2023 Annual Conference & Exposition
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Board 307: Imagining and Co-designing a Supportive College Experience for First Generation Students through an NSF S-STEM Program

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Dr. Katherine C. Chen is the Executive Director of the STEM Education Center at Worcester Polytechnic Institute (WPI). Her degrees in Materials Science and Engineering are from Michigan State University and MIT. Her research interests include pre-college engineering education, teacher education, and equity in education. She is currently on NSF S-STEM, RET, and Noyce grants.

Haley McDevitt

Haley McDevitt is an artist, graphic recorder, and facilitator who uses a combination of drawing, typography, and design to capture and synthesize information. As a visual communications partner to her clients, she creates live summaries of facilitated conversations that engage participants, aid in group sense-making, and captures connections through shared key insights. She holds a BFA in Studio Arts from the University of Massachusetts Amherst. With a passion for creative problem-solving, Haley enjoys aiding organizations to communicate their ideas in a more engaging and accessible way.

Dr. Hermine Vedogbeton, Worcester Polytechnic Institute

Dr. Hermine Vedogbeton is an Assistant Research Professor at the Worcester Polytechnic Institute (WPI). Her research interests include social justice, environment justice, ecosystem services, and women & the environment. She holds a Ph.D. in in Economics and a master's in International Development and Social Change from Clark University.

Ms. Debra Boucher, Worcester Polytechnic Institute

Debra Boucher is Assistant Dean of Undergraduate Studies at Worcester Polytechnic Institute (WPI). Prior to coming to WPi, her work positioned her work at the intersection of enrollment management, student success, and academic affairs. At WPI Debra oversees the summer session offerings and works to leverage summer activities to support strategic initiatives. She works to build systemic supports for vulnerable students, smooth the pathway for transfer students, and build collaborative systems of support for all students.

Mr. Arnold Mitchell Lane Jr., Worcester Polytechnic Institute

Arnold M. Lane, Jr. (he/him) is the Director of Multicultural Education and Community Engagement in the Office of Diversity, Inclusion, and Multicultural Education (ODIME) at Worcester Polytechnic Institute (WPI). Arnold received his Bachelor of Arts degree in Psychology from the University of New Haven (West Haven, CT). He received his Master of Education degree in Student Personnel Administration in Higher Education from Springfield College (Springfield, MA). He also received a Master of Business Administration degree from Winston-Salem State University (Winston-Salem, NC). His research interests include Black male student success, first-generation college students, orientation and onboarding experiences, and intergroup dialogue.

Brianna Raphino, Worcester Polytechnic Institute

Brianna Raphino is a Ph.D. Candidate at Worcester Polytechnic Institute (WPI) in the Mechanical Engineering Department. She received her Bachelor's Degree in 2020 from Merrimack College. She then entered WPI graduate school with a GEM Fellowship, WPI Presidential Fellowship, and a supplemental grant from the Koerner Family Foundation. She has a passion for STEM education outreach and mentorship, and has participated in numerous programs, including WRAMP (Women's Research and Mentorship Program) at WPI.

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Imagining and Co-designing a Supportive College Experience for First Generation Students through an NSF S-STEM Program

Introduction - *The CoMPASS S-STEM Scholarship Program*

Two cohorts of ten (10) first generation students from the local Worcester Public School district have been recruited to the NSF S-STEM CoMPASS scholarship program [1] that provides navigational support in attending and graduating from Worcester Polytechnic Institute (WPI), a STEM-focused private university. The S-STEM funding complements a university scholarship to meet the full demonstrated need of each student for four years, including on-campus housing to ensure that our scholars can fully participate in the college experience. Intentional programming and a mentor network were implemented with an assets-based framework. One of WPI's pedagogical approaches to engineering projects is to have students learn and experience co-designing solutions with their end-users. Thus, we engaged our S-STEM CoMPASS Scholars to co-design a supportive college experience for first generations students at WPI.

Methodology - *Capturing student voices through a graphic recording*

To capture our students' experiences, voices, and ideas, we partnered with a graphic illustrator and facilitator [2,3] for a design charrette at one of our quarterly check-ins with our CoMPASS Scholars in November 2022. We had 14 out of the 15 scholars that were on campus (since 5 were studying at a global project center that term) participate in the event. Several reminders to the students with an explanation of the special event with dinner helped with the high participation rate (although some students could attend for only part of the time).

Meetings with the CoMPASS support team (i.e., WPI faculty and staff) and the artist took place before the event to plan out the 2-hour event, and Figure 1 displays the flow of the event components. As students arrived to the meeting, we had our typical check-in chats and used the Rose-Thorn-Bud activity [4] for mindful reflection. We also designed a series of deliberate prompts for the students to write their individual responses on Post-It sticky notes:

- What did you learn last term about being a College Student? And what are you going to do differently because of it?
- What would you tell your past self about coming in as a new student at WPI?
- How do you wish WPI were different?
- What ideas or actions do you recommend? What resources might be needed?

With all the Post-It notes on the wall and grouped by common themes, the facilitation elevated multiple voices and reinforced learning as a group, as well as highlighted interconnections. This

stage allowed students to think deeply as individuals and then move onto sharing collective experiences.

Gathered around in large circle with the artist, we dove into the "Imagining and Co-designing a supportive college experience" conversation. The artist sketched on an iPad, and the portions of the artwork being worked on in real-time was projected onto a large screen in the room.
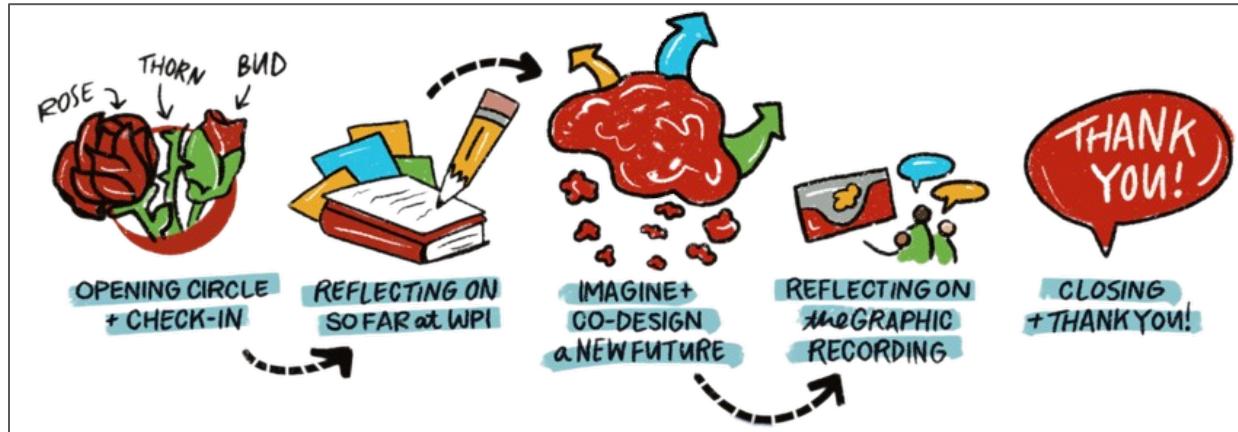
Figure 1. Reflections were used to scaffold and bookend the co-design experience.

Results – *A reimagined supportive college experience and university structure*
The graphic recording translated the real-time conversations and the key ideas into a shared visual. The scholars collectively shared their stories and brainstormed ideas together, often building upon one another or offering different perspectives. While frustrations and gripes about the university were expressed, the conversation was steered towards solutions and idea generation with an appreciative inquiry approach [5]. The students (and support team) were fully engrossed in the conversations as time seemed to go by quickly, and the focus for most people was on each other rather than looking at the real-time drawings being projected on the screen.

Towards the end of the meeting, we closed the conversation, and the artist revealed the entire drawing (Figure 2). The scholars were asked to absorb the graphic, comment on any discrepancies they noticed, and finally share their thoughts and impressions.
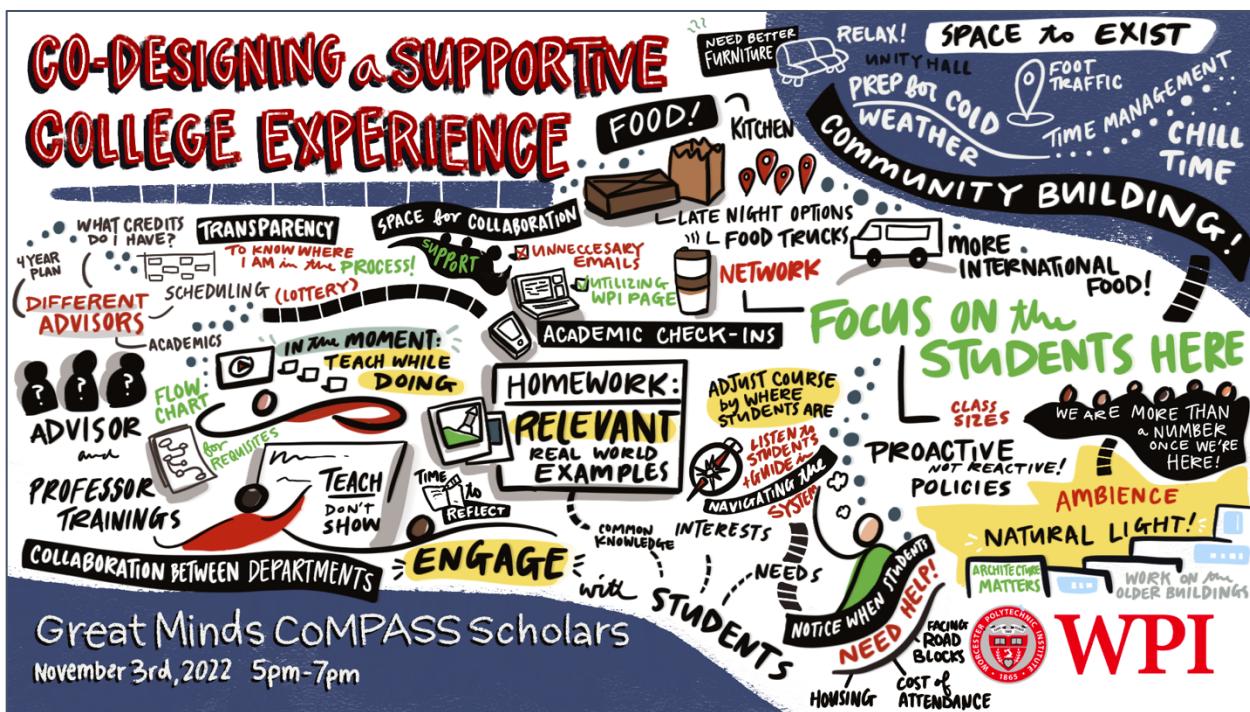
Figure 2. The finished version of the graphic illustration that captures the co-created ideas by the S-STEM CoMPASS scholars for a supportive college experience at WPI.

The personal stories and student experiences that were shared during the session were consistent with what the support team hears from other WPI students, and thus are representative of other students (especially from marginalized groups). A significant amount of discussion time was around the interactions and class policies of faculty, as well as the intense, fast-paced, and demanding culture that many STEM programs uphold. The lack of time and space for human connections and community building was also a theme. The graphic nicely captures the interrelated viewpoints around the academic experience, social life, physical space, official university communications, and resources. The graphical artwork serves as a visual representation of the voices of our scholars and serve as a tool to present what is possible for the university in order to redefine student experiences and set up systems for all students to succeed.

A particular portion of the graphic (Figure 3) illustrates a key observation that the support team has been noticing and attempting to alleviate – providing the skills and agency for students to navigate the university system with any obstacle or challenge that arises.

One of our CoMPASS scholars appreciated being asked to share their experiences and has hope that things can improve for them and others:

> *I learned that being a college student means that there's more than you have to handle besides showing up for class. ...The problems I've faced...have been vast in complexity and absurdity. The biggest action I've seen is communicating and tak[ing] steps together with students, professors, and admins to go forward.*
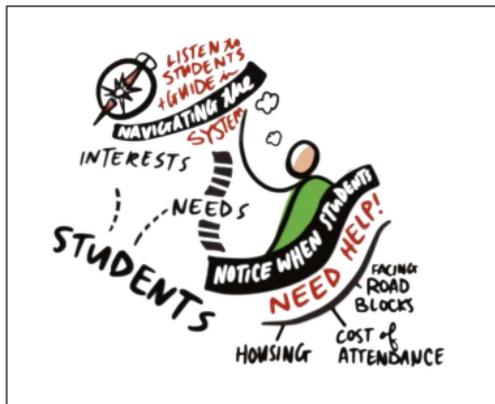
Figure 3. Close up of section of graphic illustrating students navigating the university system and captures a significant finding from the CoMPASS scholarship program.

Ongoing with our S-STEM project are interviews with the CoMPASS scholars by a faculty member on the support team (and a co-PI of this manuscript). The research study on first generation student experiences reveals that a distributed and unconnected model of student support in our university's context can be frustrating and ineffective for students. While there are a myriad of offices to support students, our students can get overwhelmed in the policies and procedures in accessing resources or solving problems that occur. The CoMPASS support team has amended its approach from providing awareness of campus resources at the start of college to a more engaged method of checking-in and coaching students through issues in a "just in time" manner. Our students have appreciated someone helping connect them to the right people at the right time and coaching them in what to do (as well as what to expect). The goal is for students to develop what Yosso terms as "navigational capital" and resiliency in a system that was not designed for them [6]. A core team of people that guides students to navigate the university system has been found to be helpful for our cohort of S-STEM scholars.

Conclusions – *Next Steps*
Through this S-STEM project, we are documenting our findings on the infrastructure that is needed (e.g., human capital) to support the whole student at WPI, and in particular students for which the university system was not initially designed for. The findings and co-designed graphical illustration provide a compelling opportunity for the university to strengthen student supports with the proper resources and systems for students, especially those from historically underrepresented and marginalized groups.

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