

# Catalyst for Change: Future of DEI in STEMM

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## Abstract

In this paper, we propose ways to address diversity, equity, and inclusion (DEI) challenges and outline steps and methodologies for creating allies and empowering leaders to support DEI efforts

in science, technology, engineering, mathematics, and medicine (STEMM) for underrepresented minorities (URMs).

## **Introduction:**

Academia has started to evolve in landscape, as have the requirements needed to develop postdocs and students for careers in science, technology, engineering, mathematics, and medicine (STEMM). The STEMM academic world must diversify in all aspects if innovation is to be increased and discovery is to be strengthened [1]. Although some higher education leaders might desire to make diversity, equity, and inclusion (DEI) a priority for their learning environments, they may have difficulty cultivating it effectively since it takes more than simply pontification and demands making administrative changes. Change agents, diversity senior associate deans (SADs) and chief diversity officers, who create DEI strategies from the ground up, and institutional support is needed to catalyze transformations need to shape the future of DEI in STEMM.

## **Non-traditional dean positions as Change Agents of DEI**

Currently, it is clear that many institutions have goals intended to increase DEI, mentoring, and career and professional development (CPD). However, these goals may be difficult to achieve due to the expansion of these areas, which undergo continual evolution. One solution to reaching the DEI, mentoring, and CPD goals is to expand current structures to include senior associate deans (SAD) to coordinate and accommodate the load required for students to be multifaceted scholars. A mentoring SAD, for example, would allow for high-power faculty to still pursue their academic goals while learning and using skills, regardless of position, to promote professional growth. Creating such a deanship position would allow undergraduates, postdocs, and faculty in STEMM to develop holistic mentorship, DEI, and CPD practices for themselves, as well as authentic relationships with senior faculty. Importantly, establishing offices for mentorship, DEI, and CPD would formalize the significance of these issues. Beyond this, it ensures faculty are getting needed resources while establishing positions to monitor evolving techniques and scholarship and creating a direct line of contact with the college's dean (Figure 1). *Longitudinal tracking, one of the SAD responsibilities, would allow the institution, its administrators, and faculty to evaluate and improve the broader impact of their programs.*

### *Mentoring Office*

Mentoring has progressed beyond an afterthought to being a field based on methodical practices [2–5]. Currently, in many cases, the responsibility of mentoring disproportionately rests on minority faculty [6]. There is a need to alleviate the burden of mentoring on minority faculty and thus in the future, a SAD position should focus on training mentors to provide culturally-sensitive mentoring. Given the importance of mentoring in STEMM, and the breadth of skills required for executing this transformative change, an associate dean position is critical. The SAD of mentoring would cover training including, intentional mentoring [7], shadow mentoring [8],

cultural humility [9], and casual mentoring [6], as well as other topics (Table 1). Importantly, the SAD of mentoring would be able to reduce and balance the workload of faculty [10], particularly URM who are so often called upon to do more.

This office would also be responsible for recognizing individuals for excellent mentoring and for rewarding those who participate in mentoring training. . Beyond this, their diverse team would include coordinators and mentoring coaches to help with facilitation of these large-scale initiatives, while an assistant dean is able to oversee day-to-day operations to accommodate team members. The SAD could then focus on training professors across career levels to aid in professors understanding the responsibilities of associate professorship; the SAD could also carry out 3-4 yearly trainings, provide onboarding training for new and existing faculty, and provide certifications based upon timely completion of mentoring trainings. In these updated yearly trainings, mentors can understand different mentoring styles as responses to certain wider-trends; for instance, during the Covid-19 pandemic, virtual mentoring created new challenges that necessitated different mentoring styles [11]. Other certifications such as culturally-aware mentoring and National Research Mentoring Network Master Mentor may be taught in unison and organized by this office. However, internal content around mentoring interventions to develop a positive university culture can further be facilitated by the SAD's office [12]. Finally, this office would work with new faculty to provide them with information and resources to become independent academicians. This office would be an ideal setting to collect necessary metrics of mentoring encompassing the mentoring of all students and faculty.

#### *Diversity, Equity, And Inclusion Office*

While most existing diversity offices have a diversity calendar of celebratory events, we believe this role must be expanded. The DEI office can send out weekly reminders to not only remind individuals of cultural holidays but explain the meaning of these holidays and their traditions. This removes the burden on trainees to explain potential absences from laboratories due to practicing a cultural-specific holiday. This will also demonstrate the institution's commitment to DEI and help everyone understand the significance of these events and the cultural adherences that URM follow. Offering events that honor national and cultural holidays, including those often neglected, across the year is important for institutions and examples of such events are in Table 1. Further, common practices that can be adopted include hosting an annual diversity month where all types of diversity are represented and discussed with the wider institutional audience. Together, these events can aid in reducing racial or cultural microaggressions and help individuals understand how to navigate microaggressions [13].

Critically, this office needs an adequate budget to support events, recruitment, and retention efforts that are dedicated to minoritized groups across many populations. It is well understood that it is important for URM to see and be reminded of individuals who look like them, so they can advance and inspire the next generation of minority candidates. Being able to highlight diverse individuals can importantly aid in stopping tokenism, a form of implicit bias that results in limited numbers of minorities at each career level. A call to action has been inspired by multiple lists that highlight some of the URM trailblazers in STEMM fields [14]. The DEI office can follow up on this call to action by inviting URM speakers and providing opportunities for recognition or URM. Importantly, we foresee a future moving away from only lists such as the 1000 Black Scientist List [14], to wider recognition of minority scientists.

Importantly, many DEI offices may coordinate with societies across the STEMM field to create a national database for URM speakers and longitudinal DEI studies.

*Career And Professional Development Office (CAD) Accepted changes to give to Elsie*

There are many challenges to getting academic jobs, and individuals entering into STEMM may be interested in non-academic careers. Without a career coaching team, such as a CPD Office, trainees may not know meaningful ways to explore other opportunities. The career center may consider providing professional assistance and activities for students through specialized career coaching, resources, connections with future employers, and planning one's graduate experience to glean the adequate skills to be successful and supported. The career centers should make sure to have resources for a variety of professional careers as well as offer time to aid individuals in understanding their desired sense of direction, whether academia or not. The academic career coach may consider setting up meetings and professional activities throughout the year, with individual weekly events related to this overarching goal (Table 1). Beyond this, across the year this office can aid in having examples of resumes, CVs, and cover letters for each field (academic and non-academic research, industry, medical, etc.). Additionally, they can have writing workshops to aid in applying for grants and other mechanisms of funding. For departments that already have these activities, they can work with the CPD office to house these efforts and broaden their impact. Finally, they can also host a department of scientific editors along with several individuals working with them for the final preparation of manuscripts. This office allows for individuals to augment their careers without burning out or giving up due to toxic stress [15].

The CPD office can aid faculty networking and increase their visibility by promoting them on social media. The CPD offices could offer training opportunities on the effective use social media. Moreover, in addition to social media training programs, platforms such as LinkedIn could be leveraged to conduct longitudinal tracking of URM trainees to help identify career options.

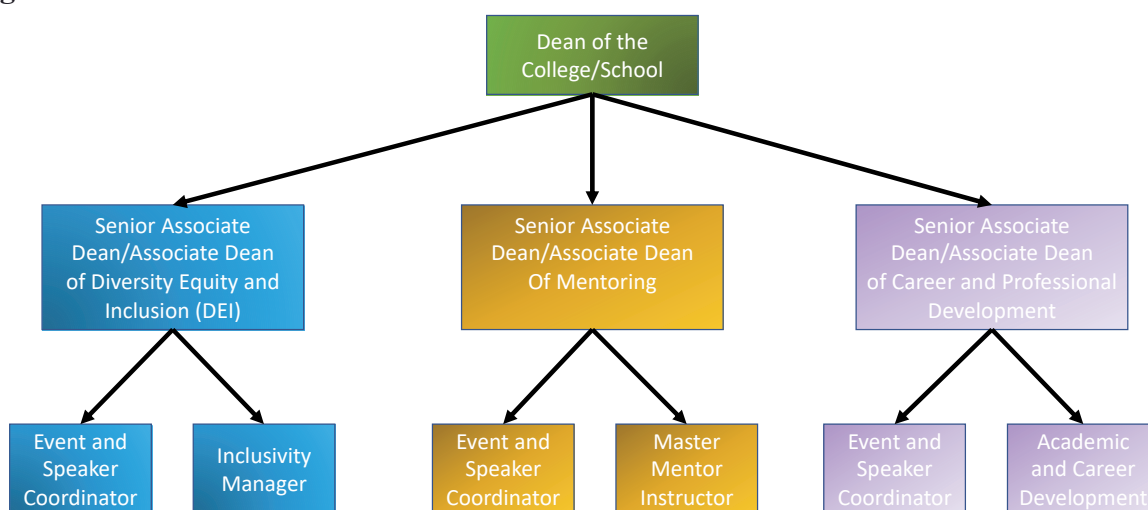
**Conclusion:**

It is time to truly think about innovative ways to diversify STEMM. Change sometimes calls for periods of uncomfortableness that are necessary to ultimately create a more inclusive roundtable of scientists. Reorganization and additions to administrative offices will take the burden off of individual faculty members. In many cases, one DEI office cannot do all of the needed functions of mentoring, DEI and career development (Table 1). The reorganization and addition of offices to form SAD would make a significant impact on mentoring, DEI and career development without neglecting many often-forgotten areas and diverse groups. Additionally, institutions must provide the funds and adequate personnel to allow programmatic events and opportunities to be offered to engage URMs in STEMM. Beyond this, if all institutions implementing these offices held conferences, it would be possible to meet, evaluate and compare the most effective strategies. Together, quantifiable change could be created, and the best practices across each institution could more easily be diffused across academia and create a straighter pathway for the future of DEI.

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**Figure 1: Example chain of command for newly established “Change Agents” offices**

Each of these offices should fall within one branch of the overall Dean’s office, with space within the dean’s office, and all offices reporting to the Dean. Each DEI, Mentoring, or CPD Dean has instructional or management staff (e.g., Academic and Career Development Instructor, Training Development and Mentoring Instructor, and Inclusivity Manager) to manage day-to-day of the deans. Smaller institutions can work across different colleges to have the required funding for these individuals to operate across the college. Furthermore, for small institutions, there may these offices which work across all campuses or colleges, with interns that are able to help deliver this message on the micro-scale, before scaling up, to ultimately a chain of command similar to that highlighted here.

**Table 1: An example of programming and scheduling that the mentoring, diversity, equity, and inclusion (DEI), and career and professional development (CPD) offices may host throughout the year.**

While across the offices there may be some overlap in events or topics, the division of these offices is important to ensure that each office gets an appropriate budget. During overlap in general topics, the actual trainings will be distinct and from different perspectives (e.g., in the context of mentoring versus DEI). Furthermore, the offices will be encouraged to work together to divide these sessions between several of the offices to highlight their unique angles. Ultimately, these offices may remain collaborative in nature, while also hosting individual events. In general, for the focus of all the offices, we envision events or trainings will be twice a month and faculty may either attend in person, or via virtual platforms. The two trainings a month will be offered weekly, to allow faculty to choose either week, as dependent on their schedules. If faculty elect to do it virtually, this will require a reflection sheet to ensure faculty internalize the key points of the events. While the example events highlighted here would be the main focus for the month, this office may also offer other events depending on their budget and opportunities.

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## Abbreviations:

CV:	Curriculum Vitae
CPD:	Career and Professional Development
DEI:	Diversity, Equity, and Inclusion
NIH:	National Institutes of Health
STEMM:	Science, Technology, Engineering, Mathematics, and Medicine
URM:	Underrepresented Minority



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