

Lessons Learned from ToxMSDT: A Pilot Innovative Toxicology Research Education Pipeline Program Targeting Underrepresented Undergraduate Students to the Field of Toxicology

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Appendix

Summary of Supplemental Materials

- Mentees in Graduate program as at August 2019
- Mentee's explanatory response on the most beneficial part of the program.
- Mentor's explanatory response on program's effectiveness
- Mentee's suggestions for improving ToxMSDT program
- Mentor's responses on main reason(s) of becoming a ToxMSDT mentor 8

Table 11: ToxMSDT Mentees in Graduate Program as of August 2019

S/N	Mentees/Cohorts	Programs/Universities
1	Mentee A (1 st cohort)	NIH PREP post-baccalaureate program but now a PhD student at Vanderbilt University School of Medicine.
2	Mentee B (1 st cohort)	Master's program in Nutrition at the university of Maryland- College Park.
3	Mentee C (1 st cohort)	Pharmacy School. Lima Linda School of Pharmacy
4	Mentee D (1 st cohort)	Ph.D. in Biochemistry and Molecular Biology. Indiana University School of Medicine.
5	Mentee E (1 st cohort)	Dental College of Georgia, D.M.D
6	Mentee F (1 st cohort)	School of Mathematics and Natural Sciences. Ph.D. in Chemistry, Sub-discipline Organic. University of Southern Mississippi.
7	Mentee G (2 nd cohort)	Master of Agricultural and Environmental Education Program. University of Georgia.
8	Mentee H (2 nd cohort)	Ph.D. Molecular and Systems Pharmacology, Emory University.
9	Mentee I (2 nd cohort)	Ph.D. Pharmacology, University of Michigan.
10	Mentee J (2 nd cohort)	Ph.D. Toxicology Program, Iowa State University.

Table 12: Towards the end of Capstone survey, ToxMSDT mentees were asked “what was the most beneficial part of this program,” the following were some of the explanatory responses from cohorts of 2017 and 2018 Mentees:

Comments/explanations:
Being able to travel to SOT and network with people from all across the country and the world, because it showed me that I can go up to these people and start intellectual conversations and more often than not, learn something new and grow as a person.
Gaining a better understanding of the field of Toxicology, its network, and all of its intricacies; I had an opportunity to Learn about the principles of toxicology and how it impacts every-day life. This is a wide field with many opportunities to make a difference.
I have learned so much about toxicology that I did not know and it really helped me in terms of figuring out what I want to pursue when I go to graduate school.
The most beneficial part of this program to me was understanding that there is a lack of diversity in the sciences, especially toxicology, and then realizing the dedication that minority science professionals have in putting together an entire program specifically for students such as myself. It gave me the confidence to explore something new, and also not be intimidated by the lack of diversity in any field because we can do anything.
I learned a lot about myself and what I don't want to do. Also, I got to travel to places I would have otherwise never been.
Everything! Every experience and interaction was worthwhile.
Obtaining a mentor and creating personal and professional connections with all the other mentors and mentees in the program.
Meeting my mentor and connecting with someone so supportive.
Information on ethics and detailed information on the flint water crisis.
The most beneficial part of this program would be that I gained a mentor, friends, and got to learn what is the field of toxicology is like. Also, traveling to SOT conference was really eye-opening for me since I got to see what a conference is like and learn how to network with people. Before this program, I wasn't aware of such a great toxicology lab existing on ISU's campus. I also learned a lot from CITI training and got to understand the basics that I need to know for conducting research in ethical manner.
The most beneficial part of this program for me was learning what each of the mentors do and forming contacts that I can rely on if I ever need help in the future regarding toxicology. Networking in this program has certainly opened up several doors for me that I hope to take advantage of.
The most beneficial part of this program was visiting my mentor's worksite. During this time I was able to actually see the work of a toxicologist and other related fields.
The most beneficial part of this program to me is finally having a mentor who will be held accountable or who wants to be responsible for my overall development.
Learned a lot about the diversity of jobs in the toxicology field. The Flint case study also opened my eyes to how much we need toxicology on all levels.
I gained valuable knowledge about a possible career. Most importantly, I gained motivation. I am extremely excited to start learning more about toxicology and motivated to do well in my classes and other activities that will better my professional life in the future. I think that meeting such awesome, smart and accomplished professionals have made me focus on my future.

Table 13: Some explanatory comments of program's effectiveness from mentors in cohorts of 2017 and 2018 were:

Comments/explanations:
Excellent program and lot of great components, including accountability, but candidate selection should be more competitive to identify high-quality and genuinely interested mentees.
As a private consultant, my work place is not suitable for the 2 day-engagement. Through my network arrange for a site and mediate and interactive communication with the site host and the mentee.
My mentee was a senior and had her next steps charted out already. She will pursue a Master's degree before pursuing admission to vet school. She hopes to look into veterinary toxicology after Vet school, which is way down the line.
Most people don't realize the role a toxicologist can play in government, yet there have been (and there are) so many current and past national instances where we were heavily involved in ensuring public health safety. I think it's particularly important to show potential toxicologists that there is life for a toxicologist outside of a lab, or academic setting.
I think this is a great program and definitely love being a part of it.
My mentee was not there, so it was not terribly effective on that front but I enjoyed the program and presentations and learned a great deal.
It was a nice get together with all mentors and the structures of the program was well explained.
It was great to come together and learn about the program, meet other mentors and students, and continue to discover the diversity of toxicology. The sessions were very informative.
The program has developed a very effective mechanism to communicate.

Table 14: The focus group that the evaluator conducted alone with the students at the end of the program's last day focused more on "aspects of the program that could be improved" or built upon. From that hour-long conversation, the following suggestions and themes emerged, most of which corroborate with what students from both cohorts said in the program's post-event surveys:

Comments/explanations:

Program events would benefit from more relaxed schedules, with more breaks between long presentations and more time for integration and application of learning: Many students in the focus group said they were challenged by program schedules that were "rushed" and "packed" and sessions that were overly long without breaks, not only because of bodily needs but because of the difficulty in focusing on and absorbing content from numerous non-interactive presentations done back-to-back. This was especially a challenge at the Iowa State Kickoff Workshop.

Program events should include more time for interactions with all mentors (not just one's own) and informal community-building between students, mentors and program administrators: Conversation both before and during the focus group made it clear that getting to know other minority students interested in toxicology and being introduced to multiple mentors practicing toxicology in varied settings were what many students valued most about the ToxMSDT program. They enjoyed their time together and enjoyed getting to know what different mentors were working on as well as the diverse backgrounds and personalities of their peers at both universities. Several cited the "speed-dating-like" Mentor & Mentee Table Talks at the Kickoff workshop as an effective exercise, while others noted how much they enjoyed hearing other students' presentations during the Capstone meeting. But students also emphasized the importance of more informal interactions, like the receptions and exploring they did at the SOT annual meeting, the tours on and near each campus, and the unscheduled hours in the evenings when they had time to bond as a group. These activities give everyone a chance to not only find like-minded individuals, but to appreciate one another's differences. While the time spent with one's individual mentor was highly valued by many students, not every match was ideal, and the focus group agreed it was best to have a diverse array of practicing toxicologists who students knew well enough to contact for advice, research opportunities, internships or references.

This introductory recruitment program needs long-term follow-up to keep the community going and more opportunities for subsequent toxicology research experiences like SURETox: Before and during the focus group, students expressed how much they were going to miss the new friends they had just made and the role models they had gained if there were not ongoing opportunities for interaction now that their "year" in the program was over. They suggested there be a blog or Facebook page for program participants to stay in touch—and to get to know the new cohort. The four students who had applied for and been accepted into the U of Illinois SURETox summer research program felt this would be an excellent opportunity to learn first-hand what toxicology research was like, get a look at another university with a toxicology program, and further the bonds that they had developed with one another through Toxicology MSDT.

The group urged Toxicology MSDT to find more research opportunities and internships for program alumni to enroll in (only one fifth of whom have mentors at universities). They also wished for ways for some alumni to attend SOT next year, or to participate in some sessions of next year's Toxicology MSDT event at their school. Students felt that maintaining ties within

each cohort and providing ties between cohorts would strengthen the program's community and enhance its long-term impact. The more people the students get to know who are interested in toxicology, the better.

Provide more opportunities to interact with toxicology graduate students: Building on the points above, many Toxicology MSDT students wished they had more opportunities to meet toxicology graduate students. Minority STEM recruitment programs like Rice's Summer with a Scientist and IUSM's Bridges to the Doctorate have demonstrated the importance of having underrepresented role models at every level, with graduate students and post-docs providing a critical link between students who are just entering a scientific specialty and the faculty who have long been immersed in it. Graduate students are often better at explaining things at an undergraduate's level—and at giving them on-the-level advice about the challenges of getting into and surviving within their graduate programs. Toxicology MSDT did provide some interaction with ISU graduate students during a poster session at the Kickoff Meeting. Beyond that, the focus group wondered if it was possible to also have a graduate student panel at one of the events, or to connect mentees with graduate student guides (rather than their mentor) for part of the SOT Meeting.

Be more clear and timely in conveying program requirements and due dates: The students emphasized how helpful and approachable the program staff at both Iowa State and Tuskegee have been, but also hoped that next year's students would get clearer statements and earlier notice about exactly what the program requires and by when. They felt there had been some contradictions and last-minute notices in the emails they received this year.

Students would like to see more modules focused on particular toxicology careers and some problem-solving exercises or games that allow students to apply toxicology knowledge: The focus group felt the program's online toxicology modules were well done (especially those with embedded questions) and pitched at the right level. However, when asked if anything was lacking, they wished there had been some modules with toxicology cases to solve or interactive "games" where they could apply the content.

Several also wished for modules that provided details on specific toxicology careers or gave behind-the-scenes looks at the jobs of various toxicologists.

More chances to interact with and ask questions of toxicology graduate students would be helpful—especially program alumni or other minority students in toxicology graduate programs.

Provide alumni with opportunities to apply for funding to attend a post-program SOT Meeting and act as student guides while there.

To improve mentee's experiences at SOT outside of the Undergraduate program, mentors or the program should give mentees assignments that force them to interact with SOT exhibits, posters and presenters in some structured way, like having them serve as a poster judges and fill out rating cards on each poster visited (or pick 3-5 favorites and explain why) or have your mentee research and ask one question of all your colleagues at their posters.

Encourage mentors to have on-site colleagues available to talk with mentees during their 2 Days with a Toxicologist. Those who did were often had the most worthwhile visits because the mentee had a range of toxicology-related experiences to explore, and some of the colleagues were closer to the mentee in terms of their interests or career-stage than the mentor.

Maximize use of the program website and blog to maintain contacts with other mentees and mentors. It should be made as user-friendly and accessible as possible, and an annually updated list of people's email addresses posted on the site would be helpful.

Table 15: Response from 2017 ToxMSDT mentee when asked “main reason(s) you agreed to become a Toxicology MSDT mentor”:

Responses:
To help the next generation of academicians/ professionals/toxicologists
Believe in the importance of mentorship and giving back, and I went to host schools.
To give something back and help create future scientists.
I enjoy participating in mentoring activities.
Reaching out to potential future toxicology students, giving back to Iowa State University, and love of mentoring and teaching.
Personal passion for mentoring, especially to increase under-represented individuals in science and Toxicology fields.
To pour into the lives of undergraduate students and give them the help I received which encouraged me to continue my education.
To pay it forward.
I'm a product of similar initiative (The NIH/NIGMS/MBRS Program) as an undergraduate and graduate student, and as PI for multi-year research/training grants at Tuskegee Univ. Thus, an opportunity to give back.
I wanted to give back as I was mentored all of my life.
This opportunity gave ample scope to develop my mentoring skills in toxicology.
Enjoy mentoring. Believe diversity is important in achieving comprehensive approaches to addressing problems.
Motivating undergraduates for furtherance of their studies towards Toxicology.
The opportunity to interact with students from other institutions. Also, I thought I could contribute to increase the interest of people of color to pursue graduate studies in toxicology and biomedical sciences.