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Engineering Graduate Leadership Fellows – Mentored Projects to Build Community

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Engineering Graduate Leadership Fellows – Mentored Projects to Build Community

This paper describes efforts to build and refine a professional development program for engineering graduate students at Michigan State University (MSU). Cohorts of Engineering Graduate Leadership Fellows are selected annually to participate in a leadership development program that includes both individual and small group mentoring by faculty and administrators, as well as peer-mentoring by past program participants. Each Fellow develops an individual project that contributes to the success and well-being of our graduate student community. Recent examples range from coordinating a series of "Lunch & Learn" seminars and assisting with the annual Graduate Research Symposium to organizing social activities and developing newsletter content.

In its first five years, the MSU Engineering Graduate Leadership Fellows program has evolved substantially and adapted to challenges like the global pandemic and shifts in graduate students' priorities and needs. Initially, the program had a "top down" structure, with project areas defined by the College of Engineering and Fellows selected to work on specific tasks. Over the years, we have evolved to a more student-directed approach, where current Fellows help to recruit and train new cohorts and students propose and develop their own projects with support from their mentors and peers. We offer lessons learned, feedback from past and current Fellows, and practical suggestions for other graduate programs interested in adapting this type of professional development experience for their own campuses.

Introduction

In addition to the technical and research skills gained through graduate studies, engineering students pursuing advanced degrees need to strengthen their communications, teamwork, and leadership skills. These types of "professional" or "transferrable" skills are essential to career success in STEM (science, technology, engineering, mathematics) fields [1]–[5]. Professional skills can be taught to engineering graduate students in a variety of formats, ranging from formal coursework and degree or certificate programs to informal workshops or cohort-based programs that gather graduate students outside of the classroom or lab [6]–[11].

At Michigan State University (MSU), the Graduate School has been nationally recognized for its efforts to promote the development of professional skills and prepare graduate students for careers in academia, government, industry, and service. In particular, they offer a number of cohort-based programs to help graduate students from across campus build professional skills, gain experience in teaching and research, and develop relationships across disciplines and degree programs [12].

Two of these cohort programs focus specifically on leadership development: the Graduate Student Leadership Academy [13] is an eight-week exercise in self-reflection, skill development, and teamwork to solve problems and build community on campus. The Graduate Leadership Fellows program is a year-long experience that encourages "graduate student leaders to engage in change-oriented projects. Fellows aim to increase belonging and community within their

college or specific populations of students, and their projects increase graduate student well-being, inclusion, and ultimately success" [14]. This annual Graduate Leadership Fellows program develops a multidisciplinary cohort composed of individual students from different programs, schools or colleges across campus. Each of these Leadership Fellows is mentored and supported by faculty at the Graduate School and in their home department or college. This approach allows individual Fellows to learn from and grow with graduate students in other disciplines while being guided from both disciplinary and interdisciplinary perspectives.

Initial Program Structure

As part of its ongoing efforts to provide professional development programming and experiences for its graduate students, the College of Engineering at Michigan State partnered with the MSU Graduate School to expand the Graduate Leadership Fellows experience to Master's and PhD students studying in one of the College's eleven engineering disciplines. Initially, in the 2018-19 academic year, the Engineering Graduate Leadership Fellows program was conceived in a very structured format, with projects and focus areas defined by the College and graduate students invited to apply to serve in specific areas or roles. Selected Fellows were offered a stipend of $500 per semester ($1,000 per year), and as part of the application process were to indicate their interest in one or more of four positions:

- The **Communications Fellow** would assist in promoting events and sharing information of interest to Engineering graduate students
- The **Inclusion and Diversity Fellow** would support the Graduate Women Lunches and Diversity Community activities
- The **Professional Development Fellow** would organize the College of Engineering Graduate Lunch and Learn seminars twice a month
- The **Symposium Fellow** would assist in planning the Engineering Graduate Research Symposium, which showcases the work of graduate students across the College.

Fourteen graduate students applied for this new Engineering Leadership Fellows program: eleven from doctoral programs and three who were pursuing master's degrees. Applicants came from seven of the eleven areas of engineering offered as graduate majors at MSU. As part of the application students were asked to provide basic contact information along with a brief paragraph indicating which Fellow role(s) interested them and why. All of the candidates were interviewed and, based on those conversations, we decided to add two more Fellowship roles:

- The **EnSURE Fellow** would help organize the Engineering Summer Undergraduate Research Experience (EnSURE) program
- The **Recruiting Fellow** would assist in identifying and connecting with prospective graduate students through on- and off-campus recruiting activities

In addition to these six Engineering Graduate Leadership fellows, we decided to partner with the Graduate School's Leadership Fellows program to co-sponsor two additional roles: a **Graduate Student Life and Wellness Fellow**, focusing specifically on the needs of Engineering graduate students, and a **Women in STEM Fellow**, working to increase engagement of women in science, technology, engineering and math (STEM). These two additional Fellows took part in the MSU

Graduate School's Leadership Fellow cohort program, which included other students from across campus. They also collaborated with the six Engineering Leadership Fellows to share information and ideas, build professional skills, and engage in individual and small-group mentoring experiences with Engineering faculty and staff.

First Year Activities

During the first year of the Engineering Leadership Fellows program, the eight participants (six selected within the College plus two participating in the Graduate School's program) took on a number of projects to enhance the graduate student experience in engineering. For example, the Professional Development Fellow took on responsibility for coordinating several "Lunch & Learn" sessions each semester; topics included:

- Resources provided by the MSU Graduate School, the campus-wide Council of Graduate Students, and the graduate student teaching assistants union
- Graduate career services at MSU
- Responsible conduct of research, including data management, authorship, and resources available through the university library
- College-level resources, programs, and support for graduate students in engineering
- Graduate student health and wellness, including campus and community resources
- Networking events for graduate students, faculty and staff from across the college

Some of these "Lunch & Learn" sessions were organized or presented by other Graduate Leadership Fellows. For instance, the EnSURE Fellow hosted a session about this summer research program for undergraduates, with a specific focus on helping current graduate students improve their mentoring skills and better integrate undergraduate research assistants into their research groups and projects. The EnSURE Fellow also worked to develop information sessions for undergraduates interested in participating in this summer research program, and developed outreach information to help recruit and prepare faculty mentors.

The Communications Fellow helped update the College website, and worked closely with the Graduate Student Life and Wellness Fellow to develop a survey instrument to learn more about the experiences of graduate students in our college. This collaboration helped to forge connections between the College's Engineering Leadership Fellows and those participating in the Graduate School's Leadership Fellows cohort. The Recruiting Fellow participated in several graduate recruitment fairs and conferences during the fall semester, and trained other current graduate students to assist in these efforts. During the winter/spring semester, this Fellow helped to coordinate activities for on-campus visits by newly admitted graduate prospects.

The Inclusion and Diversity Fellow worked with faculty and staff to coordinate activities for two affinity groups in our college, one focused on Graduate Women and the other supporting students who were interested in Diversity. These two groups met regularly during the academic year, typically for lunch, and hosted speakers from across campus on topics selected by participants, which ranged from nutrition to what graduate students need to know about filing tax returns. The Women in STEM Fellow also focused on affinity groups, but as part of their Graduate School-sponsored project they sought to connect existing campus groups from different

STEM disciplines (including the Graduate Women's group in our College of Engineering) and to develop a campus-wide Graduate Academic Women's Forum event.

The Symposium Fellow identified two focus areas for their work supporting the College's annual Graduate Research Symposium. First, they took on responsibility for communicating with campus catering services to develop a menu for the event that would include Halal options; this had been a top request from past participants, who were previously limited to the vegetarian menu. Second, they developed a categorization system that would allow participants to indicate the key research area(s) in which their poster submission best fit. This was a lengthy process, involving surveys of both students and faculty, and a considerable amount of creativity and negotiation to develop a category list that was comprehensive and inclusive, while still being short enough to fit within the logistical constraints of the Symposium.

Program Evolution and Pandemic Impacts

Part of the impetus for initially developing the Engineering Graduate Leadership Fellows program was that we had identified several areas of need that we thought would benefit from graduate students' perspectives and engagement. Thus, our initial cohort was recruited using a process similar to a "job application," where pre-defined project areas (Symposium, Recruitment, etc.) were described and applicants were asked to pick from that list. We recognized during the first set of applicant interviews that there were more areas of need – and more great ideas from students – and thus we had expanded our initial cohort from the four "job descriptions" we posted to the eight Fellows eventually selected (two in collaboration with the Graduate School).

As we worked with these Fellows during the 2018-19 academic year, it became clear that the most effective projects were ones that matched the interests and goals of the individual Fellows. The Professional Development Fellow, for example, was deeply committed to expanding access to information and resources for their peers. This led the Fellow to reach out to prospective speakers not just on our campus, but from our community of alums and industry partners. The Fellow's passion for engaging their graduate community meant that they developed a calendar of "Lunch & Learn" seminars that were well-attuned to students' interests and robustly attended (we had overflow audiences almost every week, which was a first for this series).

For the second cohort of Fellows, recruited for the 2019-20 academic year, we kept the six "position" descriptions from the first year but also asked applicants what projects, goals or ideas they hoped to share with their graduate community. We also invited our first cohort of Fellows to participate in the interview, selection, and training process for the second group, which provided additional perspectives and support as we chose new Fellows. Our new Fellows were encouraged to develop their own projects within the general areas described by the "position descriptions," which led to some new ideas and events. For instance, three of our Fellows worked together to develop an event called "Mastering It" that sought to increase understanding about graduate school for undergraduates in our college, with a particular outreach to students of color. These Fellows recruited students of color from among our graduate community to serve as panelists, and the initial event in January 2020 drew 25 undergraduate participants. This was intended as a pilot event for a series of panel discussions hosted in collaboration with different student

organizations, like the campus chapter of the Society of Hispanic Professional Engineers; unfortunately, those additional events were cancelled due to the pandemic.

Another activity in January 2020 focused on welcoming our graduate students back to campus for the new semester and included a friendly competition to encourage engagement. The Fellow who organized this event arranged for a local company to bring their mobile coffee cart to campus to provide custom drinks, and provided free donuts. The department with the highest percentage of attendees won a free lunch for their graduate students, and several other Fellows joined in the effort to engage students and encourage participation from across the college. This proved to be a fun community-building event for graduate students that allowed them to interact with students, faculty and staff from different disciplines.

Of course, the global pandemic interrupted everyone's plans in the spring of 2020. Our campus shifted to mandatory remote work and classes in March of that year, and while we resumed some in-person activities for 2021-22 it was not until the fall of 2022 that campus occupancy resumed pre-pandemic levels. During the early months of the pandemic, we paused all Graduate Leadership Fellows' activities (although Fellows still received the stipend that had been promised). Both cohorts of Fellows became important, informal sources of information and ideas as we sought to continue supporting our graduate students. These students had gotten to know us well through individual and small-group meetings, and were comfortable telling us about some of the challenges and concerns they were experiencing or hearing from their peers. They also provided feedback on our efforts to provide support remotely. For example, an effort to offer open "co-working" hours via zoom was not effective. While we were hoping to provide a sense of community and stem some of the isolation our students were experiencing, participation was limited and our Fellows reported that spending more time on zoom was not having the desired impact. Several Fellows spent time trying to develop a virtual online community using a tool called gather.town, but this alternative also failed to spark the interest of our graduate students.

In contrast, our efforts to connect by mailing handwritten notes and small care packages (tea, stickers, masks, etc.) made our Fellows, and their fellow students, feel less alone. Similarly, we started sending "Monday Motivation" emails during the summer of 2020 because students told us they were worried about continuing to work remotely once the structure of classes ended in the spring. While this was intended as a short-term effort to share some tips for remote work, our Fellows told us that students found the messages to be helpful and a source of connection, and that they looked forward to receiving them each week – so we continued the project, and nearly three years later it has evolved into a weekly touchpoint for our graduate community.

As the 2020-21 academic year began, still fully remote, our Fellows experimented with various ways to engage with and support their peers. Virtual "Lunch & Learn" sessions proved to be surprisingly popular with our graduate students, in part because the Fellows coordinating the series focused on topics that provided specific benefits to participants. For example, two recent alums were invited to share their experiences and perspectives on getting a job and working remotely during a pandemic. Similar seminars focused on making successful transitions from graduate school to engineering careers in industry, or to management or consulting roles. Several seminars focused on aspects of Responsible Conduct of Research (RCR) and offered credit

towards the university's annual RCR training requirements; we had record-breaking attendance at these sessions.

Shifting to a "Student-Up" Approach

Our Graduate Student Leadership Fellows program had been conceived with a "top down" structure, where the college identified roles and responsibilities and graduate students applied to fill these pre-defined positions. During the first two years of the program, our Fellows demonstrated that the most successful projects were those that matched students' interests and goals – and that the Fellows themselves were often the best source of information about the needs of our graduate community. As we shifted back to more in-person activities during the 2021-22 academic year, we also shifted our approach to recruiting new Fellows and implemented a "student-up" approach. While we shared examples of past Fellows' projects, new applicants were asked to describe their own project or idea for enhancing their graduate community. This was not a formal project proposal, just a paragraph or two describing a need or opportunity and what the applicant might do in that area.

We also shifted the timeline of the Fellows cohort from an academic year commitment (fall and spring semesters, from September through May) to a calendar year commitment (spring and fall semester, January through December, with summer "off"). This shift allowed for more overlap between cohorts, with some previous Fellows being invited to serve one additional semester to wrap up a project and/or to serve in a mentoring capacity for the new cohort of Fellows. It also allowed us the full fall semester to solicit applications and select Fellows for a January start. That avoided some of the challenges of the previous Fall + Spring structure, when the selection either needed to happen in the spring (forcing new Fellows to wait months to engage in the program) or in a rushed process early in the fall, which took away time from their cohort experience. Starting the new cohort in the spring semester (January) also allowed the faculty and staff serving as mentors to more fully develop programming ideas with the Fellows, whether they kicked off new projects later in the spring or spent the semester planning activities to start early in the fall.

Current Fellows continued to participate in the selection and interview process, and their discussions with applicants sought to understand the proposed project or area of interest. The focus and feasibility of different projects and approaches were discussed during these interviews, and all candidates were assessed independently based on factors like their availability (including expected graduation date), their level of flexibility in focus area or project, and the potential impact of their proposed work on our graduate community. While we set a "max" capacity for the new cohort, based on budget and the number of students we could realistically mentor, we did not specify how many new students should be selected. That gave us the flexibility to choose new Fellows based on their skills and interest areas, and to invite past Fellows to serve for an additional semester in a mentoring capacity for the new cohort. Thirty-nine students from nine different engineering disciplines applied for the 2022 Leadership Fellows program; fifteen were master's degree students and twenty-four were doctoral students. Ultimately, eight students were invited to participate in the Fellows program for 2022 (with active participation in January through May, and in September through December).

The 2022 Fellows' projects served our graduate community in a variety of ways. During the spring, one Fellow organized a human "bingo" game as an incentive for students to engage with each other during the annual Graduate Research Symposium. The game involved introducing themselves to someone new who met one of the criteria on the board, such as presenting a poster in a specific research category. Students could also earn points by volunteering to assist with setup, cleanup, or logistics for the Symposium. Completed "bingo" forms were entered into a prize drawing for gift cards and MSU-branded items. This proved to be a fun way to encourage graduate students to expand their network and learn about research in other areas of engineering.

Several Fellows worked to organize outdoor gatherings and social events where graduate students could connect with each other, meet new people, and enjoy free food. Examples included giving away pre-packaged cookies and popcorn in the courtyard of the Engineering Building on campus and bringing the KONA Ice Truck (a local frozen treat company) to one of the outlying research buildings where many of our graduate students work. These activities were popular while the pandemic limited options for in-person and indoor events, and addressed one of the biggest needs voiced by students while we worked remotely: the lack of seminars, meetings and events where free food was served.

Two of the Fellows in 2022 developed projects that tried to connect our graduate students in different ways. One created a GitHub website of information and resources that are helpful for current and prospective graduate students. In particular, this Fellow hoped these materials could serve as a type of "virtual visit" for newly admitted graduate students who are physically outside the United States, and thus not able to visit campus before making a decision about whether to attend MSU. In addition to compiling existing information about research areas and resources in various departments, this website shares students' experiences as graduate students at MSU and offers information about making a successful transition to academic studies in the United States.

Another Fellow chose to do periodic "student takeovers" of the weekly Monday Motivation emails in an effort to foster connections and build community among our graduate students. The Fellow interviewed students, faculty, and staff who volunteered to share a little about their personal and professional lives with our graduate community. For example, a recent "student takeover" featured the eight new Engineering Graduate Leadership Fellows selected for the 2023 cohort. Each Fellow shared a sentence or two about their major and research, and answered questions about favorite hobbies, foods, and traditions. These profiles, which ask similar questions of faculty and staff affiliated with our graduate programs, help foster connections based on shared interests and experiences.

Lessons Learned and Future Directions

Overall, the Engineering Graduate Leadership Fellows program has allowed cohorts of students to build professional skills, grow through individual and small group mentoring, and explore ways to build community and improve the graduate student experience at Michigan State University. While the pandemic introduced some unexpected challenges, it also presented unique opportunities to adapt our approaches and experiment with different ways of understanding and meeting students' needs. More broadly, there are a number of lessons learned over the first five years of this program, which will guide its ongoing evolution.

One goal of the initial, "top-down" Fellows program was to empower emerging leaders to take on projects that the college had identified as benefitting graduate students. Rather than one staff member trying to organize a handful of professional development experiences, for example, we could invest that time instead to mentor a handful of graduate students who could then organize activities to benefit their peers. This approach created efficiencies, as several Fellows could accomplish more than their mentor alone. But selecting and mentoring Fellows does take time and attention from faculty and staff, and thus there is a practical limit to the size of each cohort if we want to ensure that each participant benefits from both individual and small group mentoring.

Another challenge is finding a balance between the needs of the college and students' interests and goals. When projects were defined by the college, we could control the scope and predict the impact reasonably well. Shifting to student-driven projects allowed for much greater impact at times, since Fellows were better at identifying and addressing the needs of their peers. However, student-driven projects are also subject to individual bias about what is important or helpful, and sometimes limited in perspective by students' discipline, department, or group. To ensure that student-driven projects were both relevant and successful, we found we had to invest more time and attention in the beginning to help students identify projects that would serve a reasonably broad audience and define realistic project goals and timelines. It also meant that some students with less-practical ideas or less-flexible interests were not selected as Fellows.

Student-driven projects also have a tendency to succeed or fail in part due to the personality and engagement of the Fellow who has taken charge. This keeps the program nimble, as new Fellows can develop new projects to address emerging concerns. However, it also means that projects can be easily derailed when Fellows encounter unexpected challenges in their academic, research, or personal goals. Even the most successful projects may not live past their Fellow's tenure without careful consideration of what infrastructure needs to be created and sustained, and how responsibilities may be transitioned to a new cohort of Fellows. Thus, projects that are important to the college, like the "Lunch & Learn" series and the Graduate Research Symposium, require investment of faculty and staff time to ensure continuity year to year.

Finally, there have been many economic challenges over the last five years that have disproportionately impacted individuals at the lower end of the earnings scale, including graduate students. As expenses and salaries increased, we felt it necessary to increase the Fellows' stipend to help ensure that they had the necessary resources to devote some time and energy to the program (six to ten hours per month is a typical level of engagement for one Fellow). As of Fall 2022, the stipend is $1,000 per semester with most students participating for a spring and fall semester ($2,000 total). Experienced Fellows who remain for an additional semester to help mentor the new cohort also receive a $1,000 stipend. These funds are taken from the professional development budget for graduate students within our college and are paid as a graduate fellowship, which at our institution is considered a gift or award and has no work requirement.

Moving forward, we will continue to listen to our graduate students and strive to provide opportunities to develop leadership skills, grow in community, and gain experience identifying and addressing needs in our college and across campus. We are also considering ways to engage

our Fellows in leveraging the literature regarding best practices for supporting engineering graduate student success. The Engineering Graduate Leadership Fellows program has become an important part of our ability to offer professional development opportunities, social activities, and support for graduate student health and wellness. While the specific projects vary from year to year, we expect that the 2023 Fellows and the cohorts that follow to continue focusing on connecting engineering graduate students from across the college; improving communication of events, resources, and information; providing a welcoming and meaningful experience for graduate students from diverse backgrounds; engaging in recruiting and mentoring undergraduate researchers and new graduate students; and helping to prepare our students for success in industry, academia, and service roles.

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