

## **Full Paper: Student Perceptions of Involvement, Identity, and Success in an NSF-funded STEM Access Program at Baylor University**

### **Jessica Martin, Baylor University**

Jessica has worked in a variety of capacities within higher education and student affairs over the past 7 years. She earned her M.A in Higher Education and Student Development at Taylor University in 2018 and is currently pursuing her Ph.D. in Higher Education Studies and Leadership at Baylor University, where she assists with a variety of research initiatives.

### **Jana Roste, Baylor University**

After receiving her M.A. in Higher Education and Student Affairs at Taylor University, Jana Roste is a doctoral student in Baylor University's Higher Education Studies and Leadership program.

### **Mr. Austin T. Smith, Baylor University**

Austin Smith is a doctoral student in the Higher Education Studies and Leadership program at Baylor University in Waco, TX. He holds both an M.A. and a B.S. from Taylor University in Upland, IN.

### **Mr. Shane Michael Meyer, Baylor University**

Shane M. Meyer is a PhD student at Baylor University studying Higher Education & Leadership. He is passionate about technology education, student persistence, and understanding institutional commitment.

### **Miss Emma G Cartisano, Baylor University**

Emma Cartisano is a PhD student at Baylor University studying Higher Education & Leadership. She is passionate about learning theories, student success, and talent development.

### **Emily Sandvall, Baylor University**

Emily Sandvall Senior Director for Undergraduate Programs, School of Engineering and Computer Science, Baylor University, [Emily\\_Sandvall@baylor.edu](mailto:Emily_Sandvall@baylor.edu)

### **Ms. Andrea Pouso Morales, Baylor University**

# **Full Paper: Student Perceptions of Involvement, Identity, and Success in an NSF-funded STEM Access Program at Baylor University**

## **Introduction**

In the United States, attrition in STEM fields is a growing concern as American colleges and universities are not producing enough graduates to fill a growing number of STEM roles. Marginalized populations are disproportionately absent from these fields, which National Science Foundation (NSF) has sought to address through the funding of programs aimed at improving STEM students' success [1]-[2]. Thus, Baylor University created the Engineering and Computer Science (ECS) Scholars Program—a NSF-funded program to support the success of high achieving, low income (HALI) STEM students. Because student success literature overwhelmingly evidences the positive relationship between involvement and success [3]-[4], this study explored how HALI STEM students in the ECS Scholars Program perceive and experience involvement and success as related to their most salient identities.

## **Guiding Research Question(s):**

How is campus involvement perceived and experienced by high-achieving, low-income STEM students at a private, selective university?

1. How do high-achieving, low-income STEM students understand success?
2. In what ways are high-achieving, low-income STEM students involved on campus?
3. What reasons do high-achieving, low-income STEM students provide for the specific ways they are (or are not) involved?
4. How do high-achieving, low-income STEM students' most salient identities relate to involvement?

## **Methods**

This study utilized a phenomenological approach, which bridges a rich philosophical tradition with qualitative research methods. Phenomenology seeks to understand individuals lived experiences around a particular phenomenon in an attempt to recreate the essence of the experience as if one was living through it [7]. The study consisted of 30 semi-structured ranging from 60 to 90 minutes. Interviews were recorded and transcribed, and respondents' names were changed. To augment the data, the researchers implemented three alternative data collection techniques (campus mapping, photo elicitation, and identity map) into the interviews. Interviews data was coded and themed in light of the research questions.

### *Participants*

The ECS program currently has two cohorts of 11 students each enrolled. First-year students were each interviewed once and second-year students were each interviewed twice. One student in each cohort did not complete their interviews. Our 20-participant sample included 7 Computer Science and 13 Engineering Majors. Fourteen students identified as white, four as

Hispanic/Latinx, one as Asian/Asian American, and one as Black/African American, roughly representative of Baylor. Mirroring STEM fields, 16 students were males and 4 were females.

## **Results & Findings**

### *Understandings of Success (Q1)*

Though still an important component of students' self-defined conceptualizations of success, academic achievement is merely one aspect of success. The HALI STEM students we interviewed had more robust and nuanced ideas concerning what success looks like for them in college and beyond, and it was apparent that these ideas were both shaped by their contexts and helped inform their decision making related to involvement. Broadly categorized, students' understandings of success related to career preparation and opportunities—an expected theme for those in technical degree programs, happiness or enjoyment in life, and living a life of purpose—what some might call “the good life.” Edwin's response to our questions related to success reveals such understandings of success are not necessarily exclusive: “To me, [success] means being able to fulfill your own personal purpose, while at the same time, enjoying it and making a good living out of it, I would say. That'd be success.”

Though student participation in specific majors clearly shapes notions of success, students' insistence that the profitability of a future career is not the only—and sometimes not even the primary—marker of success speaks to students' more expansive conceptualizations of success. Consequently, faculty and staff may wrongly assume high-achieving and low-income students are motivated primarily—possibly singularly—by academic achievement and career/income-related outcomes, respectively. These educators will benefit from a more nuanced understanding of the complexities of students' understandings of identities and success, which play out in the context of their involvement decisions.

### *Forms of Involvement (Q2)*

The literature affirms a positive relationship between involvement and academic success, and institutions are obviously invested in realizing academic success as a measurable outcome. As such, exploring involvement within a program designed to boost academic success proves important. However, involvement is too often defined by scholars and then explored amongst students within the literature. Consequently, we sought to understand how students perceive and experience involvement themselves. Interestingly, when asked directly to define involvement and to share about their involvement on campus, students gravitated toward formal involvement opportunities. Students quickly identified clubs and organizations, along with and sponsored service, academic, and religious groups. Juliet, for instance, offered, “Involvement is . . . being a part of something, whether that is a club, involvement in school, taking part in the classes, contributing in some way.” Though students unanimously spoke of formal, planned activities as they articulated their definitions of involvement, a few—like Noah—explicitly described involvement as something more abstract and informal: “Involvement. . . is being present. I think when I'm involved, it means I'm a part of the thing—a part of the places and the communities I'm in. So yeah, that that means being present to me.”

Noah's definition of involvement is particularly important since it reflects the reality of students lived experiences. As we continued engaging students, it became apparent that their involvement, as experienced and not just defined, extends beyond easily identifiable formal involvement opportunities. Informal group interactions—in dining halls, during student-initiated study session, when walking together across campus, while grabbing a bite after a football game, and during impromptu game nights and conversations with roommates—emerged as equally, if not more, important than formal involvement opportunities for many students. The photo elicitation exercise, in which students chose pictures of meaningful places to their Baylor experience, confirmed an emphasis on informal involvement.

### *Reasons for Involvement (Q3)*

When asked about their reasons for being involved various groups and activities, students offered practical procedural insights and also motivations/outcomes insights. In other words, students shared who/what prompted their involvement, or *how* their involvement began (i.e., invited by peers, encouraged by faculty, pursued individually, etc.) and also spoke to motivations, or *why* they subsequently chose to get or stay involved. “Reasons” for involvement related to both *how* and *why* students are involved in various groups and activities both prove helpful to educators.

To the former, peer influence and active pursuit (i.e., personal research) of preexisting interests emerged as typical entry points for various forms of involvement. For many students, as was the case for Greg, a simple invitation was sufficient: “I knew some other people that were involved . . . they told me that I was a good fit [and] that I should consider joining so that’s that.”

However, educators know opportunity does not always result in engagement. So, *why* do students choose to be involved or not in certain activities? The reason for non-involvement is simple: insufficient time. Students—whether highly involved or minimally involved—generally agreed they were not as involved as they once imagined they would. Antonio reflected, “I really enjoy playing basketball and soccer and Spikeball and volleyball and that’s something I was super excited about going to Baylor, but I ended up not having the time to . . . get involved in it.” Interestingly, students indicated feeling that academic rigor and demands of their specific majors restricted their time and involvement in ways different from their non-STEM peers.

Even so, students clearly articulated various perceived benefits of involvement opportunities: relationships or belonging, career development opportunities, exploration or expression of personal interests, spiritual growth or wellbeing, opportunities to practice altruism, and rest or a diversion from academic stresses. Students’ meaning-rich framing of benefits in pursuit of holistic development is worth underscoring. For students, involvement is not reduceable to mere “fun” but rather has legitimate ends. In fact, the groups most frequently lauded by students noticeably provided not just one, but multiple—if not all—of the above benefits, suggesting students are more likely to get and stay involved when they can maximize perceived benefits.

### *Identity Salience & Prioritization in Involvement Decisions (Q4)*



believe what makes me me is the majors that I chose,” and Margot offered, “The first one I put is student. I feel like that's what I'm doing all the time. So, I think that's a very big part of my identity.” Finally, Ben clarified the importance of the immediate role of the University context in reinforcing the salience of a student-professional identity: “I guess that's what defines me most on the college campus right now. That's kind of the first question I'm asked is “What's your major?” I guess they all kind of blend into my outlook and perspective on stuff.”

Still, students did not forsake other salient identities. Margot shared about how all four of her identities—student, daughter, Christian, and friend—are apparent, even ordered in her involvement in an Engineering-related service organization:

When I think about things, I think, is this what my parents want me to do? They raised me to be a Christian and to have those values. So, in terms of getting involved in things on campus, I think: “Do I have enough time for this?” Like in terms of my studies. And then . . . I think, “Is this something that fits with my morals and with Christianity as well? And then, my friends too I go to them too for advice. So, I guess kind of all four of them.

In prioritizing their identities, students openly resisted reducing themselves to single identities which would compete with their inclusive visions of holistic success. Instead, they pursued opportunities to meaningfully engaged multiple identities simultaneously. Thus, the collective data suggests *involvement is an arena in which high-achieving, low-income STEM students prioritize and live out salient identities in alignment with their understandings of success.*

## **Discussion**

The findings support more nuanced understandings of the importance of helping students navigate and maximize many available involvement forms in light of their identities and ideas of success. As Devon reflects, “It all comes down to balancing things out. And I'll get it eventually. . .but we're still trying to find that balance, wherever it comes from,” he reveals a common sentiment among students. Educators are great at providing opportunity rich contexts that require students to prioritize their activities; however, educators do little to help students navigate subsequent involvement choices. Faculty advice regarding involvement is often oriented around university-defined student success outcomes. However, a strict focus on measurable outcomes exalts the student-professional identity over others, prompting educators to overlook forms of involvement aligned with students' broader definitions of success.

### *Implications*

Faculty may be tempted to discourage involvement—particularly informal forms of involvement—as competing with academic success. This would be a mistake. Involvement—particularly understood as a means of identity expression and formation—builds students' sense of belonging which in turn promotes retention. Therefore, we encourage faculty members to get involved themselves with students outside of the classroom. Our data suggests students enjoy and value such interactions, particularly in contexts that allow for seemingly informal, personal interactions with their major's faculty members. We believe activities like group meals or

playing Top Golf with professors provide opportunities for students to maximize the benefits they seek, by connecting them with faculty who can bridge (maximize) social/relational success and academic success. Moreover, a program that fosters such interactions during orientation provides educators the opportunity to explore student identities and goals beyond just that of student-professional, which dominates classroom contexts. These interactions equip educators with the personal contact needed to help students identify involvement opportunities that maximize students' identity coherence and success goals. Involvement plays a critical role in fostering student success, and faculty may well hold the key to unlocking its potential in new ways. Innovative student success programs provide the opportunity.

### *Limitations*

A few study limitations warrant consideration. First, this study was conducted amidst the COVID-19 pandemic, with obvious impacts on student involvement. Second, this study examined involvement in first and second-year students; their involvement patterns may still change going forward. Third, defining SES is difficult [5] and the institution's definition of "low income" for participation in ECS was unclear. Thus, findings may not be generalizable to other low socioeconomic status (SES) STEM students. Similarly, each participant received a scholarship, possibly buffering the salience of low-SES identity—resonating with the findings of [6]. Student perceptions and experiences of involvement, identity, and success—particularly related to SES, which may be underrepresented in this study—warrant further research.

### **References**

- [1] National Academy of Sciences, *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*. Washington, D.C, USA, National Academies Press, 2011.
- [2] S. Olson and D.G. Riordan, "Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics," Executive Office of the President, Washington, D.C., USA, 2012.
- [3] A. W. Astin, "Student involvement: A developmental theory for higher education," *Journal of College Student Development*, vol. 40, no. 55, 518–529, Sept/Oct. 1999.
- [4] M. J. Mayhew et al. *How College Affects Students: 21st Century Evidence that Higher Education Works*, vol. 3, San Francisco, CA, USA, Jossey-Bass, 2016.
- [5] K. Donaldson, G. Lichtenstein, and S. Sheppard, "Socioeconomic status and the undergraduate engineering experience: Preliminary findings from four American universities," presented at 2008 ASEE Annual Conference & Exposition, PA, USA, June, 2008, 10.18260/1-2--3622.
- [6] W. T. Trent and S. J. E. P., *Resources, Assets, and Strengths Among Successful Diverse Students: Understanding the Contributions of the Gates Millennium Scholars Program*, vol. 23, New York: NY, USA, AMS Press, 2008.
- [7] M. van Manen, "Phenomenology in its original sense," *Qualitative Health Research*, vol. 27, no. 6, 810–825, SAGE, 2017.
- [8] P. Kaufman and K. A. Feldman, "Forming identities in college: A sociological approach," *Research in Higher Education*, vol. 45, no. 5, 463-496, New York, NY, USA, Springer, Aug 2004.