

Building Research, Teamwork and Professional Skills in an Engineering Summer Bridge Program: Reflections Towards an Allyship Model

Prof. Kavitha Chandra, University of Massachusetts, Lowell

Kavitha Chandra is the Associate Dean for Undergraduate Affairs and Professor of Electrical and Computer Engineering in the Francis College of Engineering at the University of Massachusetts Lowell. She directs the Research, Academics and Mentoring Pathways (RAMP) to Success summer bridge and academic program for new engineering students, preparing them with research, communication and leadership skills. Her research interests are in computational and data-driven modeling of physical systems in acoustics and communication networks, model-based systems engineering, user-centric design of emerging technology and engineering education.

Dr. Susan Thomson Tripathy, University of Massachusetts, Lowell

Dr. Susan Thomson Tripathy is a social science research consultant specializing in qualitative research methodology, including ethnography and participatory action research.

Dr. Sumudu Lewis, University of Massachusetts, Lowell

Sumudu Lewis is an Associate Clinical Professor at the School of Education at UMass Lowell and also the Director of the STEM teacher preparation program called UTeach.

nadia sahila, University of Massachusetts, Lowell

Nadia Sahila is a dedicated doctoral student at the University of Massachusetts Lowell, specializing in research and evaluation in education. She holds a Master of Education in Curriculum and Instruction and a Bachelor of Arts in Marketing and Management. Currently, Nadia is a graduate research assistant with the River Hawks Scholarship Academy and a teaching assistant for the Fulbright Teaching Excellence and Achievement program, as well as the Research, Academics, and Mentoring Pathways program. Her research interests focus on diversity, equity, and inclusion, particularly in educational settings. Recent projects have explored culturally responsive education and gender equity.

Nadia has presented her research at several national conferences and has published work on building teamwork and professional skills in engineering education. Her methodological expertise spans both qualitative and quantitative research. A recipient of multiple awards, including third place in the 2023 World Evaluation Case Competition and winner of the 2023 AEA United States Student Evaluation Case Competition, Nadia is recognized for her contributions to the field of educational evaluation and her commitment to fostering inclusive learning environments.

Work in Progress: Building Research, Teamwork and Professional Skills in an Engineering Summer Bridge Program: Reflections Towards an Allyship Model

Abstract

The RAMP summer bridge program in the Francis College of Engineering at the University of Massachusetts Lowell began in 2018 to increase the number of women enrolling in engineering majors and prepare them for leadership. Over the last six years the program has invited all students who were interested in broadening the participation of women and students of color in engineering degree programs to participate in RAMP. High school juniors and seniors nominated by their teachers as potential advocates have participated during the last two years. To date, 107 students have completed the summer bridge. They are currently enrolled in various engineering majors across the four years of the undergraduate engineering degree pathway, in graduate school, or in the workforce. An analysis of student reflections from exit interviews of graduating students from 2018 and 2019 cohorts and journal entry data collected from students from the recent 2023 cohort is presented in this work. The themes emerging from this analysis show that both graduating students and current students seek to strengthen the RAMP community beyond the summer program. Their recommendations point to the need for continuing support in both personal achievement and for advocating the needs of their peers. With over a hundred RAMP participants now established across the engineering majors and the workforce, these recommendations will be integrated in the participatory action research framework that anchors the design of RAMP. We will address the training of juniors and seniors as allies and advocates to the newer cohorts, and engage RAMP alumni, thus establishing an agile model that is responsive to and supported by the program participants.

1.0 Background

Over the last six years, the Research, Academics and Mentoring Pathways (RAMP) to Success has been an impactful summer bridge program in the Francis College of Engineering at the University of Massachusetts Lowell. It has been systematically developed, evaluated, refined, and offered to new undergraduate students joining the college of engineering to support their transition from high school to college. RAMP addresses the priorities that students have identified as important as they navigate the challenges in the undergraduate engineering degree pathway. The program's overarching goal is to engage students in teamwork, research, and professional development early in their undergraduate career and provide opportunities to exercise these skills in a variety of contexts. Originally designed to support new female students, RAMP has been expanded to all students, including high-school juniors and seniors. The mission is to provide students who are underrepresented in engineering the knowledge and resources to be successful in engineering education and careers, while acquiring leadership skills that contribute to broadening the participation of women, ethnic, and racial minorities in engineering.

RAMP takes place over six weeks in the summer before the Fall semester when students first enroll in college. Participants are recruited during the previous Spring semester, after admission decisions are announced. Students who express interest fill out an application form that describes

the program mission and expectations for the summer. The requirements include: (i) enrollment in a mathematics course; (ii) conducting a team-based research project with a faculty member; (iii) weekly engagement with professionals from industries; and (iv) participation in workshops that present resources for student success. RAMP also includes an interactive weekly workshop that brings attention to the issues of diversity, equity, inclusion, and belonging (DEIB), through team activities designed for students to get to know each other and identify their own goals and interests for the future. Details of the program design and outcomes have been reported in previous work [1-4].

During the academic year, RAMP directors work with students on their individual needs, connecting students electing to participate in research with faculty mentors and finding opportunities for community engagement for those interested in volunteering and outreach activities. Informal meetings, interviews, and cohort get-togethers are also organized. These events have helped inform students' progress, their experiences, accomplishments, and challenges. A key component of RAMP has been the engagement of students in focus groups using the framework of participatory action research [2]. In Fall 2023, a group of seven RAMP students from the 2020-2023 cohorts volunteered to participate in a focus group after bringing attention to a key challenge related to mental health and well-being that many engineering students were experiencing. They offered potential solutions through stronger community building and support from peer groups, proposing a model of sharing each other's experiences in how they are overcoming mental health issues. This has initiated a student-led action plan to address the mental health challenges that our students are experiencing. The increase in stress and mental health of undergraduate engineering students has been a growing concern as reported in recent studies [5-7].

In this work we highlight the importance of integrating into the design of summer bridge programs a continuous process for engaging students in conversations at different stages of their academic careers. The information gained from these discussions will serve to adapt the next iteration of the summer bridge with program elements that can better bridge the connections between newly arriving students to the program and the participants from previous years. Ensuring that these connections between different cohorts are aligned with student needs, the summer bridge can become seamlessly extended to the academic years. Moreover, this approach can help create future leadership among the participants, a critical requirement to ensure that programs such as RAMP can be scaled and be accessible to more students.

The first two RAMP cohorts from 2018 and 2019 have completed their engineering degree program. We assessed their experiences through exit interviews and report in this paper a summary of their responses. The students noted that being able to identify themselves as belonging to the RAMP community was a positive outcome of their participation during the summer, an identity they appreciated throughout their engineering program. The potential for summer bridge programs to create community and sense of belonging has been discussed in surveys of STEM summer bridge programs [8,9]. Characterized as a psychosocial goal of the program, improving student sense of belonging to a community has been found to influence student motivation, academic achievement, and well-being [8]. The Meyerhoff Scholars Program [10] for example is among those that identified through interviews and focus groups with

participants, the importance of the summer bridge in creating a sense of belonging and a shared identity.

The experiences of graduating students and the recommendations from the current RAMP students indicate that there is a clear need to build a structured extension of the summer bridge that can leverage the sense of belonging in the RAMP community created by the summer activities. The intention of a group of students to become allies in improving the mental health of their peers will serve as a scaffold for extending the summer RAMP model to the subsequent academic years. Such a model is in line with the student-centered mission of RAMP. We use the term allies here to refer to RAMP students who have developed a group identity and desire to support other students within and outside the group through their shared experiences. For students to become effective allies, they must acquire not only a system level understanding of the issues that they are aiming to dismantle but also be willing to manage their time and other resources that are often at conflict in these activities. To integrate the skills for allyship in a program such as RAMP all stakeholders must first understand the meaning of this term in the context of our institution.

Section 2.0 begins this work with a brief literature survey to better understand allyship in the context of higher education and in the more general context. Section 3.0 is an overview of program experiences from students belonging to the 2018 and 2019 cohorts who have completed their undergraduate engineering program. Section 3.0 summarizes the reflections from the most recent SBP cohort (2023) using data collected during the weekly DEIB workshops. Section 4.0 concludes the paper with directions for future work.

2.0 A Literature Survey on Allies and Allyship

Allies are generally defined as members of a dominant group who enthusiastically work to dismantle oppressive systems experienced by marginalized communities actively striving to rectify social injustices [11,12]. Allyship programs are of uttermost importance for building supportive and nurturing relationships with individuals or groups to promote inclusion. Allyship is a dynamic, collaborative, and challenging process where allies establish profound relationships with people and communities where they work as an ally [12]. With respect to forming mental health allies, Ponte [13] states that being a mental health ally means working with those struggling with mental health issues, so they feel valued and needed.

In the higher education context, a recent study by Moore and Cox [14] on allies, advocates and accomplices looks at the historical relationships between Black and white women in engineering education and make the case that more than allyship is required. An accomplice position, i.e. one who is willing to take a stand and perhaps lose is recommended for the coalition work needed in this environment. They position their work on the foundational knowledge and interactions needed to support enduring relationships between Black and white women, both of whom experience intersecting systems of oppression. The model proposed in [14] looks at transitioning allies to advocates and then as accomplices, each stage extending the commitment to equity. Advocates and accomplices are willing to increase their own risk and vulnerability whereas allies may have little to gain from intervening.

The adoption of an advocates and allies (A&A) program to a STEM campus is the focus of recent work by Sotirin et al. [15]. Their work adapts the program developed at North Dakota

State University [16] that engaged men faculty in individual and institutional change efforts for greater gender equity on their campus. The approach taken in [15] to address Diversity, Equity, Inclusion and Sense of Belonging (DEIS) for individuals with non-majority identities is to first train volunteers from the majority groups (white men) to learn more about DEIS in academic systems and become advocates. An A&A Advisory board comprised of a diverse member group oversees the work of the advocates and guides them using non-majoritarian perspectives. Secondly, these advocates share their findings with larger groups on campus, potentially influencing the behavior of the majority and dominant voices on campus. Through this process of learning, sharing, and advocating, groups of Allies may emerge that practice allyship within their sphere of influence.

The literature on engineering students being allies and advocates or their needs in an ally is rather limited. To address this, the study in [17] investigates the perspectives of Black STEM graduate students about faculty ally behaviors through semi-structured interviews. Recognizing that being an ally can be fraught with politics and pitfalls, the authors in [17] applied a constructivist grounded theory approach to engage twelve students identifying as Black/African American in 60-90 minute interviews. The analysis revealed three dimensions of (i) Preparing to be an Ally; (ii) Foster Credibility and (iii) Practice Active Allyship. Students identified specific actions under each of these dimensions. An example was that faculty exercise agency to develop critical knowledge about allyship and minoritized communities rather than burden others with requests to teach them.

A larger body of literature on allies and allyship exists in the more general context of social justice. The motivation to be allies stems from a deep recognition of the imbalances and prejudices inherent in society. Their motivation is grounded in the belief that impactful societal transformation is a commitment to standing alongside those who face discrimination and oppression, and it is rooted in empathy and a genuine desire for justice [18, 19]. The drive to be allies is further fueled by the conviction that systemic injustices can be challenged to promote inclusivity and that collective progress can be achieved through solidarity [20].

Warren and Warren [21] noted that the “motivation of allies tends to wax and wane with prominent events” (p. 783). Referring to the brutal shooting of the Black unarmed teen Trayvon Martin in 2012, the authors recalled the enthusiastic involvement of White individuals, groups, and organizations stepping forward as allies. They noted how this allyship subsided when there were no notable systemic changes, only to be re-energized eight years later when the murder of George Floyd was brought to the forefront sparking renewed public outcry and a revival of allyship advocating for substantial reforms. This energy has also ‘waned’ as the authors predicted.

Sustaining allies’ motivation over time beyond prominent events [11,19,21-25] and assessing allyship behavior [26-28] is of critical importance for fostering enduring and meaningful partnerships to ensure consistent collaborations and progress towards a shared outcome, rather than rely solely on sporadic or high-profile occurrences to drive collective engagement for systemic changes. Radke et al., [26] identified four groups of motivation: outgroup-focused motivation, ingroup-focused motivation, personal motivation, and moral motivation.

Members of the outgroup-focused motivation category are genuinely committed to supporting and advocating for the rights of marginalized or disadvantaged groups. They actively participate in allyship programs that are dedicated to addressing systemic inequalities and promoting social justice [26, 23, 12]. The second category of motivation is ingroup-focused motivation. Individuals in this category may also have a sincere interest in actively supporting initiatives and efforts to address specific issues or challenges faced by disadvantaged groups. However, their behaviors and actions are conditional and centered around maintaining the status of their advantaged group [19,23]. The third category of motivation is personal motivation. Radke et al., [26] proposed that when individuals from an advantaged group are motivated to actively support and advocate for marginalized or disadvantaged groups, they may do so to meet personal needs such as “to improve their reputation, gain popularity, increase opportunities to make money, or, in the case of politicians, increase the likelihood of being elected” (p. 301). Finally, morality serves as a potent motivational force for allyship compelling individuals to engage in actions that promote justice, equality, and the well-being of others [28]. These studies provide a general perspective on the meaning of allies and related issues with respect to their motivation and actions.

Although there are relatively few studies of training students to become allies and advocates, we will draw on findings in the current research and integrate some of these practices into our RAMP summer bridge and its academic extension in future work.

2.0 Exit Interviews with Graduating RAMP Students

To understand how students look back on their RAMP experience upon graduation from the University with their bachelor’s degrees, we began conducting exit interviews with students in May 2022, when the 2018 cohort began to graduate (10 students interviewed). These exit interviews were repeated with the 2019 cohort in May 2023 (5 students interviewed).

Each interview was conducted and recorded via Zoom by a member of our research team and lasted from 30-45 minutes. Students volunteered to participate and provided consent, including permission to record the interview. Questions asked during these interviews were designed to elicit students’ reflections on any long-term benefits they received from participating in RAMP, suggestions for continuing the program to the academic year, and plans for after graduation. Opportunity for students to ask their own questions and comment on additional areas of interest was also provided. Once the interviews were completed, the transcripts were coded using Dedoose and analyzed thematically. Table 1 summarizes the status of students in these cohorts.

As depicted in Table 1, 13/18 (72%) of the students who completed RAMP in 2018 received their undergraduate engineering degree within 4 years, as did 8/15 (53%) of students who completed RAMP in 2019. Of these students who graduated, 11/13 (85%) of the 2018 cohort enrolled in a Master's or PhD program after receiving their undergraduate degree, as did 7/8 (87.5%) of the 2019 cohort. Very few students transferred or dropped out of UMass Lowell (2/18, 11% of students in the 2018 cohort; 1/15, 8% of students in the 2019 cohort).

The long-term benefits of RAMP discussed by students emphasized two key themes: (1) Social/emotional support and (2) Academic goals/skill building. Regarding social/emotional support, students mentioned forming friendships with peers, developing a support system of people “you can go to” with questions, receiving assistance and encouragement from faculty in

engineering (especially from the RAMP director), having opportunities for networking with industry representatives, and developing a “sense of community” with RAMP students, faculty, and staff. One student also commented that she appreciated being “surrounded by women” during the program, because she had been worried there may not be many women in her engineering major.

Table 1. Graduation and Employment Outcomes for Students in Each Cohort

Students who . . .	RAMP’2018	RAMP’2019
Completed RAMP	18	15
Received undergraduate engineering degree within 4 years	13	8
Enrolled in engineering Masters (including 4+1 programs)	10	4
Enrolled in engineering PhD	1	3
Transferred or dropped out of the UMass Lowell undergraduate engineering program	2	1
Planned to work in engineering after graduation and not pursue a graduate degree right away	3*	n/a

*Includes one RAMP 2018 student who had not yet graduated at the time of the exit interview

Academic benefits discussed included getting a head start on engineering coursework, becoming familiar with the university, receiving help with transitioning from high school, gaining experience with public speaking, and learning more about different engineering majors. In some cases, RAMP students were able to graduate a semester early, and others discovered they were more interested in another engineering field and changed majors.

Interviewees also provided several recommendations for extending RAMP to the academic year that we classified into actionable goals for program directors to consider. These recommendations and goals are presented in Table 2. The actionable goals are further classified as belonging to an allyship (A) or individual (I) aspirations.

Table 2: Student Recommendations for Extending RAMP to the Academic Year

Student Recommendations	Actionable Goal
Have regular “check-in” conversations with RAMP peers and faculty on values and future goals.	Maintain connections with RAMP community (A)
Extend RAMP into a “club” for informal conversation with bi-weekly meetings.	Extend the community experience of RAMP (A)
Collaborate with other clubs to hold workshops and events	Extend RAMP partnerships (A)
Receive advice from more senior RAMP students regarding engineering classes and professors	Share practices among RAMP members (A)

Have RAMP students participate together in a conference or convention (one student suggested creating a RAMP conference)	Extend the community experience of RAMP (A)
Provide opportunities to connect with mentors and therapists more specific to engineering	Address college-specific challenges and barriers (I/A)
Hold seminars on professional communication and public speaking	Build professional skills (I)
Present at student panels and networking events	Contribute to college events (A)
Organize presentations including speakers from industry and professors	Build professional/leadership skills (I)
Be aware that students are already very busy with courses and other extracurricular activities, so it may be difficult for them to attend frequent RAMP meetings/events during the academic year.	Address college-specific challenges and barriers (I)

Students’ suggestions for extending the RAMP program indicate an especially strong interest in allyship, with six recommendations categorized as allyship, three as individual, and one as a combination of allyship/individual. Of note is the recommendation for addressing college-specific barriers, such as the lack of engineering-specific therapists and mentors. This correlates with the need for college-specific mental health resources that was brought to the attention of RAMP directors by the more recent 2021-2023 RAMP cohort.

3.0 Reflections from 2023 RAMP cohort recorded from journal entries after Diversity, Equity, Inclusion and Belonging (DEIB) workshops

During the first five weeks of RAMP, we added one-hour meetings twice a week committed to workshops focusing on DEIB. The nine workshops that students participated in were based on various themes such as team building, intersectional identities, going beyond one’s comfort zone, culture wheels, power and privilege, microaggressions, identifying strengths and challenges, ethics, and exploring music and art reflective of the cultural heritage of the participants. We employed a variety of pedagogical strategies during the workshops including but not limited to discussions, role plays, and games. Table 3 shows the structure of each of the nine workshops.

Table 3: DEIB weekly session content and activities

Session	Session structure and activities
1	<p>Course schedule and Purpose of DEIB.</p> <p>The student participants were introduced to the structure and purpose of DEIB workshops as related to them. This first session focused on introductions and a lengthy icebreaker activity, <i>The International Trading Game</i> [29], which allowed the participants to work in groups to explore global inequities through a simulation involving trading.</p>

2	<p>Exploring Social Identities. Participants were asked to read two articles: <i>The Complexity of Identity: “Who Am I?”</i> [30] and <i>Diversity and Inclusion in Engineering Education: Looking Through the Gender Question</i> [31]. The first part of the session focused on exploring the social identities of the participants, identifying and discussing systems of privilege and oppression in society, and examining how these factors impact their experiences and social identities. The second part of the session enabled the participants to explore the significance of multiple social identities in engineering design by examining a specific engineering project.</p>
3	<p>Leaving the Comfort Zone Using the YouTube video <i>Who Moved My Cheese.</i> [32] the participants explored their comfort zone and the limitations of this comfort zone through group discussions and personal reflections.</p>
4	<p>Social Justice – Culture and Identity The participants delved into two central concepts of social justice: culture and identity. They reflected on the intersections of their privileges with another’s oppression by identifying target and non-target groups in our current society. In addition, the participants explored their personal and social identities through reflecting and creating a presentation on their ‘fullest name.’</p>
5	<p>Ethics, Power, and Privilege In this session, the participants explored the Code of Ethics for Engineers and through several activities, e.g., The Privilege Walk, the participants reflected and discussed their ‘unearned’ privileges and how these privileges can be used to assist others.</p>
6	<p>Microaggressions The session focused on understanding microaggressions, bias, and the differences between Prejudice, Discrimination, and Stereotypes. Participants were presented with examples of microaggressions taken from social media and asked to discuss the causes of these aggressions towards another individual and the role of a bystander in interfering and stabilizing the situations</p>
7	<p>Core Values During this session, the participants explored their core values and world views – their highest priorities, deeply held beliefs, and core, fundamental driving forces by creating their ‘Core Value Tree.’</p>
8	<p>Teamwork – Build a Bridge In this session, the student participants were randomly grouped, and each group was given a variety of materials, but no two groups had the same type or amount. The goal was to build a foot-long, 6-inch-long, and 6 inches wide bridge. The student groups could trade or swap materials depending on their design idea, but ultimately all bridges should be the same height and able to connect.</p>
9	<p>Culture, Music & The Arts In this final session, student participants explored their cultures through music, art, and games.</p>

At the end of each week, the participants were encouraged to reflect on their weekly activities across all the RAMP activities and write a reflection on Google Docs. While this was not a mandatory requirement, many participants chose to share their thoughts on their weekly experiences of classes and social encounters during each week of RAMP. The student participants were asked to reflect on the following prompts each week:

- What did you enjoy doing this week - i.e., the highlight of the week? Please explain.
- What was the most challenging part of this week? What did you do to overcome the challenges you faced?
- If you encountered any issues, challenges, or problems this week do you have any recommendations or suggestions for improving your experiences?
- Where and when did you feel a sense of inclusion and belonging - this could be in a RAMP session, or it could be a formal or social encounter on campus with a professor or colleague. Please describe your experience.

All data was collected through submission in Google Classroom and analyzed for general themes. It was apparent that each week students had different highlights and challenges. The challenges described were related to the academic sessions incorporated into the program, and most students were able to overcome these challenges through working with peers or through discussions with professors. However, they did not offer any constructive feedback on what we could do to improve their experience regarding the structure of RAMP. Regarding inclusion and belonging, all students who completed a reflection each week indicated they felt included during the RAMP sessions, working with their peers on projects, and eating lunch with their friends. Generally, RAMP provided a safe learning environment for the students to make new friendships and social groups, be supported emotionally and academically to overcome challenges, and provide novel learning and career opportunities. However, the community support felt during RAMP can rapidly dissolve without active interventions.

Focus Group Fall 2023: A focus group was conducted this past Fall semester to garner the perspectives of six students, who were a part of RAMP from 2020-2023, regarding the status of their mental health and access to university resources. The intention was to determine whether the community spirit and the inclusive atmosphere experienced during RAMP carried through successive semesters. The conversation was recorded with participants' permission. It became apparent through this dialogue that students faced many challenges.

Among these challenges voiced by the participants were: (i) difficulties in accessing and utilizing the mental health and wellness resources on campus; (ii) inconsistency in the implementation of the disability accommodations by the course instructors; and (iii) feelings of frustration and isolation because of seeking assistance or asking for help regarding their health. These concerns are in line with the observations from other studies [6]. Through examination of students' feedback, it became clear that to continue with the inclusive climate students experienced during RAMP, an allyship program is needed to extend into the academic year. Furthermore, the participants indicated need for a more empathetic and understanding campus environment regarding their specific health and well-being issues and proposed that the creation of a physical space for students to support each other would be beneficial to them.

4.0 Conclusions

This paper presented a summary of responses, comments and suggestions from undergraduate engineering students who had participated in the six-week RAMP summer bridge before they began their freshman year at the University of Massachusetts Lowell. This information was collected from exit interviews with two of the graduating cohorts, and from journal entries and focus groups of currently enrolled students. A common theme that emerged was the sense of belonging to the RAMP community that the students identified with. There was also a need expressed for extending the summer bridge to the academic years to support participants in their individual professional development and to develop programs for students to be allies to each other in overcoming mental-health challenges being experienced by many in the student body. A brief literature survey of allyship in the context of higher education was provided that identified critical issues that must be considered before embarking on the programmatic design of building allies and advocates. An important takeaway in the design of summer bridge programs is to ensure that the program includes processes for consistent inclusion of students' voices at successive stages of their academic career. An analysis of emergent themes will not only enable the summer bridge to be extended but also provide an opportunity to create a bench of future leaders from the participant group who can be proactive in scaling the program to a larger group of students.

References

1. K. Chandra and S. Tripathy, "RAMP to Success: Program Design and Outcomes Report for 2018 Launch," *Francis College of Engineering, University of Massachusetts Lowell*, 2018. [Online]. Available: https://www.uml.edu/docs/ramp2018-final-report_tcm18-309285.pdf.
2. S. Tripathy, K. Chandra and D. Reichlen, "Participatory Action Research (PAR) as Formative Assessment of a STEM Summer Bridge Program," *Proc. ASEE Virtual Annual Conference*, 2020 <https://peer.asee.org/33957>
3. S. Tripathy, K. Chandra, H. Hsu, Y. Li and D. Reichlen, "Engaging Women Engineering Undergraduates as Peer Facilitators in Participatory Action Research Focus Groups", *Proc. ASEE Virtual Annual Conference*, 2021 <https://peer.asee.org/37049>
4. K. Chandra, S. Lewis and S. Tripathy, "Engaging Future Engineers through Active Participation in Diversity, Equity, Inclusion and Belonging", *Proc. 2023 ASEE Annual Conference and Exposition*, 2023 <https://peer.asee.org/43314>
5. K.J. Jensen, J.F. Mirabelli, A.J. Kunze, T.E. Romanchek and K.J. Cross, "Undergraduate student perceptions of stress and mental health in engineering culture", *Intl. J. STEM Education*, 10 (30), p1-23, 2023 <https://link.springer.com/article/10.1186/s40594-023-00419-6>
6. C.J. Wright, S.A. Wilson, J.H. Hammer, L.E. Hargis, M.E. Miller and E.L. Usher, "Mental health in undergraduate engineering students: Identifying facilitators and barriers to seeking help", *J. Engineering Education*, 112 (4), p.963-986, 2023 <https://doi.org/10.1002/jee.20551>

7. L. Wang, X. Zhou, W. Wu, A. Chen, “Moderating Effect of Gender and Engineering Identity on the Association between Interpersonal Relationships and Mental Health of Female Engineering Students”, *Int. J. Environ. Res. Public Health*, 19 (22), p1-16, 2022
<https://doi.org/10.3390/ijerph191610425>
8. M. Ashley, K.M. Cooper, J.M. Cala and S. E. Brownell, “Building Better Bridges into STEM: A Synthesis of 25 Years of Literature on STEM Summer Bridge Programs”, *CBE – Life Sciences Education*, 16 es3, p1-18, 2017.
9. B.C. Bradford, M.E. Beler and F. L. Oswald, “A Meta-analysis of University STEM Summer Bridge Program Effectiveness”, *CBE Life Sci Educ.*, 2021, Jun;20(2):ar21. doi: 10.1187/cbe.20-03-0046
10. K. I. Maton, S. A. Pollard, T.V. McDougall Weise and F. A. Hrabowski III, “Meyerhoff Scholars Program: A Strengths-Based, Institution-Wide Approach to Increasing Diversity in Science, Technology, Engineering and Mathematics”, *Mount Sinai J. of Medicine*, 79, p610-623. 2012
11. M. Williams and N. Shatif, “Racial allyship: Novel measurement and new insights”, *New Ideas in Psychology*, 62, p1-10, 2021
12. M.T. Williams and S.M. Gran-Ruaz, “Can anti-racism training improve outgroup liking and allyship behaviours?”, *Whiteness and Education*, 8 (1) p20–38, 2023
<https://doi.org/10.1080/23793406.2021.1988687>
13. K. Ponte, “How to be a Mental Health Ally”, *Harvard Business Review*, 2022
<https://hbr.org/2022/05/how-to-be-a-mental-health-ally>
14. K. Moore and M. Cox, “Allies, Advocates and Accomplices: A Critical Look at the Relationships Between white and Black women in Engineering Education”, *Proc. 2021 ASEE Annual Conference Virtual Meeting*, Paper ID# 34624, 2021
15. P. Sotirin, A. Storer, S. Goltz and A. R. Minerick, “Adoption of an Advocates and Allies Program to a Predominantly STEM Campus”, *Collaborative Network for Engineering & Computing Diversity (CoNECD)*, Arlington, Virginia. 10.18260/1-2—45429, 2024
16. C. R. McGeorge and C. Bilen-Green, “Engaging men as allies for gender equity in higher education: An exploration of an Advocates and Allies Program,” *Journal of Women and Minorities in Science and Engineering*, 27(2), p25-29, 2021
17. S. Stone-Sabali, A. B. Mallory, K. J. Mills and E. Alexander, “On Racial Allyship and Constructing a Racial Allyship Framework: Black Graduate STEM Students’ Insights and Recommendations for Aspiring Faculty Allies”, *J. Diversity in Higher Ed.*, 2023
<https://dx.doi.org/10.1037/dhe0000510>

18. D.J. Goodman, "Motivating People from Privileged Groups to Support Social Justice", *Teachers College Record*, 102(6) p1061-1085, 2000
19. M. Kutlaca and H.R.M Radke, "Towards an understanding of performative allyship: Definition, antecedents and consequences", *Social and Personality Psychology Compass*, 17(2), 2022.
20. K.E. Chaney, R. Cipollina and D.T. Sanchez, "Perceptions of White Women's Stigma-Based Solidarity Claims and Disingenuous Allyship", *Social Psychological and Personality Science* p1-10, 2023 <https://doi.org/10.1177/19485506231188757>
21. M.A. Warren and M.T. Warren, "The EThIC Model of Virtue-Based Allyship Development: A New Approach to Equity and Inclusion in Organizations", *Journal of Business Ethics* 182, p783-803, 2023 <https://doi.org/10.1007/s10551-021-05002-z>
22. C.T. Begeny, J. van Breen, C.W. Leach, M. van Zomeren and A. Iyer, "The power of the Ingroup for promoting collective action: How distinctive treatment from fellow minority members motivates collective action", *Journal of Experimental Social Psychology*, 101, p1-16, 2022
23. K.E. Edwards, "Aspiring Social Justice Ally Identity Development: A Conceptual Model", *NASPA Journal*, 43 (4) p39-60, 2006
24. A.W. Fingerhut and E.R. Hardy, "Applying a model of volunteerism to better understand the experiences of White ally activists", *Group Processes & Intergroup Relations*, 23(3) p344-360, 2020
25. D.J. Goodman, "Motivating People from Privileged Groups to Support Social Justice", *Teachers College Record* 102(6), p1061-1085, 2000
26. H.R.M. Radke, M. Kutlaca, B. Siem, B., S.C. Wright and J.C. Becker, "Beyond Allyship: Motivations for Advantaged Group Members to Engage in Action for Disadvantaged Groups", *Personality and Social Psychology Review*, 24(4), p291-315, 2020
27. L.A. Collier-Spruel and A.M. Ryan, "Are All Allyship Attempts Helpful? An Investigation of Effective and Ineffective Allyship", *J Bus Psychol*, 39, p83-108, 2022 <https://doi.org/10.1007/s10869-022-09861-9>
28. C.R. McGeorge, R.B. Toomey and Z. Zhao, "Measuring Allyship: Development and Validation of Two Measures to Assess Collegiate Athlete Department Staff Engagement in LGBTQ Allyship and Ally Behaviors", *Journal of Homosexuality*, 71(8), p1900-1917, 2021 DOI: 10.1080/00918369.2023.2217315
29. J. Sloman, "The International Trade Game", *The Economics Network*, 2002. [Online]. Available: https://www.economicsnetwork.ac.uk/showcase/sloman_game#:~:text=Countries%20compete%20against%20each%20other,as%20much%20money%20as%20possible

30. B.D. Tatum, "The complexity of identity: "Who am I?," In Adams, M., Blumenfeld, W. J., Hackman, H. W., Zuniga, X., Peters, M. L. (Eds.), *Readings for diversity and social justice: An anthology on racism, sexism, anti-semitism, heterosexism, classism and ableism* p9-14, New York: Routledge.
31. A. Peixoto, C.S.G. González, R. Strachan, P. Plaza, M. de los Angeles Martinez, M. Blazquez, and M. Castro, "Diversity and inclusion in engineering education: Looking through the gender question", *2018 IEEE Global Engineering Education Conference (EDUCON)*, p2071-2075, 2018
32. S. Johnson, "Who moved my cheese. Vermilion", *You Tube video* uploaded by B. Keyvan, 1999
<https://www.youtube.com/watch?v=jOUeHPS8A8g>