPs) [1], and bring critical resources and energy to their local institutional contexts. The importance of these efforts has been investigated by a burgeoning research base and consistently demonstrated by a variety of measures, including the retention of underrepresented students, positive student experiences, and a sense of community [2], [5].

The Collaborative Network for Engineering and Computing Diversity (CoNECD) conference both symbolically and practically brings together communities focused on programmatic support of women and racial minorities (i.e., Women in Engineering ProActive Network and National Association of Multicultural Engineering Program Advocates) and

communities focused on engineering education research (i.e., American Society of Engineering Education). In addition, the structure of the conference emphasizes focused attention on additional communities and dimensions of inclusion, such as first-generation, LGBTQ+, and disabled students. This confluence of people and interests represents an important opportunity to speak to and across communities that usually remain siloed. Our aim is to draw these communities together into a critical dialogue about co-curricular support.

## **Purpose**

The purpose of this paper is to identify key dilemmas associated with leveraging co-curricular support without further marginalizing students from underrepresented populations in the engineering and computing professions. These dilemmas emerge from considering concepts such as intersectionality [6], [7] as well as from practical choices related to funding. Because conversations surrounding broadening participation in engineering and computing have historically occurred in diversity silos (i.e., spaces dedicated to addressing the issues of a single potentially marginalizing aspect of a person's identity, such as gender or race), these dilemmas often go unnoticed.

Given the broadened scope of CoNECD, our research team considers it the perfect venue for bringing these dilemmas to the forefront. Identifying and unpacking the dilemmas requires the community to look with a wider and more critical lens on practices that focus on a narrower specific purpose. Questions emerge that bring to light tricky overlapping priorities: What would it mean to support gender non-binary students in a program structured around the male-female binary? How do programs focused on a cohort community welcome transfer and non-traditional students? We discuss these and other orienting questions, grounded in specific examples from co-curricular practice, in order to collectively imagine new possibilities and call for greater critical awareness of the issues.

## **Prior Work**

The paper itself emerges out of two primary scholarly trajectories. The first trajectory is focused on better understanding the phenomenon of offering co-curricular support. In this area, Walter Lee (second author on this paper) and other scholars have collectively focused on advancing understanding of the mechanics of offering co-curricular support [1], [2], [8]–[10]. This includes examining: relationships between interventions and student outcomes [2]; program goals and aims [1]; funding practices and challenges [8]; program initiation [9]; program perception from the perspective of both students and faculty [10], [11]; and other topics related to how support efforts are structured [12]. This focus on empiricism (i.e., the *what* of co-curricular support) has brought important attention to these practices, and is leading to questions about purpose and strategy (i.e., the *why* and the *how*).

The second trajectory has applied a more critical lens to broadening participation. In this area, Stephen Secules (first author on this paper) and other scholars have collectively focused on critical theoretical commentary on engineering educational contexts and practice [3], [13]–[15]. This has included critical ethnographic accounts of engineering classroom practice [16], [17], institutional systems [3], [18], co-curricular support [11], and theoretical discussions on aspects of educational settings [15], [19]. In a critical theoretical paper at last year’s CoNECD, Secules introduced two prominent theories, intersectionality and liberatory pedagogy, to initiate a discussion about *how* co-curricular support might be conceived of, structured, and enacted if these theories were a guide [4].

These two trajectories complement one another, with the first set of scholarship documenting existing practices and the second imagining new possibilities. Yet without merging the two scholarship, the scholarship focused on practices can remain somewhat rooted in the status quo, and the scholarship focused on critical theories can remain somewhat disconnected from the reality of institutional practices. Further progress towards a strategic and situated understanding of co-curricular support requires creative and collaborative research efforts that combine multiple ways of knowing and researching. The next section outlines the collaborative research process taken up in this paper.

### **Collaborative Inquiry**

To uncover key dilemmas in co-curricular support, our research team leveraged collaborative inquiry methodology (also referred to as co-operative inquiry) [20]. We selected this methodology because it enabled the lead authors, Secules and Lee, to work with other people who have similar concerns and interests in pursuit of developing creative ways of critically examining co-curricular support practices. Instead of simply interviewing practitioners or researchers, the two initiating researchers decided to form a team of people with both theoretical and practical expertise in this area, ensuring that our insights were substantially grounded in both existing literature and institutional realities to inform direct action. This approach resulted in a research team consisting of 7 people (Table 1), each working together as both co-researchers and subjects. In forming the team, we specifically invited people who the initiating researchers knew were passionately focused on improving the experiences of particular communities (e.g., first-generation students, LGBTQ+ students, disabled students, women, racial and ethnic minorities, non-traditional students, students from low socioeconomic backgrounds). In doing so, our aim was to ensure that the primary issues and needs of various communities were represented by an advocate for the needs of one population while balancing the needs of several others.

**Table 1: Inquiry Group Positionality**

Team Member	Role & Brief Bio
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Stephen Secules - Primary	Stephen Secules (he/him/his) is a Visiting Assistant Professor in the School of Engineering Education at Purdue University. His research interests include promoting equity and culture in undergraduate engineering education in both curricular and co-curricular settings. Stephen identifies as gay or queer, White, cisgender, and able-bodied. As he wasn't out in undergrad, his primary relationship to co-curricular support has been through scholarship and practice as an academic professional. He is interested in how theoretical and critical perspectives on co-curricular support can impact many student populations and institutional systems.
Walter Lee - Primary	Walter Lee (he/him/his) is an Assistant Professor in the Department of Engineering Education and Assistant Director for Research in the Center for the Enhancement of Engineering Diversity at Virginia Tech. His research interest includes co-curricular support, student success, inclusive Diversity, and STEM learning environments. Walter is an able-bodied, cisgender, Black man, and these lived experiences inform his work.
Karis Boyd-Sinkler - Primary	Karis Boyd-Sinkler (she/her/hers) earned her Bachelor's degree in Engineering Science from the School of Engineering and Applied Science at the University of Virginia. She is currently pursuing a Master's in Industrial and Systems Engineering and a PhD in Engineering Education at Virginia Tech. Karis is an able-bodied, cisgender, Black woman who is actively involved in the recruitment, outreach, and retention of engineering students. She researches and supports students from traditionally underrepresented and underserved communities.
Adam S. Masters - Secondary	Adam S. Masters (they/them/theirs) earned their bachelor's in Mechanical Engineering from the University of Delaware, and is currently pursuing a PhD in Engineering Education and a Masters in Mechanical Engineering at Virginia Tech. Adam researches and advocates for access and equity in engineering; as a part of their current research, Adam is exploring inclusive practices with partners from diverse, liberatory maker spaces. Adam is White, queer, transmasculine non-binary, and disabled, and their lived experiences inform their work.
Cynthia Hampton - Secondary	Cynthia Hampton (she/her/hers) earned her bachelor's degree in Biological Systems Engineering from Kansas State University as a

	low-socioeconomic, first-generation, non-traditional student. She is pursuing her Master's in Management Systems Engineering and PhD in Engineering Education at Virginia Tech. Cynthia has eleven years of practice with STEM co-curricular programming that spans her undergraduate and graduate degree processes. The intersections of agency, structures, inequity, race, gender, class, history, and policy in complex educational systems represents Cynthia's research, practice, and service as a Black, able-bodied, cisgender woman.
Ashley Taylor - Secondary	Ashley Taylor (she/her/hers) has a passion for reducing educational inequities fueled by years of fervent listening to her home community in a high-poverty area of rural Appalachia. She continues to advocate for listening to communities, particularly underrepresented and underserved student communities. Ashley works to support students in the Center for the Enhancement of Engineering Diversity and is a doctoral candidate in Engineering Education at Virginia Tech, with previous training in public health and mechanical engineering. Ashley is a White, cisgender, able-bodied, Appalachian woman.
Dustin Grote - Secondary	Dustin Grote (he/him/his) earned bachelor's degrees in Psychology and Organizational Communication from the University of Portland and a Master's degree in Higher Education and Student Affairs Leadership from University of Northern Colorado. He is currently pursuing a PhD in Higher Education at Virginia Tech focusing in research and policy. Dustin's research and practitioner expertise is in college student access, particularly the community college pathway to degrees for transfer, non-traditional, low income, first generation and URM students.

**Inquiry Cycles**

Once our inquiry group was formed, we completed the collaborative inquiry following the phases of reflection and action, informed by the process outlined by Heron and Reason [20]:

1. Form inquiry group and agree on the focus of inquiry, including set of questions to be investigated and method for exploration (i.e., procedures for gathering and recording data)
2. Inquiry group engages in agreed-upon actions (i.e., individual sensemaking)
3. Inquiry group re-assembles to share their data (i.e., collective sensemaking)

Our inquiry group focused primarily on the previous experiences of its members rather than influencing their current or future actions. Our central goal was to advance understanding of co-

curricular support by collaboratively examining our own experiences and actions in light of critical theoretical frameworks. A primary outcome of the inquiry is a conceptual framework that can assist others with critically investigating their own practice. As a result, our cycle of reflection was more condensed than typically associated with an action-oriented methodology, and more explicitly connected to critical and social theories.

During the first inquiry cycle, primary co-authors (Secules, Lee, Boyd-Sinkler) met as a team to discuss the focus of inquiry including a set of questions and reflection tasks to initially ask secondary co-authors (Masters, Hampton, Taylor, Grote). Primary co-authors designed an interactive shared file repository to account for the dialogue that would take place in the following cycles. The second inquiry cycle took place over the span of three weeks. During this time, secondary co-authors were prompted to respond to the reflection tasks and questions made by primary co-authors and posted in the shared file repository (see Appendix A for more details). Secondary co-authors were encouraged to share knowledge from their experiences in/with various communities, dependent on both their professional expertise as well as lived experience. Team members were specifically asked to focus on issues of race (racial and ethnic minorities), gender (conceived as a gender spectrum, as opposed to the gender binary), sexual orientation (non-heterosexual identities such as lesbian, gay, bisexual, asexual, queer), disability (including permanent or temporary physical, psychological, and developmental impairments), socioeconomic status (students from lower-income backgrounds or experiencing financial hardships), first-generation college status (students who are the first in their family to attend college), transfer status (students who began at a community college), and non-traditional status (related to age, delayed enrollment, part-time status, marriage, children, caregiver, etc.)

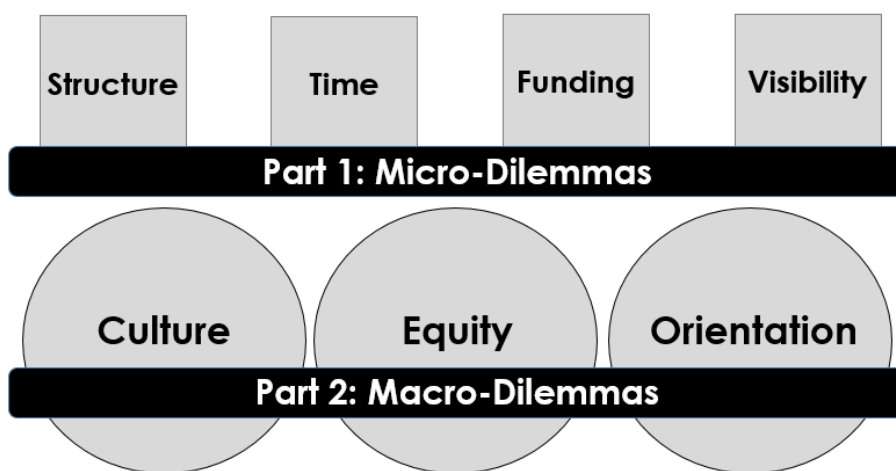
Initially, secondary co-authors were asked to solely respond to the task without any interactions from other secondary co-authors. This was done to ensure that each of the secondary co-authors' voices were represented in the task. Secondary co-authors were then prompted to interact with and respond to comments made by the other team members. During this iterative process, primary co-authors facilitated the interactions by posing probing questions and comments. At the end of this cycle, primary co-authors synthesized all of the comments made by the researchers. During the third inquiry cycle, primary co-authors reviewed the synthesized notes with secondary co-authors. Changes and comments were made during this process until the entire research team reached consensus.

Throughout the reflection process, we tried to remain open to multiple ways of knowing by instructing co-authors to consider the inquiry topic in light of their personal experiences and theoretical frameworks that made sense to them, and prioritized the lived experiences of various marginalized populations. Co-authors were encouraged to express their understanding using stories and images. While we did not individually incorporate expressing our knowing through

action in our lives (i.e., the fourth component of cooperative inquiry, Herson & Reason [20]), it is our hope that our insights will encourage the actions of others.

### Key Dilemmas

In the following sections, we will discuss the seven areas of inquiry (i.e., dimensions) we considered (Figure 1). First, we provide an overview of each dimension including a synthesis of the conversations that emerged from collaborative inquiry. Also, one to two examples that highlight the dimension will be provided. We begin with the micro-dilemmas, or those most directly tied to a specific component of programmatic efforts. We then discuss macro-dilemmas, or those requiring practitioners to think more holistically as it relates to identifying the root of the program and possible solutions.



**Figure 1:** Areas of inquiry associated with the collaborative inquiry

#### Structure

Structure pertains to the availability, eligibility, or lack thereof to participate in programs, activities and/or services that are physically and reasonably accessible by students. It encompasses the structure of the institution, as well as the surrounding spaces and places. It is important to note that structure goes beyond a physical space or location. Within structure, key issues include whether the facilities inside are physically and socially accessible (e.g., ADA compliance, gender neutral restrooms, spaces/places that students are comfortable enough going). Other key dilemmas with structure pertain to whether co-curricular programs exist in the first place, how programs are embedded in university structures (e.g., policies, rules), and how the university determines eligibility constraints for different spaces and populations.

#### Examples related to structure.

*Will I be safe there?: How infrastructure impacts LGBTQ+ students' ability to participate (Adam Masters and Stephen Secules).* Many campuses do not have informal student groups for LGBTQ+ students in STEM, let alone institutional structures for LGBTQ+ student



support. The transitioning and hidden nature of these identities also make them fundamentally hard to support or to quantify. Many LGBTQ+ students participate in existing co-curricular programs centered on race and gender, but there are other LGBTQ+ students who distance themselves from these support programs out of fear. The particular impact of these co-curricular support programs on LGBTQ+ students is an important, but often overlooked aspect.

Co-curricular support programs that include an on-campus housing component pose challenges for LGBTQ+ students that may prevent their participation. LGBTQ+ students are at risk of homophobic or transphobic bullying in the close quarters of their room. Additionally, depending on the facility's infrastructure, they may or may not have access to safe bathrooms (i.e., gender neutral and/or gender-inclusive bathrooms) in the residence halls. While several co-curricular programs have made attempts to be inclusive, they are at times bounded by the larger institutional housing structure. In many cases, university-level residence life offices will require students to identify their gender in binary terms according to sex assigned at birth (male or female) at the time of housing registration, thus explicitly excluding transgender, non-binary, and gender nonconforming students.

*Access denied: Barriers for transfer students to research experiences and cohort model programs (Cynthia Hampton and Stephen Secules).* Many co-curricular support efforts rely on students gaining research experiences in a structured and mentored setting. For most engineering research laboratories, there are one or more required prerequisite courses that a student must complete before they can be used. In many cases, these courses are taken by students during their freshman or sophomore year. Thus, transfer students are unable to access these labs without having to take these courses out of sequence.

Many programs for the support of minority and women engineering students take a cohort model approach. There are good reasons for the cohort model, including fostering a sense of community on campus, structuring a living-learning environment, and using membership in the program as a source of targeted recruitment. But cohort models are inherently less accessible to students at the fringes of engineering institutions. Transfer students from 2- or 4-year colleges are often excluded from these programs, or not told about these opportunities for support in the first place.

### **Time Commitment**

Time commitment is composed of two parts, the amount of time required to participate and the timing of the event as it relates to eligibility. Timing includes the day of the week and time of day, perhaps even the time of year (e.g., summer bridge programs). In this area key issues include whether the amount of time required is unreasonable or conflicts with obligations, such as personal well-being, work, family, and/or religious observation obligations. Many students have out-of-school commitments of this nature, and students from minoritized and non-traditional populations may have particularly different schedules and commitments from the normative majority participating in a program.

### **Examples related to time commitment.**

***Only so many hours in the day: Time commitment for students from low SES backgrounds (Ashley Taylor).*** Co-curricular interventions (e.g., living-learning communities, summer bridge programs) often require substantial time commitments from students. Students from low socioeconomic (SES) backgrounds often work for a variety of reasons, including to supplement college costs or support family members back home. Work obligations for students from low SES backgrounds can exceed 20-30 hours per week. Therefore, additional time commitments required by co-curricular support programs pose serious challenges for students. For example, living-learning community meetings and tutoring sessions that occur in the evening and/or on the weekends often conflict with common working hours for students from lower socioeconomic statuses, especially those who may be working in off-campus positions. A similar dilemma appears for students who participate in summer bridge programs, as students from lower socioeconomic statuses often hold summer jobs which they use to save up money for college. These students are sometimes forced to decide between working a summer job or participating in a summer bridge program.

***Not worth the spoons: The investment required to engage (Adam Masters).*** Non-disabled people often think about energy as limitless, such that they can power through tasks, past their own ‘limits.’ But the reality of daily life for disabled people is often thinking intentionally about where, when, and how to expend the finite amount of energy they have (i.e., the Spoon Theory [21]). By pushing their energy limits, a disabled person is ‘borrowing spoons from tomorrow’ (i.e., reducing energy available for the next day and/or necessitating recovery time).

Programs regularly assume students have limitless energy, allowing for major energy and time commitments such as participation in co-curricular events. This assumption may force disabled students into an uncomfortable choice between programmatic support and their personal well-being. Additionally, students are often expected to engage in the evening and/or during unplanned, unstructured sessions for the purposes of ‘organically’ connecting with peers and/or potential mentors. Participation in any session, whether structured or unstructured, requires an investment of energy and it can be challenging to determine whether an event will be worth the ‘spoons’ (energy investment) if it is unstructured. Events hosted in the evenings require a disabled student to budget ‘spoons’ throughout the day in order to have energy left late in the day.

### **Funding**

Funding includes the affordability of a program, such as how much programs cost and what help exists to meet funding needs. In this area, key issues relate to fixed, variable, and opportunity costs of a program. Additionally, funding pertains to what help is available, accessible, and easily activated to offset costs of a co-curricular support program (e.g.,

scholarship or sliding fee structure). Availability, accessibility, and activation of funding resources may include social capital required to access financial support, such as required parental involvement in the Federal Student Aid application process (FAFSA).

### **Examples related to funding.**

*The color of opportunity: Supplemental funding for success-oriented activities (Cynthia Hampton).* Required fees can prohibit the participation of minoritized groups in first-year success programs, such as summer bridge programming. Depending on the summer bridge, students can be sponsored to participate at no cost through industry or grant funding, or cost anywhere from several hundred to several thousand dollars. Realizing the potential of academic, social, and cultural preparation for incoming first-year students, organizations such as the National Society of Black Engineers (NSBE) provide scholarships for NSBE Jr. chapter members to attend such programs. NSBE scholarships range from several hundred to several thousand dollars to go towards the cost of attendance in summer bridge programs. Due to the complexities of race, access, and wealth in the U.S., the cost of attendance in one way or another will impact the representation of students in a program. One accountability for this issue is the use of a “sliding scale” of fees for all participants in a program based on estimated family contributions and financial aid information.

*Hidden in plain sight: Costs of co-curricular support programs (Ashley Taylor).* Some co-curricular programs are costly and carry hidden costs beyond the “ticket cost,” or cost that students see when they apply to participate. For instance, a student who wants to participate in a co-curricular study abroad program may see a program “ticket price” advertised as \$4,000. However, that cost may not include the plane ticket, vaccinations, or health insurance required to participate. Further compounding this issue, we often make assumptions that a scholarship guarantees full participation in a study abroad experience. For instance, if the cost of the program is \$4,000 and a \$1,200 plane ticket, then a scholarship will be provided for \$5,200 and that should be enough for a student from a low SES background to participate. Nevertheless, there are fees and incidentals that might occur on trips like being able to eat in restaurants or engage in other social activities with the rest of the study abroad group. Differential access to resources might result in differential leveraging of co-curricular programs. Because of substantial funding barriers to participation in co-curricular support, students from low socioeconomic backgrounds often utilize financial aid refund check/dollars such as, grants, scholarships, and or loans as monthly spending money for participation in all different types of co-curricular activities.

### **Visibility and Perception**

One aspect of visibility is accessibility relating to placement, language, and format of branding, advertising, and physical artifacts, all of which impact who is aware of opportunities in co-curricular programs. Brochures may contain images and language that imply a gendered, raced, and classed message about the participants. Beyond representation in advertising, students

can look to see who generally participates in these programs and generate their own perceptions about who is the normative participant. Although this embodied visibility can be out of a program's control, other forms of messaging may attempt to counteract or respond in light of this reality. In this area, key issues related to branding, advertising (content and dissemination venues), and physical artifacts and the (explicit and implicit) messages that each of these send about who is or is not welcome in a space. This includes a consideration for invisible dimensions of identity, as well as acknowledgement of students who may not know if they are welcomed or not based on language use.

### **Examples related to visibility and perception.**

***“We want you” advertising: What our posters are saying (or not!) to non-traditional students (Dustin Grote).*** Traditional venues for co-curricular programs to advertise programming are on-campus housing venues like poster boards in residence hall hallways, lounges, and cafeteria spaces. These are not locations visited by non-traditional students who commute from and live in off-campus homes. This advertising privileges traditional students who live on-campus and can become a barrier for non-traditional students to participate in co-curricular programs.

***Who is this really for?: Perceptions versus intentions of programmatic support for racial minorities (Cynthia Hampton).*** Perceptions of programs for racially diverse students can take various forms, from both the standpoint of the student, parent, and institutional counterpart. From a student, and possibly parent, standpoint, the perception of a program's racial demographics can either draw or repel potential participants. A program may be open to all demographic groups, but misperceived as only for African American and Latinx students because it is administered through a minority programs office. Additionally, programs targeted towards the same racial demographic groups may cause competition for student bodies at the college versus institutional level depending on newly defined institutional goals for recruitment and retention of racially minoritized students.

***More than just cisgender women: Underrepresented gender identities (Adam Masters).*** Programs serving underrepresented gender identities in engineering have historically only supported cisgender women, and many of these programs and spaces still maintain a very binary concept of gender and/or gender expression today (i.e. man-masculine/woman-feminine). Transgender students (both those who are out and those who are closeted) may feel uncomfortable participating in gendered spaces and programs; gendered spaces may be distressing and trigger gender dysphoria and/or they may invalidate students' identities all together.

In its call for scholarship applicants, the Brooke Owens Fellowship Program recently sent out a message that stated, *“Are Trans Students Eligible? Yes! We warmly welcome all gender minorities who have historically faced gender-based bias in the industry. That includes not only*

*cis women but also non-binary, agender, genderfluid, and genderqueer students as well as transgender women and others.”* This example demonstrates the possibility of explicit inclusion of transgender individuals when an implicit, tacit, or embodied visibility might have otherwise suggested only cisgender women would be included.

## **Culture and Inclusion**

Culture refers to the beliefs, customs, and norms that are unconscious, hidden, or assumed in activities. Culture can be associated with particular groups (race/ethnicity, class, gender, age) and/or spaces. Culture can refer to specific ethnic cultural groups, wherein programming requires a level of cultural responsiveness to ensure that examples are resonating with the variety of student backgrounds present. Co-curricular programming around a single identity group can create a sense of presumed homogeneity, where students who are a minority within the group do not feel as welcomed. The culture of a co-curricular support efforts can also be more or less inclusive, creating situations where minoritized students are othered, spotlighted, or left out of a conversation. The interactions between students in a particular activity or program, as well as between students and administration, can either represent or counteract the wider engineering culture at an institution.

### **Examples related to culture and inclusion.**

***Ladies and gentlemen: The impact of cisnormativity and heteronormativity (Adam Masters).*** For a student who is LGBTQ+, many engineering events can be isolating and uncomfortable due to pervasive cisnormativity and heteronormativity. Take pageant events for example, where students vie for gendered ‘Mr. Engineer’ and ‘Ms. Engineer’ titles, and are rewarded for cis-hetero-normative behavior and dress. Other co-curricular supports, such as professional development workshops, teach students how to dress ‘appropriately’ (along binary gendered lines) for the workplace. Such pervasive cisnormativity and heteronormativity prevents participation and support of LGBTQ+ student populations, especially those who are transgender and/or non-binary.

***Mismatch in maturity: Non-traditional students isolated by culture of social activities/programs (Dustin Grote).***

Across co-curricular programs a substantial gap in maturity often exists between traditionally and non-traditionally aged students. This can create a mismatch in culture and inclusiveness of activities. For example, both traditionally and non-traditionally aged students participated in a global engineering study abroad program. Non-traditionally aged students described several instances of feeling othered and excluded, particularly around the culture of social activities that involved drinking, partying and clubbing. Students described challenges with fitting in with the less mature traditionally-aged students’ social culture.

## **Equity**

Equity is always a challenge in a group where there is a minority and majority. Minority Engineering Programs and Women in Engineering Programs are designed around this realization, creating an opportunity for minorities to become a majority within that setting. Inevitably though, these same groupings create their own new majority/minority dynamics around other intersections of identity. In this area, key issues include whether leadership structures enable those being served to presume any power; whether the voices of the majority within the underrepresented group allow for other voices to be heard; and whether the admission process is so narrow that some people cannot realistically join based on entry point.

### **Examples related to equity.**

*The loudest voice in the room: Who matters and who is heard? (Cynthia Hampton and Adam Masters)*. The conversation of ‘diversity’ can often over-rely on demographic improvements in the number of women in engineering without considering the intersectional identities that are interwoven with gender, such as racial, disability, and trans identity. This can even be seen from a program administration view, where Black women recruitment and retention administrators in STEM face marginalization and silencing, leading to limitations in decision making and funding decisions at the college and university level [22]. It is common within working groups or meetings that relatively privileged groups take up more space in conversations and the voices of minoritized groups are not heard or represented. One manifestation of this aspect is the communication of viewpoints by white cisgender women leaders, who believe they represent all diversity but only represent the experiences of white cisgender women. It can also occur in male-dominant environments in which co-curricular program planning occurs (e.g., a minority engineering program). The level of equity in these conversations can shape the purpose, vision, and practices of co-curricular programming.

*Punitive prerequisites: Transfer students left out of on-campus leadership opportunities (Dustin Grote)*. Many housing and residence life, fraternity and sorority, and student club/organization leadership positions are prohibitive of hiring transfer students because of policies requiring prior experience living on campus. These policies create inequities of access for transfer students who lack on-campus living experiences during their freshman and sophomore years while spent at a community college. Generally, having had opportunities during their freshman and sophomore years to develop relationships with faculty and staff advisors who lead them, most leadership positions in these important co-curricular programs are held by first-time-in-college students. This is particularly true with Resident Assistant (RA) positions in on-campus dorms, which often require previous experience living in the university’s residence halls. In one case, even the Transfer Living and Learning Community (LLC), which houses only transfer students, has resident assistants who are not transfer students.

## Orientation

Although many who are invested in co-curricular support want to see systemic change towards social justice, different instances of co-curricular support can embody an orientation that exists either uncritically within a status quo or actively challenges it. In this area, the key issue relates to whether or not the co-curricular effort is actively opposing a patronizing and deficit orientation towards the students it wishes to service. Many initiatives focus simply on improving the student or helping them assimilate to the broader culture, whereas an alternative orientation empowers and engages students as partners in activism towards departmental or institutional change. In any program or initiative there may be a balance between multiple functions, which can determine an overall orientation of the co-curricular programming and activities. There may also be substantial differences between student perceptions and experiences of the programmatic goals and the individual personnel's intentions in this regard.

### **Examples related to orientation.**

***Beyond the "have nots:" Moving past deficit orientations for first generation students (Ashley Taylor).*** Sometimes co-curricular support can unconsciously or unwillingly adopt a deficit orientation when working with first generation students. With helpful intentions, co-curricular support sometimes tries to give first generation students insight into "rules of the game," where 'the game' refers to how to navigate higher education. Co-curricular support programs with a deficit orientation may sound something like this: *first generation student, here are the knowledge, skills, and resources that you don't have (i.e., deficit) that you need to have to be successful here.* For instance, etiquette dinners and fashion-show type events that instruct students how to dress and eat convey distinct messages about the orientation of a co-curricular program. These types of support programs can subtly make suggestions towards assimilation, conveying messages about what norms, cultures, and experiences are and are *not* valued. Ultimately, co-curricular support that adopts a deficit orientation emphasizes helping students navigate broken systems by assimilating to dominant group culture instead of valuing students' diverse cultures and empowering students to transform systems. Designing co-curricular support with an orientation that acknowledges and values the unique culture, capital, and experiences of first-generation students, such as Yosso's (2005) Community Cultural Wealth, may be a strategy for creating counter-narratives to the deficit approach.

***Surviving vs. thriving: Perceptions and misconceptions (Cynthia Hampton).*** In the context of predominantly white institutions (PWI), support targeted towards the transition of racially minoritized groups can be misconstrued as taking a deficit approach for students from racially diverse backgrounds if not fully supported at the departmental, college, and institutional level. A delicate balance of exposure to undergraduate institutional processes, recognizing and acknowledging the need to ask for help, and knowledge of resources can aid in student empowerment. However, existing within the current system and the concept of 'reaching back'

to other students who may have similar experiences can sometimes be lost if students are encultured into a ‘survive’ and not ‘thrive’ mentality.

***Fix the student or fix the institution?: Relative time allocations and broader mission (Stephen Secules).*** Many programmatic leaders have understood the importance of taking non-deficit attitudes towards their students and realize that “fixing” the student is not a great approach. They may run tutoring centers or offer coaching for surviving an academic culture because of the practical necessities regarding their student populations. And yet, with only so many hours in the day, the work regarding making engineering colleges more inclusive, accessible, and equitable is often left out of the mission of co-curricular programs. In some ways, this approach recruits and prepares students to fit into an academic system and culture that is known to be marginalizing and inequitable. Although some portion of student-focused support will remain a necessity, co-curricular offices can also think about carving time for a strategic agenda of transforming classroom and institutional spaces towards inclusion and equity using their practitioner expertise. Initial steps could include partnering with an institutional office of teaching and learning to co-create an inclusive pedagogy workshop, or forming a strategic advisory committee to administrative leadership personnel. This strategy could lessen the pressing needs for individual student-focused remediation, while making more long-term and sustainable change to institutional culture.

### **Implications & Concluding Remarks**

Existing co-curricular programs and efforts have an important ongoing role for equity and inclusion in engineering departments. Co-curricular programming needs to think intersectionally and expansively about its role in institutions. Traditionally where co-curricular support structures exist, many are structured to support racial and gender (binary) minority populations. Many other intersectional concerns exist outside and within these populations, but without a programmatic structure in place. We see this paper as a working framework to allow reflection around how diversity efforts in institutions are approached and assessed. Educators may use the sections of the paper as starting points for self-reflection:

- How are co-curricular programs constrained by the physical infrastructure, rules and regulations, and institutional context in which they are run?
- How do artifacts, advertising, or embodied participation send explicit or implicit *messages* about belonging and inclusion of groups of students?
- How can existing support *practices* be altered to support students with queer, trans, non-traditional, lower socioeconomic, and/or disabled identities?
- How can smaller populations (e.g., intersections of race, gender, sexual orientation) within minority groups be supported with *equity* when a critical mass may or may not exist in the group/program?



- How can programs balance the pressing need to support students in navigating engineering with the hope to *transform* departments and institutions altogether?
- How do new or existing *structures* (MEP, WIEP) adapt and account for the needs associated with axes of identity often not considered within their target population?

In Appendix B, we suggest specific additional pragmatic questions to consider within a given institution's day-to-day operations and decisions.

Finally, we note that these questions do not need to be asked and answered only by co-curricular institutional leaders in a vacuum. They are also questions that can centrally arise from sensitively asking, listening to, and believing student participants about their experiences. New challenges around asking can occur when discussing sensitive subject matter or identities, such as disability, sexual orientation, or socioeconomic status. Yet empathetic listening and co-constructing a response to marginalization can be a corrective against essentialization and a form of agency for students experiencing marginalization [13], [23]. Throughout this paper and conference session, we hope to initiate reflective dialogue on co-curricular practice that can be a source of insight and a catalyst for change in local contexts.

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## Appendix A - Collaborative Inquiry Details

### Reflection Process: Inquiry Cycle 2

Informed by various theoretical lenses [4], [6], [14], [24], the following prompt guided our reflection:

“As a reminder, our central goal is to advance understanding of co-curricular support by collaboratively examining our own experiences and actions in light of critical theoretical frameworks. To facilitate this process, we’d like each member of our inquiry group to consider the following features of co-curricular support (e.g., structure, funding, etc.) in light of the intersections or dimensions of identity. (Note: we’ve provided a brief description of each in Table 2; please feel free to update these definitions). In doing so, please identify instances (key dilemmas) in which a feature of co-curricular support creates marginalization or exclusion for a minoritized group, whether intentionally or unintentionally. For example, cohort models (structure) can make it difficult for both transfer and non-traditional students to participate. To note these dilemmas, you would insert an X in the box that intersects structure and transfer status, and add a comment on the X to explain why you put it there (see example below). Do not feel the need to add a comment in each grid/block as your expertise/experience may not always be relevant. Also, feel free to ask follow questions or co-sign comments made by others. Once everyone has had a chance to note their initial opinions, we will meet as a group to identify key takeaways and examples that clearly demonstrate either a positive or negative example of this occurring.”

**Table 2:** The features of co-curricular support being referenced included the following:

Feature	Working definition
Structure	<ul style="list-style-type: none"> <li>● Availability and eligibility to participate</li> <li>● Programs, activities, and services are physically and reasonably accessible by students</li> </ul>
Time Commitment	<ul style="list-style-type: none"> <li>● Time commitments required are reasonable for students.</li> </ul>
Funding	<ul style="list-style-type: none"> <li>● Programming is affordable to students.</li> <li>● Funding realities.</li> </ul>
Visibility + Perception	<ul style="list-style-type: none"> <li>● Approachability (Advertising and Recruiting Practice)</li> <li>● Acceptability (Staffing, Messaging, Branding)</li> <li>● Representational intersectionality (which identities are represented)</li> </ul>

Culture	<ul style="list-style-type: none"><li>● Beliefs, customs, norms</li><li>● Appropriateness of Programming and Activities to a cultural background</li></ul>
Equity	<ul style="list-style-type: none"><li>● How activities are structured (who has power, voice, etc)</li><li>● Leadership structure and power dynamics (staffing)</li></ul>
Orientation	<ul style="list-style-type: none"><li>● Liberation and activism vs. efforts to improve student deficits.</li></ul>

## **Appendix B - Reflective Questions for Co-curricular Programming**

Are my support efforts:

1. physically accessible to students with disabilities?
2. located in spaces that are physically and socially accessible to non-dominant groups?
3. requiring an unreasonable time commitment from students with other priorities?
4. requiring an exorbitant amount of physical or mental energy?
5. occurring on days or at times that are reasonable for students with jobs or family obligations?
6. excluding students in my target population based on the criteria listed for eligibility?
7. requiring an unreasonable financial commitment from students with financial hardships?
8. requiring students forgo other worthwhile or vital opportunities?
9. requiring students to rely on adults (e.g., guardians) that may or may not be willing or able to help them?
10. sending undesired messages about who is welcome?
11. advertised in a manner that is likely to be received by my target population?
12. privileging the culture of a sub-group within my target population?
13. providing opportunities for students of all identities to take leadership?
14. providing space for the voices of all students to be heard?
15. privileging students with a specific type of social capital?
16. focused on changing the institutional structure or 'fixing' the student so they fit within the institutional structure?