

TEACHING AND LEARNING CENTERS: A STEM PERSPECTIVE ON THE IMPACT FOR AN INSTITUTION OF HIGHER EDUCATION

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Abstract

The true pillar of quality higher education is well-trained, effective, and knowledgeable faculty who are invested in the success of their students. The discipline-specific knowledge required for entering an academic career as a STEM faculty member is mostly gained through academic graduate and post-doctoral training. However, formal preparation in the areas of teaching and mentoring are often lacking, and typically occur through observation of more senior colleagues. In reality, when it comes to teaching and mentoring, many STEM faculty members “build the plane while flying it,” and mainly learn by trial and error. As all interactions between faculty and students can seriously impact student retention and success, there is a great need for faculty development opportunities in these areas. The focus of this communication is on the impact of mentor and pedagogical training at Xavier University of Louisiana from the STEM faculty perspective.

Keywords: *Faculty development, mentor and pedagogical training.*

1. Introduction

Looking back at my 27-year career as a chemistry faculty member at Xavier University of Louisiana (Xavier), I can clearly see my progression in gaining research and teaching expertise. Graduate school taught me how to think analytically, develop hypotheses worth pursuing, and think as an independent researcher. My time as a teaching assistant was my “only” opportunity to develop teaching skills before becoming a faculty member, and my experience with mentoring was limited to interactions with my research advisor and occasionally with undergraduate research students. To sum it up, as a new faculty member, I was ready to set up my own research group, start writing proposals, and involve students in my research projects. When it came to teaching, I could do a reasonably decent job covering the course material, but a “great” teacher, I was not. The realization that “satisfactorily teaching” and “effectively teaching” are different came to me years later as I started participating in pedagogical seminars and workshops offered by Xavier’s Center for the Advancement of Teaching and Faculty Development (the Center). The importance of mentoring skills and formal mentor training came to my attention years after that, when I first participated in the Preparing Mentors and Advisors at Xavier (P-MAX) Program.

Xavier University of Louisiana is a relatively small institution located in New Orleans, Louisiana. As with most things in New Orleans, the University has its own special character and culture, and is unique in many ways. Xavier is the only Black and Catholic university in the western hemisphere. It is also the only Catholic college founded by an American-born saint, Saint Katharine Drexel. The University’s Fall 2021 enrollment was 3,604 (approximately 76.9% African American/Black, 5.0% Asian, 5.7% White, 4.6% Hispanic or Latino, and 7.8% others; approximately 76.0% female and 23.9% male, 0.1% not reported). Of the 2,749 undergraduate students, 77.3% majored in biomedical sciences (Bioinformatics, Biochemistry, Biology, Chemistry, Computer Science, Data Science, Mathematics, Neuroscience, Physics, Psychology, Public Health Sciences, and Sociology). Xavier’s faculty are very diverse (approximately 36.7% African American/Black, 35.9% White, 6.5% Asian, 13.5% non-resident aliens, and 7.4% other; 46.2% female and 53.8% male).

Xavier is nationally recognized for its biomedical and physical sciences curricula, and the accomplishment of its students. Xavier’s success to a large extent has been due to the quality and dedication of its faculty and staff, and the full and selfless support they provide to Xavier students.

2. Methods

Xavier’s Center for the Advancement of Teaching and Faculty Development was established in 1994, and has since significantly evolved in scope of work and impact. It became much more active post-Hurricane Katrina with the hiring of a full-time director who possessed faculty development

experience. By that time, I was tenured, promoted, and had already been teaching and mentoring students for over a decade. My early-career faculty development mainly occurred through observation of more seasoned faculty and their mentoring. In 2011, a new position for a STEM Educational Improvement Specialist (EIS) was established in the Center using funds from the National Science Foundation (NSF)-funded Innovation Through Institutional Integration (I³) grant. Having a STEM-specific pedagogical resource made the Center's offerings more immediately relevant to the STEM disciplines.

Often STEM faculty, and scientists in general, have the perception that faculty development workshops consist of "touchy-feely" and/or vague discussions, when what they are looking for are precise, data-driven, evidence-based concepts and best practices presented efficiently. The presence of an EIS with a STEM background in the Center slowly broke down the departmental silos, opened new lines of communication, and brought the faculty together in a variety of ways. In fact, the EIS served as a STEM-Center liaison, informing the Center's offerings to ensure that they met the needs of STEM faculty while simultaneously encouraging faculty to utilize its resources and services.

As I started taking advantage of the workshops and seminars offered by the Center, I gradually realized that there is an art and science to teaching, and that merely delivering (or "covering") the course material is very different from delivering the course material in a way that maximizes student learning. Effective teaching requires knowledge of how students best learn, which has significantly evolved with the changes in technology and is informed by cognitive science.

In 2014, Xavier's *Project Pathways* received funding from the National Institutes of Health (NIH), National Institute of General Medical Sciences (NIGMS) BUILD (Building Infrastructure Leading to Diversity) Program. There are ten BUILD awardee institutions across the country, and together with the Center for Evaluation and Coordination (the CEC at the University of California, Los Angeles) and the institutions awarded funding under the National Research Mentoring Network (NRMN) Program, they form the Diversity Program Consortium (the DPC, www.diversityprogramconsortium.org/), aiming to increase diversity across the biomedical research careers through enhanced training and mentoring. Under this funding, the Center started offering mentorship education workshops, which have made significant changes in the mentoring culture at Xavier. The EIS participated in the "Train the Trainer" workshops offered by the NRMN to become a Trained Facilitator of mentorship education workshops, and went on to design and implement the P-MAX (Preparing Mentors and Advisors at Xavier) Program. P-MAX is modeled after the Entering Mentoring Program developed at the University of Wisconsin-Madison and tailored to fit Xavier's culture and mission. The program consists of an eight-hour summer session followed by three, one-hour sessions in each of the fall and spring semesters of the academic year. Topics covered include but are not limited to: definition and practice of mentoring; effective communication (including identifying one's communication style, adapting to other communication styles, tailoring one's communication style to situational expectations, general strategies for improving communication, active listening, and providing constructive feedback); setting and aligning expectations; developing a mentoring contract/compact (including support for developing one); use of individual development plans (IDPs, including details on how to assist and guide students in developing theirs); writing a mentoring philosophy (including support for developing one); implicit bias and cultural responsiveness training (including understanding identity, privilege, prejudice, discrimination, stereotypes and stereotype threat, and combating implicit bias); inclusive mentoring; scholarship of mentoring and advising; and self-care for mentors. The sessions are moderated by the Trainer and multiple internal and external experts as guest facilitators. Participants completing the summer session and at least four out of the six academic year sessions receive a certificate of completion.

Originally, biomedical faculty and staff working with undergraduate research students were invited to participate in P-MAX training. Over time, as the buy-in by the administration and across the Institution increased, this training became an expectation, and later a requirement for grant proposal internal clearance for any research projects involving students. Soon faculty and staff from other disciplines and other institutions also started taking advantage of the training. The P-MAX training is now available virtually through the Center and is open to all interested individuals free of charge.

3. Discussion

As a P-MAX participant, I learned that effective mentoring could improve teaching and skills-training effectiveness, as well as student retention and success. In addition, it could encourage students traditionally underrepresented in STEM/biomedical research fields to participate, persist, and excel in those areas. I also learned that being a "mentor" is much more involved than being a "research or academic advisor", and that being the mentor to individuals from groups that are underrepresented in the sciences, especially those with cultural backgrounds that are different from the mentor's, is much more complicated. As of 2022, I have served as the research mentor to over 100 undergraduate students from underrepresented groups. I have always taken this role very seriously and did my best to be a role model and a source of information for my mentees. However, once I participated in the P-MAX workshops,

especially sessions on implicit bias, cultural responsiveness, and diversity, equity, and inclusion (DEI), I realized that I had much more to learn and many ways to improve.

For instance, I had never considered that implicit bias could influence my actions, decisions, or impressions, and I had never questioned my gut reactions to different situations. Being aware of the existence of implicit bias has made me more alert and attentive to my own thoughts and reactions, more observant of the signs of its presence in others, and better equipped to combat it.

As a teacher, mentor, and research advisor, I often assign my students projects, request that they complete certain tasks, give them direction and advice, and correct their mistakes. Awareness of the existence of stereotype threat and its potential impacts on students' science identity, self-confidence, performance, and achievement has assisted me in finding approaches that could diminish them on my students and mentees. Some such approaches are to emphasize their positive individual attributes, accomplishments, and contributions; verbally and visibly show my trust in their abilities as scientists in training; and make sure that they see me as a supportive ally.

Cultural responsiveness was another topic that I had never explicitly considered in my mentoring. I always considered myself to be respectful of other people's cultures, religions, and backgrounds. For the first time, I questioned whether being respectful is enough, and whether behaviors I consider to be respectful could be perceived differently. I began to make a conscious effort to understand other people at a more culturally sensitive, fundamental level.

In addition, through P-MAX sessions, I became more informed about DEI-related issues, and how they affect our communities, including academia, at all levels. During the recent events highlighting the still prominent racial injustice in the United States, and the resulting social unrest, this training became very important in my understanding of, and communications with my mentees, who are mostly from the racial/ethnic groups directly affected. As a result, I began to be more explicit in my inclusivity efforts. I also realized the true importance of acknowledging and addressing systematic inequities (social, economic, racial, cultural, etc.) rather than focusing only on equality within the classroom.

As a result of P-MAX training, I began developing a mentoring philosophy and mentor-mentee compacts (contracts). These documents allow me to periodically reflect on why and how I serve as a mentor and to make the requirements, standards, and expectations of my mentor-mentee relationships very clear to my mentees from the beginning. Rather than using a generic document for all mentees, I now start with a basic mentor-mentee compact template that has all the necessary sections, and finalize it in discussion with each mentee, so that it would address the needs of each individual relationship, including the preferred methods of communication. In addition, I started assisting my mentees in developing IDPs, which help them in clarifying their goals and identifying the required steps in the pathways to achieving them.

As our EIS often says at the P-MAX workshops, "Good mentors are developed, not born". Even though certain personality traits may be driving forces for becoming a teacher, good teachers are also developed not born. There certainly is a lot of overlap between teaching and mentoring.

The direct impacts of faculty development on student learning and success might be hard to assess; however, its impacts on faculty retention, productivity, effectiveness, and career advancement, important contributors to student success, are well known.

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