A DEI Task Force within a Mechanical Engineering Department

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Motivation and Background

Faculty and staff can and do influence the climate of a department and achievement of students. Research shows the positive effects of choosing to implement evidence-based teaching practices like active learning and inclusive teaching [1], and having a growth mindset in relation to the abilities of students [2]. However, research also shows that the local climate in a department could cause students of color to be driven from STEM [3], or that a chilly climate could have a disproportionate impact on female students [4]. And while the focus of Diversity, Equity, and Inclusion (DEI) efforts tends to be on women and under-represented minorities (URMs, defined as non-white, non-Asian), populations with representation at or above the demographics of the general population (typically Asian) face their own challenges [5]. Additionally, part of supporting all students includes mitigating disenfranchisement in majority populations (typically white males) [6]. In this paper, we describe recent efforts in the Mechanical Engineering and Applied Mechanics (MEAM) Department at the University of Pennsylvania (UPenn) to address these issues. Most of our initial efforts in this area have focused on the undergraduate population as well as their intersection with faculty and staff. It is our aim that sharing these early efforts may encourage others to take on similar endeavors, and will also provide a reference point for future work of ours in this area.

Status of Diversity Efforts Prior to 2020

MEAM, one of six departments within the School of Engineering and Applied Sciences (SEAS) at UPenn, has pursued DEI-related initiatives and joined School-wide and University-wide efforts for many years. In the past decade, specific efforts included:

- Forming a Diversity Action Committee and naming a Departmental Diversity Advisor. The Diversity Action Committee consisted of the Department Chair, the Departmental Diversity Advisor, and the undergraduate and graduate program chairs.
- Participating in a multi-departmental collaboration with the National Center for Women and Information Technology (NCWIT) and NSF’s ENGAGE Engineering program to set and achieve goals related to recruiting and retaining undergraduate women.
- Analyzing recruitment, retention, attrition, and graduation rate data for students from underrepresented groups in MEAM.
- Securing SEAS funding to support masters students interested in research leading to matriculation in a PhD program (with emphasis on students from underrepresented groups).
- Supporting the formation of “Women in MEAM”, a student-led group that fosters community and engagement amongst female members of MEAM through social and academic events.
- Holding “community building dinners” every semester where students from underrepresented groups had an opportunity to socialize with each other and with selected faculty and staff to promote networking, communication, and support.
- Requiring faculty search committee chairs and strongly encouraging all faculty members, especially search committee members, to attend implicit bias training (this included working with SEAS to arrange for the training to be held in an engineering building to promote attendance).
- Initiating a LGBTQ “Safe Space” training workshop, normally held elsewhere on campus, to be held in a SEAS campus at times chosen to facilitate faculty and staff attendance. This led to over 60 faculty and staff across SEAS receiving the training and being designated as LGBTQ allies.

To ensure decisions were feasible within our administrative structure and that the decisions were rapidly implemented, the Diversity Action Committee was staffed by the Associate Director of Undergraduate Programs, the Associate Director of Graduate Programs, and the Office Manager and Assistant to the Chair. The committee met typically once or twice per semester, and the Departmental Diversity Advisor regularly reported to the faculty at faculty meetings, and more extensively at the annual summer faculty retreat. These efforts yielded increased awareness of DEI issues amongst the faculty, numerous changes to departmental policies and practices, and an enhanced sense of community between students. However, efforts from semester-to-semester varied. But as the new cycle of 2020 raged during a global pandemic, our department – like many others across the US – redoubled efforts to make progress on several DEI fronts.

**Institutional Support Structures**

Over the course of the last year or so, our department, school, and university have revised institutional structures to deepen support for DEI efforts. There is a now an Associate Dean for DEI at the school-level, and a liaison from each of the six departments in SEAS was appointed to support this role. The existing Director of the Office of Diversity, Equity, and Inclusion (ODEI) also directly supports this role. The SEAS Diversity Liaisons committee meets monthly with both the Associate Dean for DEI and the Director of the ODEI to exchange information, share best practices, and assess and plan events, policies, and action. Inclusion, Diversity, Equity, and Access together are one of three major priorities of the new strategic plan SEAS has formed [7]. Current SEAS-wide efforts include establishing new faculty training on DEI issues, new support mechanisms for students, and creating feedback/incentive/assessment mechanisms for faculty on DEI issues. Part of this is a SEAS-wide effort to ensure diversity in the portraits displayed throughout the SEAS complex. As a first step, a new portrait space in the Towne Building that honors the accomplishments of diverse SEAS alumni is being created.

In the MEAM department the liaison to the school-level Associate Dean for DEI is referred to as the Director of DEI. One of the authors, Prof. Rob Carpick, was appointed to this position by the chair in August of 2020. This role is supported by DEI Task Force within the MEAM department (on which the other authors are serving). The Task Force itself includes both faculty and staff and is diverse in terms of race, gender, socio-economic status (current and former), sexual orientation, and faculty rank (including tenured, tenure-track, and non-tenure track). It includes 4 women, 3 Black members, 1 Latinx member, 1 Asian member, 2 out LGBT members, 4 immigrants to the US, and several members that were first generation and/or low-income college students themselves. One attended a HBCU for their undergraduate degree. Several have diverse family members (e.g., by marriage). All are committed to making serious progress on DEI issues including addressing racism, sexism, and other forms of discrimination. We began with building community within the DEI task force team itself. We meet biweekly to share updates and decide on next steps. The task force has identified things that we can do as a department that range from immediately actionable items (e.g., a suggested DEI statement for course syllabi) to longer term goals (professional development for faculty related to DEI issues, more consistent advising, etc.).
Many of these have also been suggested elsewhere [8]. Following these meetings, the Director of DEI shares announcements and updates at the biweekly MEAM faculty meetings. Other methods of disseminating the work on the taskforce include a #diversity channel on the MEAM-wide Slack workspace, emails, and discussion at the annual faculty retreat. All meeting minutes and reference materials are also posted on Box, the cloud-based file-sharing service, and accessible to all faculty.

Demographics

The current demographics of the MEAM department undergraduate student body (Table 1) and full-time faculty and staff (Table 2) are shown below. Note that this does not include recent hires that won’t start until January 2022.

Table 1: Current demographics of undergraduate student body. Note that unreported refers to only race/ethnicity.

<table>
<thead>
<tr>
<th>Category</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td>59</td>
<td>64</td>
<td>58</td>
<td>244</td>
</tr>
<tr>
<td>Male</td>
<td>42</td>
<td>39</td>
<td>47</td>
<td>36</td>
<td>164</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>20</td>
<td>17</td>
<td>22</td>
<td>80</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>24</td>
<td>21</td>
<td>20</td>
<td>23</td>
<td>88</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
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<td>1</td>
<td>5</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
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<td>29</td>
<td>24</td>
<td>22</td>
<td>99</td>
</tr>
<tr>
<td>Other</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Multiple race-ethnicity</td>
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<td>1</td>
<td>7</td>
<td>4</td>
<td>16</td>
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<tr>
<td>Unreported</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 2: Current demographics of full-time faculty and staff. Tenured faculty include associate and full professors, tenure-track faculty are all assistant professors. Non-tenure-track faculty include lecturers, senior lectures, and professors of practice at all levels (assistant, associate, full). Race/ethnicity data was not available at the time of submission.

<table>
<thead>
<tr>
<th>Category</th>
<th>Tenured &amp; Tenure-track Faculty</th>
<th>Non-tenure-track Faculty</th>
<th>Staff</th>
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<tbody>
<tr>
<td>Total</td>
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<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Mission

The main goal of the DEI task force is to support retention, graduation, and achievement of all students. We plan to do this with a multi-pronged approach that includes the following themes.

1) Build community (Focus: Undergraduate students)

The culture and community of the department plays a critical role in retention, graduation and achievement of the students. Through various events, both curricular and extracurricular, we plan
to build community by increasing interactions between students, faculty, and staff at all levels. The goal is to make all students, regardless of gender, race, or socio-economic status feel welcome, heard, respected, and able to reach their full potential.

2) Support faculty professional development (Focus: Faculty)

As mentioned earlier, implementing evidence-based teaching practices like active learning and inclusive teaching [1], and having a growth mindset in relation to the abilities of students [2], leads to better student outcomes.

3) Implement & revise departmental support structures (Focus: Faculty & Staff)

Representation matters, as do institutional support structures. Issues ranging from hiring to undergraduate awards will be under scrutiny to make sure our efforts as a faculty support the to support a diverse student body

Progress to Date

In this section we share examples of activities related to DEI issues that the task force has been associated with in some way. These fall under the general themes identified above of building community (events, newsletters, programming), supporting faculty professional development, and initiatives related to the department support all students.

Build community

- MEAM held an all-faculty meeting to discuss racism and racial equity issues as part of the #ShutDownSTEM event in June 2020. Discussion points/ideas/action items were captured and shared with all faculty and staff in MEAM.
- MEAM held an undergrad town hall on racism, racial diversity, and racial inclusion in June 2020. Discussion points/ideas/action items points were captured and shared with all faculty and staff in MEAM.
- Picture A Scientist events held in collaboration with WIM (Women in MEAM) including a virtual watch party and subsequent panel discussion focused on undergraduate students
- Another screening of Picture a Scientist aimed at graduate students and post-doctoral scholars
- "Building Community" section added to both the undergraduate and graduate MEAM newsletters. All faculty were added to the newsletters.
- Newsletter featured prominent engineers for Black History Month, doing the same for Women's History Month
- MEAM created the "MEAM Ambassadors" program for the benefit of all students during the COVID era. We were successful in recruiting a diverse group of Ambassadors to lead the program.
- The Task Force held "DEI office hours" in Fall 2020 for MEAM undergraduate students to drop in and talk with two or three members of the DEI Task Force about any issues they wanted to discuss.
- Reviewed recent student surveys for feedback on DEI issues and this was shared with faculty
**Support faculty professional development**

- MEAM faculty held an extended discussion on DEI issues at their annual faculty retreat. Discussion points/ideas/action items points were captured and shared with all faculty and staff in MEAM.
- Dean Vijay Kumar, Assoc Dean C.J. Taylor, Director of the Office of Diversity, Equity, and Inclusion (ODEI) Laura Stubbs, and Director of the Advancing Women in Engineering (AWE) program & Wellness Advisor Michaile Rainey came to a MEAM faculty/staff meeting in Fall 2020 to share issues, share student feedback and examples of bias that have occurred, and to emphasize the importance of DEI issues
- Shared materials and resources amongst faculty to address DEI issues in syllabi, assignments, and in lectures
- Agreements to work on integrating DEI issues across the curriculum

**Implement & revise departmental support structures**

- MEAM is working hard on diversifying the faculty. First, we appointed a new Diversity Search Advisor (DSA), Prof. Douglas Jerolmack. The DSA monitors equal opportunity compliance in faculty appointment and promotion processes, actively promoting diversity and equity. Second, we placed a new ad to hire faculty this year, where we substantially changed the wording from past ads to make it much more inclusive and solicitous of diverse candidates [9]. This effort led to the hire of two new faculty members to the department that will start in January 2022 that are both members of underrepresented groups (1 Hispanic woman, 1 Black man).
- The department hired a number of female faculty over the last few years (including part-time faculty). For example, we hired our first female Senior Lecturer (one of the authors) and assigned her to teach MEAM 101 (a common 1st year course).
- A female faculty member was assigned to teach a section of ENGR 105 (another 1st year course).
- We have reviewed mechanisms for nominating and reviewing our student awards and have made improvements to the process so that we regularly check that nomination pools are diverse, and we actively encourage nominators to promote diverse nominees.
- There was a recent overhaul of the undergraduate curriculum that made it more flexible. This tends to be helpful for all students, but particularly those from underrepresented groups.

**Initial Results & Future Plans**

Prior to the town hall mentioned above, a survey was sent to the students soliciting comments on their concerns related to racism, bias, and DEI issues. There were only four responses, but MEAM also culled relevant comments from the annual undergraduate survey that was conducted near the end of the spring 2020 semester. Key concerns of students from these limited comments include:

- Need for more diversity amongst the faculty, especially those teaching early in the undergraduate program
• Need for more training/discussions on issues in class amongst all students (noting that some good sexism/gender identity discussion had happened)
• More explicit statements from the department (statements opposing racism, supporting diversity events, acknowledging events like Black history month and pride month, info guiding underrepresented students to events like career fairs for underrepresented minorities) would be meaningful.
• Review policies on funding and resources for different clubs and student organizations to ensure inclusivity.

The authors have all heard positive feedback on events like the Picture a Scientist screenings and newsletter changes as well. One of many efforts the DEI taskforce is planning that will capture the effects of these efforts annually is a more comprehensive climate survey. To find out if any of these DEI efforts work, we need to look for evidence they work [10]. We plan to continue the focus on minority groups in corresponding monthly undergraduate newsletters (Hispanic heritage month, Black history month, Pride month, Women’s History month, Asian American and Pacific Islander heritage month, etc.). A faculty-focused event is being planned at the Penn Museum with a focused on the history of engineering, a food-centered event is being planned for international students, and a world’s fair themed standing exhibit/poster presentation is being planned to showcase student work from a variety of backgrounds.

A broader goal of this effort is to track the evolution of the climate in the department as well as the demographics of the students, faculty, and staff. Although the numbers in Tables 1 and 2 provide a baseline description of the composition of the department at this point in time, this is really a snapshot of a dynamic and evolving population that would likely be better captured through ecosystem metrics [11]. Additionally, we have submitted an NSF proposal that will support addressing DEI-related concepts (among other things) throughout a four-course lab sequence in the core undergraduate curriculum. Through this and many complimentary efforts, we plan to put in place a framework through which students, faculty, and staff can co-create a climate that fosters access and inclusion and leads to retention and success for all students.

References


