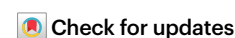


Equitable hiring strategies towards a diversified faculty

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We provide a roadmap for overhauling faculty-hiring processes to eliminate barriers of entry to historically excluded groups.

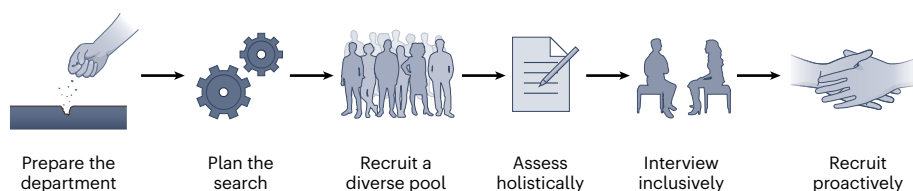
In academia, hiring practices have constrained the entry of individuals from historically excluded groups – in particular, of people with disabilities and of people who identify as LGBTQ+, Black or African American, Hispanic or Latino, American Indian or Alaskan Native. This has hindered the societal impact of research and the ability to educate students about equity. Although many university departments have committed to ‘do better’, a new mindset ought to be embraced to gain the skills necessary to rectify injustices stemming from faculty-hiring processes. In this Comment, we offer a faculty-hiring roadmap for eliminating many of the barriers of entry to members of historically excluded groups. The examples and context are from topical areas in biomedical engineering, yet the roadmap can be adapted and used more broadly. We call on university departments to recognize the failings of current hiring practices and to adopt equitable guidelines for diversifying their faculty. A diverse faculty across academic centres will collectively boost science and innovation.

Academic faculty strongly contributes to the advancement of scientific research and to the higher education of the workforce. Insufficient diversity in the professoriate cripples this mission. Homogeneous teams are less innovative and less effective than diverse teams^{1,2}. This means that, as a profession, faculty is underperforming. A diverse faculty is essential for creating an environment where all students have the opportunity to have diverse role models and to thrive^{3–5}. In biomedical research, a lack of diversity also hurts society in more tangible ways: for example, for the non-majority of citizens with melanin-rich skin (an increasing percentage of the population of the United States), the pulse oximeter is ineffective. And insufficient consideration of differences in sex and race in the responses to therapeutic regimens has resulted in clinical-outcome disparities across patient groups^{6–9}. Inadequate foresight and oversight about building diverse teams

for the development of medical technology perpetuates healthcare inequities on a global scale.

Many university departments in biomedical engineering state that they value diversity. Research studies have shown that both faculty and students prefer faculty from historically excluded gender groups and racial or ethnic groups¹⁰. However, in biomedical engineering, faculty remains overwhelmingly white, male, cis and non-disabled. Despite the good intentions, university departments have overall been ineffective at improving the diversity of their faculty. The reality is that current strategies for recruitment and hiring are not adequate, as suggested by a study that simulated the effect of three factors on increasing the diversity of faculty in the United States – increasing diversity in the pipeline, increasing the number of available positions, and increasing the transition rate into faculty positions¹¹. In 2019, only 4.4% of the total PhD degrees in engineering were awarded to students from historically excluded groups (specifically, people who identify as Black or African American, Hispanic or Latino, American Indian or Alaskan Native), and the number of women was 24.1% (ref. 12). Assuming exponential growth of diversity in faculty, from 13.8% in 2030 to 73% by 2080, the fraction of assistant professors hired from historically excluded groups would only increase from 5.9% in 2030 to 8.9% in 2080. Increasing the number of faculty positions by 100 per year would not have any appreciable effect, and there would be little change in the total number of faculty positions^{11,13}. However, increasing the transition rate to faculty from the current 0.25% to 10% would change the fraction of assistant professors hired from historically excluded groups from 12.4% in 2030 to 56.5% in 2080, assuming exponential growth in diversity¹¹.

We believe that one driver of the disconnect between intentions and outcomes is that many faculty and administrators lack sufficient education and skills to effectively attract and hire faculty candidates from historically excluded groups. To address this need, in this Comment we outline a faculty-hiring roadmap, compiled from a review of the literature and our collective experience, for accelerating the diversification of faculty through holistic and equitable hiring practices¹⁴. Although the ideas and resources that we describe here are especially



Roadmap for equitable practices for the hiring of faculty.

salient for the cultural climate and needs of departments of biomedical engineering, many of the strategies that we describe are universally applicable to academic departments.

Preparing the department

A lack of diversity is a barrier to improving diversity^{3,11,15}. Most individuals would not want to be 'the first' in an environment that has historically excluded individuals like them. Before opening a search for faculty, the culture of the department must be improved, specifically the reward structures and feeling of support that people within an organization experience on a day-to-day basis. If a place does not feel 'right', it is unlikely that individuals who are not part of the majority group will join; and if they do, they may not be able to thrive and may not stay¹⁶. Before a department can consider diversifying its faculty, it is essential to improve the organization's culture via values-led efforts.

Identify areas for growth. It is impossible to enhance diversity if a department is not aware of what areas within it or within the profession lack diversity, and if faculty and administrators do not appreciate why diversity is important. Stakeholders should take time to familiarize themselves and the department with where it stands with respect to various diversity metrics. In addition to internal data, there may be national data resources for benchmarking departments and universities against their peers (this is indeed the case in the United States)^{17–19}.

Start with the academic leadership. Both the department's chair and the school's dean (or individuals with similar responsibilities) must be fully 'bought in' to creating and fostering a culture where faculty members from historically excluded groups will thrive. Without support from leadership, the department's culture will not be ready to take in new hires from historically excluded groups. In an informal survey about interview experiences, Black faculty candidates cited that the meeting with the department's chair was most revealing of a department's culture. Transparency about the current state of the department, a demonstration of awareness of areas of concern, and articulation of a concrete plan of action were key aspects that candidates valued. The support of the dean is particularly critical for larger initiatives, such as executing cluster hires, securing institutional grants for advancing faculty diversity, and implementing policies and training for faculty searches. This does not mean that the recruitment of candidates from historically excluded groups cannot be made in the absence of a chair or a dean who is forthcoming on these topics; however, achieving diversity will be more likely when there is effective leadership in this area. If chairs and deans do not fully understand what is needed to hire and support historically excluded individuals, training time and resources should be put in place.

Assess the current department climate. Before a search for faculty is underway, the current values, mission, incentives and reward structures of the department, and any unwritten rules for a faculty member to be considered successful, should be assessed. Do these structures disproportionately affect individuals in ways that advantage or disadvantage certain groups^{20–24}? Feedback on this question could be solicited from internal and external networks. This can bring diverse perspectives that may help develop an action plan for adjusting any identified deficiencies. However, when soliciting feedback, one should pay attention to any real fear of repercussions within internal networks. Feedback could also be solicited from tenured senior faculty in the department, both from historically excluded groups and from faculty

who have spent the time and energy to become more knowledgeable and engaged with any cultural departmental issues. If there is any reason to believe that a fear of repercussion will prevent honest and transparent sharing of information at any stage of the process, a plan to address this should be put forward. Progress will be limited by the truthfulness of the information that can be collected. If departmental culture falls short – as would be the case without support from chairs and deans, or if faculty members have not recognized their inherent biases – it may not be ethical to recruit new faculty members from historically excluded groups into that environment. This implies that the department should first focus on building a supportive culture so as to be ready to recruit any suitable historically excluded candidate in future.

Improve the department's culture and accountability. After assessing the internal culture, tangible choices and changes to improve it should be made. Engagement and accountability may also need to be improved. Just removing gatekeeping structures that limit access is unlikely to be sufficient. Rather, a groundskeeping perspective that promotes the success of faculty (such as team-mentoring programmes, service audits and recognition of invisible labour) should be adopted²⁵. There are many notable scholars that provide actionable items to guide departments in these efforts^{26–30}. Changes in department processes should be incorporated into the departmental strategic plan, documented for transparency and evaluated for efficacy.

Learn from past mistakes. By learning why faculty leave and why they stay, a department can engage in continuous improvement, and align its processes for faculty search and faculty support to be consistent with its desire to diversify its faculty^{3,15,23,31,32}. Although it is certainly not easy, courage to reach out to failed hires, failed promotions, and failed retentions should be mustered to ask them, with humility, why they did not make the institution their home. It may be worth looking past their first answer, which may be guarded or phrased to absolve the department or institution of any wrongdoing. Hearing and accepting 'hard truths' should help reframe recruiting efforts.

Planning the search

It is nearly impossible to change the course of a faculty search after it has begun. To implement changes, the department and faculty-search chair should begin planning several months before an expected opening is granted.

Establish the goal and seek buy-in. Faculty hiring should be built on a foundation set by the departmental values and mission. Does the department state diversity, particularly diversity of lived experiences that includes historically excluded groups, as one of its values? If it does, then enhancing faculty diversity must be explicitly stated as one of the goals of the search. If it does not, it is unlikely that the department will produce the culture and resources needed to attract and sustain a diverse faculty. An unwillingness of current faculty to support efforts and initiatives to diversify it will undoubtedly manifest to candidates in later parts of the search, and undermine recruiting efforts. Hence, consensus from a critical mass of department faculty is necessary before embarking on the hiring process. Leadership from the chair to build consensus and to refine the department culture is critical. Data-supported best practices to mitigate bias may be used to facilitate this change.

Consider how research areas can limit the applicant pool. Narrow research-area hiring priorities can make it difficult to improve department diversity. Focusing a search only on research areas that are well established in the profession can limit the pool of diverse applicants. To increase the likelihood of attracting a diverse applicant pool, we suggest implementing a broad search without a research focus area, or to choose research topics (such as health disparities, and health impacts of racialized trauma) with high numbers of scientists from historically excluded groups. However, we recognize that departments may have specific needs or constraints that may necessitate a more targeted search in a specific field. In this scenario, departments must consider listing as many key terms applicable to the targeted field as possible, to increase the chances of attracting a larger and diverse applicant pool.

Strategically build the search committee. Identify a faculty-search chair and committee members who are known diversity advocates and who are educated on best hiring practices for achieving diversity. The search committee must have several diversity advocates – the greater the number, the greater the chance of success.

Train the search committee. Members of the faculty-search committee should be explicitly charged with the task to improve the diversity of the department's faculty. When expectations are clearly defined, bias is reduced^{33,34}. Once stated, training experiences for all committee members should be enacted, to mitigate unconscious bias. Rubrics – that is, sets of evaluative criteria – and similar tools should be established, to facilitate the fair evaluation of all candidates on all metrics relevant to the search, including contributions to departmental diversity goals. Although education is an important first step to revealing problematic attitudes, on its own training is insufficient to 'move the needle' on diversifying the department³⁵. Members of the search committee must be explicitly trained to recognize discriminatory hiring practices. Additional implicit-bias training may further reduce these effects in individual evaluations and in group discussions³⁶. Committee members should also be educated on racial and gender biases in commonly used quantitative evaluation metrics (in particular, citations, the H-index and grant-funding levels)^{34,36,37}. To limit the negative effects that such training can have (such as evoking defensive or even explicit biases)³⁸, it should be coupled with activities that help committee members recognize and address potential defensiveness^{39,40}.

Assess roadblocks from past searches. The whole committee should review past recruitment efforts and perform a retrospective and ongoing analysis of the diversity of the pool at each stage of hiring, to identify areas for targeted improvement. Initiatives such as the [National Change Initiative](#) from the National Science Foundation in the United States can help identify institutional barriers and suggest best practices for tracking demographics at all phases of the faculty recruitment, hiring and retention.

Embrace new hiring strategies. It may be possible to take advantage of strategic hires, and of cluster hires in a single year. This may require discussion with other departments or centres of the university. Securing the ability to make multiple offers at the same time can improve the ability to recruit faculty members from historically excluded groups. Also, strategic hiring in clusters (as in the Faculty Institutional Recruitment for Sustainable Transformation ([FIRST](#)) programme of the United States National Institutes of Health) is more likely to lead to larger and earlier positive effects on faculty diversity and culture^{31,41}.

BOX 1

Diversity statements

The value and burden of diversity statements must be carefully considered, as writing these statements can be harmful and frustrating for individuals from historically excluded groups. The act of writing a diversity statement in an application for a faculty position may require historically excluded individuals to re-live painful experiences, or to describe how they will fix problems created by faculty who may not have taken any action towards greater diversity. If a goal of the faculty search is to hire an individual with a different lived experience, the request for a diversity statement may come off as a request for them to justify themselves on the basis of their identity to a group who has traditionally not valued their identity. Therefore, before requesting a diversity statement, the faculty-search committee should ensure that the statement is truly needed. A diversity statement may indeed be needed in some searches (this is the case in some states in the United States, particularly states with anti-affirmative action laws), owing to an explicit prohibition to use identity as a hiring criterion. Alternatively, hiring criteria can include attributes such as lived experiences or demonstrated activities that directly relate to faculty roles (in particular, teaching and mentoring a diverse student body; ref. 41). If a diversity statement is deemed necessary, search committees must take steps to mitigate the harm that these statements may cause. When requesting statements from candidates, the hiring department should have a clear DEI statement of its own, and should provide a link to its own priorities. We recommend that the department also shares an assessment of where it stands with respect to its diversity goals. Importantly, requesting a diversity statement in the application without commensurate and meaningful evaluation of candidates on the basis of the content of that statement is performative, harmful and unethical. To mitigate bias in the evaluation of DEI statements, it is crucial that a standard rubric based on the hiring criterion be used.

Revise application materials. All requested materials for the application to a faculty position should be aligned with the search goals and be designed to encourage candidates from historically excluded groups to apply. It should be clear to the committee and to the applicants that diversity will feature at the interview stage and in the entire evaluation process. Providing guidance that aligns with the hiring criteria for all statements requested in the application will increase transparency and reduce disparities owing to mentoring and access⁴². Importantly, because requesting diversity statements can be harmful to individuals from historically excluded groups, such requests should be made thoughtfully and carefully (Box 1).

Recruiting a diverse applicant pool

The search committee and department head must actively search for and recruit talented applicants who can bring diverse lived experiences to the department. A search with only a passively posted job opening is unlikely to be sufficient to yield a diverse applicant pool. The department needs to have a strategic plan to recruit a diverse applicant pool for the current search and may need to consider

BOX 2

Build relationships

When academic departments and faculty-search committees are unable to hire women and members of historically excluded groups, they often claim that they did not have a diverse pool of applicants. We posit that this is partly because we have lived our lives in a segregated society, in which our connections and networks remain remarkably non-diverse. To succeed in the diversification of faculty, we must overcome the socializations embedded in us from childhood, which have taught many of us to interact predominantly with those who are 'like us'. We must therefore actively work to diversify our networks. This requires that faculty identify and build deep and authentic relationships with trainees and faculty from historically excluded groups well in advance of setting off a faculty search. As a starting point, faculty can actively participate in, and contribute to, events that focus on individuals from these groups, such as career-development workshops (examples are [NextProf Pathfinder](#) and [Rising Stars programmes](#)), trainee visibility and seminar series (in biomedical engineering, the BME UNITE series and the LatinXinBME Symposia are two examples), affinity societies and groups (for example, BlackinBME, LatinXinBME) and activities from professional societies (such as the Celebration of Communities of Color in BME Luncheon of the Biomedical Engineering Society).

putting resources into tracking and courting prospective candidates for future searches.

Use inclusive language in job advertisements. Language used in the job advertisement can promote or discourage a potential applicant from applying^{43,44}. The advertisement should be free of gendered, racist, sexist, ableist and cultured phrases (diversity-language checkers such as Textio and Diversely can be helpful). The search's goal should be clear, and the language should communicate the department's commitment to diversity and inclusion.

Cast a wide net. Recruitment efforts should consider a wide range of institutions, including Historically Black Colleges and Universities, Hispanic Serving Institutions and departments in other countries. In particular, search committees should mitigate 'pedigree' bias, as it can substantially limit the diversity of the candidate pool (for instance, approximately 80% of computer science faculty received their PhDs at only 25% of institutions⁴⁵). When compared with all PhD earners, Black or African American and Hispanic or Latino PhD earners are more likely to obtain their degrees from institutions that are not in the top-25 engineering programmes⁴⁶. Institutional ranking of where a candidate earned their PhD is often an influential component of an application review; however, the productivity of early-career faculty better correlates with the ranking of the employing institution than with the ranking of the training institution⁴⁷.

Leverage relationships. Deep and authentic relationships with trainees from historically excluded groups established well in advance of the current search can be leveraged to identify exceptional candidates

(Box 2). Such trainees should be encouraged to submit applications for opportunities within the department, and to share search announcements with their peers.

Advertise actively, broadly, early and often. In addition to advertising faculty openings in journals, listservs, conferences, social-media sites and department and university websites, openings should be advertised to any relevant networks of individuals from historically excluded groups (such as [Black Doctoral Network](#) and, in biomedical engineering, LatinXinBME⁴⁸, BlackInBME and BME UNITE) and in any other networks that are diverse and inclusive.

Society meetings may also be fit venues for recruiting. Here are a few examples, with an emphasis in biomedical engineering: the Annual Biomedical Research Conference for Minoritized Scientists, the Society for Advancement of Chicanos/Hispanics and Native Americans in Science, the Society of Hispanic Professional Engineers, the National Society of Black Engineers, the National Society of Black Chemists and Chemical Engineers, and the American Indian Science and Engineering Society. Lists of winners of prestigious diversity fellowships (such as Ford Fellows, GEM Scholars and NIH F31 awardees) can be obtained through search engines and web crawls.

Evaluate the diversity of your candidate pool. If allowable by law, applicant demographics can be tracked at each search stage (many institutions can provide this information to the search committee in a de-identified manner). If a minimum requirement for the diversity of the application pool has not been reached, the pool should be broadened before proceeding to the next stage.

Conducting holistic and equitable assessments

If not carried out carefully, the assessment stage of the faculty-hiring process can be fraught with biases that disadvantage candidates from historically excluded groups. In particular, bias can result from shifting or prejudiced definitions of 'best' and 'fit'. The assessment stage can thus be the most insidious phase of the hiring process. Data support that innovations from historically excluded groups (which can innovate at higher rates than majority groups) are discounted and less likely to earn the excluded groups academic positions⁷. This bias may be unintentional, and hence may often go undetected. To diversify the profession, deeply entrenched patterns of overlooking and undervaluing exceptional candidates from historically excluded groups during their assessment must be intentionally broken out.

Make hiring criteria clear. Ambiguity can enter the search process by, for instance, a committee member advocating for a candidate on the sole basis of a highly subjective and generalized criterion, such as 'fit' or 'excellence' (these words are vague and may carry racial-socialization underpinnings), and ignoring contributions to diversity and inclusion and other similarly important factors. To avoid ambiguity in hiring criteria, holistic criteria must be made absolutely clear to the search committee (and ideally to the department's entire faculty) from the outset, and reiterated at each stage of the hiring process. Committee members should find agreement in advance about whether any candidate who excels in one criterion but underperforms in another merits full consideration. We provide an example set of hiring criteria as Supplementary Information.

Establish assessment criteria before the search is underway. Hiring rubrics are evaluation tools that provide a set of guidelines to

BOX 3

Rubrics

A good rubric should reflect departmental values, and be agreed on. Although it is important to work towards committee consensus on expectations for each hiring criterion (to minimize 'discretion elimination'), it is important to recognize that there are many ways that a candidate can meet those expectations (for example, by contributing to the diversity of the department and discipline, through innovation via patents, or via new research methods). As such, the rubric should include illustrative examples to calibrate the committee to the standards associated with each score, rather than merely list traits that the candidate is required to fulfil. Particular care should be taken to avoid criteria (notably, citation record and prestige of the academic institutions they have belonged to) that are inherently biased and that have a high risk to artificially lower the scores of candidates from traditionally excluded groups. A good rubric should also include binary and scalable or scoreable metrics appropriate for each stage of the recruiting process, and be modifiable in response to feedback from the search committee.

promote the consistent application of selection criteria, and have been widely recommended to counteract hiring bias (Box 3). Rubrics that are aligned with search goals should be used to prevent ambiguous and shifting definitions of excellence in each criterion³³. Rather than considering an overall 'excellence' category, search committees can outline clear criteria in each category of the rubric that would be rated. In addition to delineating a list of factors to be evaluated, search priorities should be considered when weighing the impact of each factor on a candidate's overall score. The chair of the search committee may consider taking the lead in drafting the rubrics before soliciting feedback from the whole committee. Committee members should then collectively agree on the rubric assessment-and-scoring norms before reviewing the first application, and should hold each other accountable in using those criteria throughout the review. Deciding on evaluation criteria before reviewing any applicant can reduce the influence of the discretion of the decision-maker in evaluating job applicants^{49,50}. Without such a 'discretion elimination' strategy, committee members may unintentionally shift their assessment to fit their desired candidate, often amplifying a strength as the top hiring priority or discrediting a candidate by overemphasizing a weakness. These shifting metrics can lead to biased outcomes following the assessment of candidates^{49,50}.

Use rubrics to narrow the candidate pool at all stages. When possible, rubrics should be used throughout the initial screens and interviews, and during hiring recommendations. However, applying a detailed rubric can seem daunting when needing to review hundreds of applications; hence, if the search committee has constraints that mandate a less detailed initial screen, it must apply bias-conscious methods that are consistent with the goal of the search in narrowing down the pool. For example, the minimum criteria for full review could include holding a PhD in a relevant research field along with a background of lived experiences that contribute to the diversity of the department. Likewise, to avoid scenarios that amplify a candidate who excels in one criterion but underperforms in another at the later stages of the

search, one may consider implementing an initial screen consisting of a broad evaluation of sufficiency (such as 'exceeds expectations', 'meets expectations' and 'does not meet expectations') with regard to each facet of the holistic rubric (such as research, teaching and lived experiences) before conducting a full review.

Use analyses of the rubric results to guide the discussions. Before discussion by the search committee or by the department's faculty, an analysis of the rubric results (quantitative data and submitted comments) should be presented so that collective viewpoints are known before opening the discussion for individual comments. This can help to reduce first-speaker bias against a candidate. To facilitate the implementation of rubrics as part of the screening and evaluation processes, we have created a suite of example worksheets (Supplementary Information) with pre-populated tables for tabulating and visualizing reviewer scores, as well as templates for screening and evaluation (the evaluation criteria and weighting factors in these worksheets can be fine-tuned to ensure alignment with the priorities of a specific faculty search).

Conducting inclusive interviews

Interviewing should 'level the playing field' and thus allow for all candidates, including candidates from historically excluded groups, to perform at their best and to evaluate the department's culture as they contemplate the opportunity to accept a potential offer.

Designate a primary point of contact. For logistical reasons, the same individual, preferably the chair of the faculty-search committee, should remain the primary point of contact for the candidates throughout the hiring process. However, the designated point of contact should seek feedback from the committee and any relevant faculty or administrators to ensure that the information provided to the candidate is accurate and standardized. Answers to any questions should be shared with all faculty candidates when appropriate. To ensure the transparency of the interview process, the point of contact should provide, before the screening interview, an overview of the process and clarify the expectations directly with each candidate. Establishing a strong rapport with candidates will provide them with the opportunity to best represent themselves.

Level the 'playing field' for the interview. Individuals from historically excluded groups or with international backgrounds will be interviewing in an environment that might be highly racialized and thus intimidating or unwelcoming. To counteract any stress and inequities associated with past training experiences, the committee should clearly establish norms and expectations for the interactions with all candidates. This includes creating a standardized list of questions for the interview in advance, sending guidelines to candidates about the expectations for the research seminar and chalk talk (if applicable), providing small breaks between sets of meetings, and disseminating talking points to relevant department members so that they can provide consistent information to the candidates and ensure that the appropriate resources and interest groups are highlighted.

Show that you value the candidate. When a candidate visits the institution for an on-site interview, it is important to use this time to help them envision what their life will be like should they join the institution. Although making a good first impression is important, it is also important to avoid presenting an unrealistically rosy view of the local culture

as how members of historically excluded groups may experience it. One way to showcase genuine interest in the candidate is to make sure that high-level leaders (the department's chair, the school's dean, any centre directors, and institutional diversity officers) who are well aligned with the priorities of the faculty-search committee participate in interview activities. Another strong signal of interest, particularly when the department is lacking in diversity, is engaging other members of the local community who may share similar life experiences as the candidate by, for instance, inviting them to the research seminar or to participate in the interview process in a non-evaluative manner.

Include students in the interview process. To best serve the student population, candidates for faculty positions ought to reflect the diversity of the student bodies. Also, the candidate may eventually serve as a role model. It is then advisable that students from diverse backgrounds be a part of the interview and evaluation process. Round-table meetings are an effective way for faculty candidates to meet with students. The students who get involved with the hiring process should then be asked to provide feedback (via surveys, for example) for the search committee.

Identify and mitigate the effect of toxic faculty members. Any influence, on the hiring process, of faculty that undermine and circumvent an inclusive departmental culture, should be minimized. Because hiring is a lengthy process, faculty known to be heavily biased against any group should not be scheduled to participate in individual meetings with a candidate of that group. In group settings, a member of the community who feels comfortable to intervene, if necessary (for example, to shut down toxic conversations), and who can serve as an ally for the candidate, should be present. University leadership should be alerted to any instances of toxic behaviour via the appropriate institutional reporting structures. This will help ensure that expectations for acceptable conduct during interviews are regularly and clearly communicated.

Collect feedback before post-interview discussions. After interviews, feedback from all participants in the interview process, including students, post-doctoral fellows and faculty members outside of the department, should be collected. Using anonymous survey mechanisms for feedback can mitigate any power dynamics that may limit input from junior members or from minority faculty members. It should be ensured that feedback can be given without risk of repercussions. In soliciting feedback, the same rubric used to evaluate the candidates can be used, allowing for written comments. As with rubric analyses, feedback should be presented before post-interview discussions about a candidate and used to guide the discussion on the basis of the agreed criteria and away from vague criteria of 'fit' or 'excellence'.

Making the offer

In offer negotiations, it is important to focus on giving the candidate what they need to be successful rather than the minimum that is negotiable. In view of inequities in mentorship at the doctoral and post-doctoral levels, some candidates may not be aware of the available resources or of what is negotiable⁵¹. Hence, the offer should cover critical factors and resources, even if the candidate does not explicitly ask for them. Resources at the relevant institutional levels should be leveraged to maximize the offer so that the new faculty member will have every possible opportunity to succeed.

Reduce bias in the negotiation process. Individuals from historically excluded groups may feel that there is an additional power dynamic that they need to overcome when negotiating with administrators. This may lead a minority candidate to negotiate less vigorously, which may result in fewer resources for them and in the perpetuation of inequality. To the extent possible, to reduce discrepancies, the ranges of what candidates can negotiate for should be standardized.

Think creatively. The department should genuinely help provide for the current and future anticipated needs of the candidate. For example, faculty members from historically excluded groups may have a need and desire to connect with other professional shared-identity communities outside of the institution, especially if the institution lacks such communities. If so, the offer may include funding and resources for them to participate in opportunities to connect with outside communities formally (for example, at conferences) as well as informally. This type of resource should help support the candidate's success.

Protect the new hire in writing. A new hire will hopefully help improve the diversity and culture of the department's faculty. However, it is not their job to help the department continue to do so any more than it is the job of every other faculty in the department. Institutions ought to be thoughtful about not overburdening new hires with service tasks and other uncompensated work that do not contribute to promotion. Hence, normalizing the expectations from the department for the new hire in writing will help to empower them to push back when asked to do more than agreed or than expected.

Recruiting candidates

When the most promising individual or individuals have been identified, they should be shown why the department is the best place for them to start their career as faculty. The faculty-search committee should maintain regular and timely contact with the candidate(s) and reinforce the department's enthusiasm.

Do your homework. Members of the search committee may want to educate themselves on how they can make their environment more welcoming, inclusive and equitable before recruiting new faculty members^{34,52,53}. Committee members should be prepared to give clear answers to candidates about the tangible ways in which the university is working to improve and maintain an environment that supports both their professional success and their personal wellbeing. They may want to purposefully speak to recently recruited junior faculty and to senior faculty who are actively engaged in improving departmental culture about their positive and negative experiences. When appropriate, they should act to mitigate negative issues for new hires.

Honestly communicate department and university policies. Clear information should be provided to the candidates about department and university policies designed to achieve equity. These may include policies on parental leave, sabbaticals, expectations on teaching and service workload, tenure success rates across demographics and how collaborations are valued. The candidates should also be informed about what the university and department are already doing well and the vision for the future, and about any challenges on diversity, equity and inclusion (DEI) and the steps being taken to overcome them.

Provide opportunities for the candidates to meet with members of the broader community. Candidates should have opportunities to engage with members of the broader university community (in particular, faculty from other departments) who can provide insights into the culture of the department and university, can share similar or overlapping research interests, are leaders of training grants and training centres, have similar interests in service, or share identity groups with the candidate. Informal meetings that are clearly dissociated from the interview process are recommended.

Give opportunities to meet with students. Faculty candidates should also be given several opportunities to meet with graduate students and undergraduates, perhaps in small groups. This will benefit the candidates who seek to form an idea of the students that they may have in their laboratory or classroom and may provide the candidates with a snapshot of the student demographics. If the student population is neither diverse nor enthusiastic about the department's culture or their research, the candidate will most likely notice it. Hence, any such issues should be addressed before the faculty-search process starts.

Provide resources for community-wide engagement. The on-site visit of the new hire must include off-campus resources that provide information about the community in which the new faculty member will live. Any assumptions about what the candidate desires should be avoided. The candidate should be asked whether they have any specific interests in the local community or concerns about it. There are many such factors that may have a role in a candidate's decision to take the offer, such as the availability of childcare, the length and type of commute, any communities for single faculty, whether their racial or ethnic and religious and/or cultural values and needs are represented in the local community (in, for example, churches, schools and hair salons), and the ability of the university or broader community to provide opportunities for their partner. Because it is often difficult to encapsulate all necessary community-wide engagement into one visit, additional visits and perhaps virtual meetings that allow the candidate to engage with the local community may be necessary.

Call to action

Changing faculty-hiring practices is essential to diversify the professoriate^{3,4,24,54}. However, recruiting faculty from historically excluded groups into an academic culture that was not built for them can be challenging. Towards dismantling the systemic racism and discrimination that has been prevalent within academia, partly because of complicit action and inaction, all stakeholders need to work to transform departmental culture to value inclusive excellence and to educate themselves and departmental colleagues on the beneficial outcomes of an academic workforce with diverse viewpoints^{3,7–9,32,54}. Ultimately, success in the diversification of faculty requires committed leadership and collective effort by the academic community.

It is also important that committees interested in increasing diversity focus on performing equitable and holistic evaluations that include contributions to diversity and inclusion as evaluation criteria, as opposed to using metrics or other requirements that have been shown to propagate systemic biases. It is also important to note that increasingly long postdoctoral training periods before a faculty position is obtained affect academic diversity. Longer postdoctoral training periods further privilege those who are financially able to complete one. Black or African American and Hispanic or Latino PhD

earners that leave academia at the graduate-student-to-postdoc transition point do so at disproportionately higher rates than their white peers¹⁴. Because some engineering disciplines have substantially lower postdoctoral-training expectations than biomedical engineering⁵⁵, it may be worth considering collectively how the length of postdoctoral training can be shortened.

We hope that the roadmap and the data-supported best practices for an equitable and holistic faculty-hiring process that we provide here will be useful to faculty and administrators. We realize that not all the actions laid out in this roadmap will work for all departments, yet we hope that, at the very least, the roadmap will serve as a starting point for conversations about how to improve the hiring process. Bright minds from the entire diversity of the human population ought to be recruited following equitable and inclusive hiring processes.

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Competing interests

The authors are all members of BME UNITE, a group of biomedical engineering faculty in the United States who are educating themselves about DEI, improving the representation of their communities, and combating racism in STEM.

Additional information

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