

SUBMISSION

Submission to the Department of Industry, Science and Resources

Submission to the Diversity in STEM review: Let's Talk Solutions

26 May 2023

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

The case for increasing diversity in science, technology, engineering and mathematics (STEM) sectors is undeniable. Increasing diverse participation can alleviate workforce shortages, increase productivity and innovation, attract international talent and learn from Traditional Knowledge. But Australia will not be successful at eliminating barriers to diversity in STEM unless we adopt a systematic and strategic approach to equity, diversity and inclusion.

The Diversity in STEM review is an ideal opportunity to begin the work of applying a sector-wide strategic approach to improving diversity, instead of the fragmented approach that has been adopted to date. The approach needs to encompass not just attracting a diverse STEM workforce, but also retaining, recognising and promoting that workforce, especially into leadership. While gender equity must be a core part of this approach, we must ensure discussions on diversity are not limited to participation of women and non-binary people. Action to increase intersectional diversity will require a cultural shift, based on strategic policy changes that are evidence-based, promoted by government, and led by the sector's boards, CEOs and management teams. Leaders at all levels must take up the mantle of championing diversity, which is so often a burden thrust upon the very people already encumbered by its absence.

This submission, a response to the *Let's Talk Solutions* questions, builds on ATSE's previous [submission](#) to the Diversity in STEM review by highlighting how a systematic approach to diversity can be supported. ATSE's previous submission recommended developing a whole-of-sector strategy for diversity in STEM including by evaluating programs and scaling up successful programs that support diversity across the STEM pipeline, apply an intersectional lens to enhancing diversity, and engage with mid-to-senior leaders of STEM organisations.

In addition to our previous recommendations, ATSE makes the following further recommendations:

Recommendation 1: Invest in high-quality research into the barriers to increasing diversity and inclusion to enable better program design and evaluation.

Recommendation 2: Develop a National Office for Diversity in STEM, supported by stable long-term funding, to provide national leadership and champion diversity in STEM.

Recommendation 3: Empower the National Office for Diversity in STEM to provide a central and dynamic repository of effective STEM-focused diversity strategies and programs, and encourage and facilitate their uptake across the STEM sector.

Recommendation 4: Promote the adoption of systematic and intersectional frameworks that enhance diversity and promote inclusion, including recruitment, training, pay equity, mentorship, flexible work arrangements and advancement into leadership.

Recommendation 5: Connect with and leverage the Australian Universities Accord and Australian Research Council reviews to develop career stability for early career researchers and more opportunities for career progression.

Recommendation 6: Work with the Australian research sector and public funding agencies to better align incentives to measurable targets and achievements related to intersectional diversity, equity and inclusion.

Assessing the existing barriers to diversity in STEM

ATSE's earlier submission to the Diversity in STEM consultation highlighted the need to identify and expand programs that are demonstrably effective (ATSE, 2023). Programs should undergo continual monitoring and incorporate pre-determined assessment criteria measured against established, valid and reliable industry baselines. The Office of Women in STEM Ambassador has produced a [guide](#) to evaluating gender equity programs (Kingsley, 2020), which is an important tool to help industry and academia ensure their gender equity strategies are effective. This suggests a starting point from which to develop evaluation guidelines for other kinds of diversity. To enable the selection of appropriate metrics, there is a need to develop a repository of baseline data.

As recommended in ATSE's previous submission to this consultation, baseline data is required to develop an understanding of how diverse populations are represented in STEM – data that is currently not available for all groups of interest – and the barriers that diverse people face in their STEM careers. This could then illuminate pathways for more effective programs and strategies and enable more accurate assessment of existing programs. However, it is important that conducting this research does not create barriers by

delaying the commencement of potentially beneficial programs and the ongoing support of proven programs.

Quantitative data collection is critical as it will enable new and existing initiatives to be assessed against common baselines and allow programs to be designed to tackle specific barriers in the pathway to diversity.

It is important that this is paired with a program of qualitative research, focusing on the lived experiences of people underrepresented in STEM, to provide further insights and help to design more effective programs and strategies. Without investment in collecting this data, it will be impossible to know just how effective planned interventions are and will leave the sector vulnerable to wasting time and resources for little benefit. A consolidated national approach will be required to systematically embark on this research program.

Recommendation 1: Invest in high-quality research into the barriers to increasing diversity and inclusion to enable better program design and evaluation.

Enhancing national leadership

The data collected through diversity and inclusion research will enable the development of a strong, strategic and systematic approach to addressing diversity issues in STEM. The design and implementation of this approach will require effective leadership, both within organisations and, crucially, at a national level, to coordinate, encourage and support action to address the lack of diversity across the sector.

At an organisational level, tools like the Women in STEM Ambassador's guide to evaluating programs (Kingsley, 2020) and the strategy for gender inclusiveness, wellbeing and diversity in engineering workplaces (Kanga, 2014) are highly effective, and organisational leadership teams must be expected and encouraged to adopt these approaches. From a national perspective, ATSE's recent *Our STEM Skilled Future* report notes that providing materials that highlight a diverse range of role models and career pathways will help to break down stereotypes and provide role models for people from underrepresented groups who are considering a career in STEM (ATSE, 2022). National-level leadership can help bring these tools to boards, CEOs and the public, while championing the development of new tools to address marginalisation wherever it occurs.

National leadership on diversity in STEM is currently centred around the Office of the Women in STEM Ambassador. While this position continues to be very important, broadening the office's remit to focus on diversity in STEM will help bring the focus to broader inequalities throughout STEM and highlight and coordinate responses to intersectional issues. Adopting a similar model to the Australian Human Rights Commission, with a structure that empowers their office to conduct necessary research, develop resources and advocate based on evidence, would ensure that this new office can address intersectional barriers to inclusion and diversity, while maintaining existing programs for women in STEM. This new office would require long-term resourcing certainty and sufficient administrative support to ensure that a new National Office for Diversity in STEM could establish systematic and long-term programs to address diversity issues. The work already done to build tools, research and proven approaches to support women in STEM could be further developed and applied to other dimensions of diversity.

Recommendation 2: Develop a National Office for Diversity in STEM, supported by stable long-term funding, to provide national leadership and champion diversity in STEM.

Recommendation 3: Empower the National Office for Diversity in STEM to provide a central and dynamic repository of effective STEM-focused diversity strategies and programs, and encourage and facilitate their uptake across the STEM sector.

Adopting a strategic approach to diversity in industry

National leadership will help individual organisations to adopt systematic diversity strategies to effect meaningful and measurable change. Organisational strategies must extend beyond recruitment, to systematically address barriers in retention and career progression, and intersectional disadvantage.

Currently, a vast range of individual programs scaffold diverse participation in the Australian STEM ecosystem (including ATSE's programs: IMNIS, which links STEM students with senior industry mentors and professional development; Elevate: Boosting Women in STEM scholarships; and the STEM SME Diversity and Inclusion Toolkit). To maximise potential effect, these programs must not be adopted in isolation, but delivered as part of a broad, systematic strategy that combines and connects multiple diversity policies, levers and programs. Uptake of proven programs and policies should be actively encouraged by sector and organisational leadership to ensure maximum impact.

One notable approach to increasing inclusion and diversity within STEM has been the development of a targeted [strategy](#) for gender inclusiveness, well-being and diversity in engineering workplaces, which provides a framework upon which individual organisations can build their policies and operational procedures to support diversity in the workplace (Kanga, 2014). This strategy views a commitment from leadership and ongoing monitoring of policy efficacy as core components to the success of the strategy. This has been effective in the workplaces that have adopted it and could be used as a model beyond the engineering industry. Other programs, like the [Workplace Gender and Equality Project](#) and the [Champions of Change Coalition](#), highlight how CEOs and Boards can use their positions to promote gender diversity, including in STEM. Strategies like these should form the basis of a systematic approach to inequality in STEM. However more still needs to be done to ensure a systematic approach where progress is measured and reported. Leadership by Government to promote these and similar strategic approaches would support broader adoption in industry, academia and government. A National Office for Diversity in STEM would be able to fill this role and provide the necessary leadership to identify and promote effective strategic approaches to improve diversity and inclusion across the STEM sector.

Recommendation 4: Promote the adoption of systematic and intersectional frameworks that enhance diversity and promote inclusion, including recruitment, training, pay equity, mentorship, flexible work arrangements and advancement into leadership.

Improving the STEM research ecosystem

STEM is a diverse group of disciplines with highly divergent career pathways, leading to varying barriers to inclusion. The differences across disciplines and workplaces must be considered in any national strategy for diversity in STEM. For example, information technology and engineering have relatively clearly delineated career pathways, with the main diversity challenges being attracting and retaining diverse students and workers. However, in STEM research, limited opportunities for secure, ongoing, and attractive employment are constraints to diversity that must be addressed.

Research careers are unfortunately characterised by insecure work – ATSE would argue that this is unnecessary, and alternative approaches to employment in research ought to be considered. Current university STEM research education and career pathways create a leaky pipeline, with many points at which individuals are squeezed out of the system. Higher degrees and research careers are often uncertain and require many years of study and foregone income, leading to many passionate and talented individuals withdrawing. People with disadvantage, and especially those with intersecting disadvantages, are less likely to be in a position to pursue or endure in risky careers and are more likely to drop out of the university degrees necessary to enter the STEM research workforce (Grattan Institute, 2018). Low socio-economic status contributes to lower university completion rates – an effect that magnifies for students who are Aboriginal and Torres Strait Islander, from a regional area, or studying a STEM degree (Lim, 2015).

Following graduation, junior research staff regularly work on short-term contracts whose extension relies not on their job performance, but on the extreme difficulty of obtaining grant or philanthropic funding in a highly competitive environment with severely restricted investment pools and very low funding application success rates. Early career researchers employed by universities are often young, and women are more likely to be employed in casual academic positions, at lower levels, than male researchers (McKenzie, 2016). Casual academics report concerns about their ability to continue in their chosen career and progress life milestones, such as purchasing a home, in such an insecure career environment (McKenzie, 2016). Career progression in this environment usually follows a linear pathway that advantages academic outputs over industry and lived experience, frowns upon career breaks and, because of grant funding and university rules and practices, often fails to support career break and re-entry. Advancement is often based on an individual's material ability to endure material disadvantage and manifest discrimination rather than skill, dedication or knowledge.

Addressing diversity in STEM research careers therefore requires more than creating networks and programs and establishing inspiring role models (the 'lean-in' approach). These interventions are certainly important, but the best long-term solution is to create more opportunity and certainty for STEM research careers, making these careers more accessible and attractive to a vast range of Australians. This will require re-evaluating the entire research eco-system to align incentives to create more stable pathways into

research careers and greater career flexibility, stability and certainty. Linking public funding to measurable equity and diversity targets would help to align incentives and ensure increasing diversity remains a high priority. These issues go beyond the scope of the Diversity in STEM review. It is therefore essential for the review to interface with the concurrent Universities Accord and Australian Research Council reviews to redesign a system that serves national interests, is seen as a good career choice for top talent and provides opportunities for diverse Australians to engage and contribute.

Recommendation 5: Connect with and leverage the Australian Universities Accord and Australian Research Council reviews to develop career stability for early career researchers and more opportunities for career progression.

Recommendation 6: Work with the Australian research sector and public funding agencies to better align incentives to measurable targets and achievements related to intersectional diversity, equity and inclusion.

ATSE thanks the Department of Industry, Science and Resources for the opportunity to respond to the Diversity in STEM review. For further information, please contact academypolicyteam@atse.org.au.

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