

SUBMISSION

Submission to the Department of Industry, Science and Resources

# Submission to the Diversity in STEM Review

11 April 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. ATSE is committed to diversity in STEM (science, technology, engineering, and mathematics) and applies a diversity and inclusion lens to all our work<sup>1</sup>.**

ATSE welcomes the opportunity to provide a submission to the review of Diversity in STEM. This submission argues issues of diversity in STEM can be addressed by identifying successes in existing programs, and then investing in and scaling up these programs. True diversity is inclusive of all underrepresented groups, including women, Aboriginal and Torres Strait Islander people, LGBTQIA+ people, cultural and linguistically diverse people, disabled and neurodivergent people, and people from rural and remote Australia. Increasing diversity and inclusion in the workforce has consistently been called out as a critical enabler to improve workforce shortages and improve productivity (Turban, Wu, & Zhang, 2019). This review represents an opportunity to address the diversity and inclusion shortfall in Australia’s education system and workforce.

ATSE’s [Women in STEM Decadal Plan](#) (2019), developed together with the Australian Academy of Science, outlines a vision for achieving gender equity in STEM, which includes improving retention of women in STEM through their career progression. ATSE supports active support for and inclusion of diverse women and other underrepresented groups in the STEM sector through the [Elevate: Boosting Women in STEM program](#) and through the development of a [Diversity and Inclusion Toolkit](#). Elevate addresses gender inequities in STEM by providing undergraduate, post-graduate and leadership scholarships for women in STEM, fostering more women-led industry-academia collaborations in applied research and business, growing professional skills of women in STEM and by propelling women into leadership. The Diversity and Inclusion Toolkit, developed in response to the Women in STEM Decadal Plan, provides reference guides for STEM-focused businesses to embed principles and practices to support diversity and inclusion in their recruitment, retention, and reach. Additionally, ATSE is actively implementing measures to increase the diversity of our Fellowship, including special measures to increase the number of Aboriginal and Torres Strait Islander people, women, and non-binary people in our Fellowship.

ATSE makes the following recommendations:

**Recommendation 1:** Develop a whole-of-sector strategy to consolidate and build upon efforts to enhance and support continuous improvement in diversity in STEM.

**Recommendation 2:** Use objective and documented evidence to assess existing programs and initiatives designed to advance diversity and inclusion in Australian STEM fields, to identify the most successful programs.

**Recommendation 3:** Invest in and scale up successful programs that:

1. Support women and people with diverse backgrounds across the entire STEM education and career pipeline.
2. Apply an intersectional lens to address a range of inequities and build diversity in STEM.
3. Engage with mid-to-senior leaders of STEM sector organisations, including Directors, Vice Chancellors, CEOs and Board chairs, and support them to build a culture of support for diverse people to advance in STEM.

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<sup>1</sup> Further information on ATSE’s commitment to diversity and inclusion can be found on [our website](#), highlighting our D&I policy, our programs supporting D&I such as Elevate, the D&I toolkit for SMEs and our work on sector wide leadership through development of the Women in STEM Decadal Plan.

## A strategic, consolidated approach to advancing diversity in STEM

In recent years there has been a strong focus on the issue of diversity in STEM in Australia, with a significant number of programs and initiatives established to address a range of structural and cultural barriers. Many of these initiatives, such as the Women in STEM Decadal Plan, were underpinned by evidence drawn from sector-wide consultation to identify the issues preventing Australia from advancing towards widespread and sustainable equality and diversity. However, many initiatives have not been designed using a strong evidence base. Fewer still engage in continual monitoring and assessment of efficacy and impact based on objective and documented metrics that are pre-determined and compared to a suitable control – or commit to continuous improvement based on those measures. Many initiatives have been crafted and run by women, and focused only on women's participation, without a clear strategy for addressing intersectional issues that compound disadvantage and hinder progress towards true diversity in STEM. To realise the opportunities presented by investments made in programs to date, and to genuinely support participation and success for underrepresented people in STEM, Australia needs a connected strategy, building on the Women in STEM Decadal Plan, that addresses systemic and cultural barriers and supports and empowers men as well as women to be part of the solution.

While there is strong awareness of the barriers faced by women in STEM, and targeted initiatives to redress these inequalities, women's underrepresentation in STEM (particularly at senior levels) persists. There is a strong evidence basis and many high-profile STEM professionals who have dedicated their time and effort to this issue through engaging in programs, acting as mentors, and participating in numerous consultations and reports. The Diversity in STEM review is an opportunity to widen the focus from women to include other underrepresented groups, who experience both similar and unique barriers to career progression, and to consolidate these efforts to reduce the burden on the sector to continue to champion these initiatives in a fragmented fashion.

ATSE recommends identifying which programs and initiatives have been successful by robust evaluation of their impact on diversity in the sector since their introduction. These identified programs must have been given time to build and show results, while new programs should have the opportunity to demonstrate their effectiveness before an assessment is made of their success. Once identified, successful programs – those with demonstrated advancement towards diversity in STEM - should then be supported and scaled appropriately, with a clear strategic focus on intersectionality. These should include programs that create a more inclusive STEM workplace culture, rather than exclusively focusing on underrepresented individuals. To address the complexity of structural and cultural issues hindering Australia's advancement towards equality and diversity in STEM, it is crucial that a range of programs and initiatives with a range of different approaches are supported. This range of approach will require that metrics of success differ across programs, based on program goals and target populations, resulting in data that may not necessarily be directly comparable. To ensure that the relative efficacy of diversity and inclusion programs can be compared, an ongoing program of data collection surrounding the most translatable metrics of STEM workforce participation is needed, allowing programs to directly compare their success against these population metrics and building a common yardstick by which programs with differing metrics can be assessed against. The Women in STEM Ambassador's evaluation tool may be useful in this regard. This would also enable visibility of the aggregate impact of diversity in STEM programs over time and identify areas that require more targeted interventions.

**Recommendation 1:** Develop a whole-of-sector strategy to consolidate and build upon efforts to enhance diversity in STEM.

**Recommendation 2:** Use objective and documented evidence to assess existing programs and initiatives designed to advance diversity and inclusion in Australian STEM fields, to identify the most successful programs.

## Programs to support diversity across the STEM education and career pipeline

Women remain critically underrepresented in many STEM fields throughout the STEM pipeline – from early education through all career levels. Moreover, it is a 'leaky pipeline', with the number of women dwindling at

each level of seniority. This gender imbalance in STEM often begins in primary school and gradually worsens through to university level study, early career and into senior management. Overcoming barriers to retaining girls in STEM during primary and secondary schooling is an important initial step in addressing this issue. However, this can be challenging, especially when teachers are teaching out-of-field and do not have a strong background in or enjoy the subject themselves. A Diversity in STEM strategy must consider mapping challenging and implementing interventions through the whole education and career pipeline.

ATSE's Elevate program is an example of an initiative designed to address barriers for women and non-binary people in the higher education sector, whereby factors inherent to its design reduce intersectional barriers for applicants from diverse backgrounds. The program will award up to 500 undergraduate and postgraduate scholarships to women and non-binary people in STEM and aims to address gender and other inequities by fostering more women-led industry-academia collaborations in applied research and business, growing professional skills of women in STEM and propelling women into leadership.

Supporting leadership development from school-leavers right through to those women and other under-represented groups seeking board directorships and other leadership positions is a vital step in addressing issues of diversity in STEM. ATSE recommends investing in and scaling up a range of successful programs to ensure that the whole STEM education and career pipeline can support women and diverse people to succeed in STEM.

**Recommendation 3.1:** Invest in and scale up successful programs and initiatives that support women and people with diverse backgrounds across the entire STEM education and career pipeline.

### **Beyond gender: an intersectional approach to supporting diversity in STEM**

Gender disparity is acutely apparent in the fields of engineering, digital technologies, physics, mathematics, and in positions of leadership across all disciplines (Australian Academy of Science, 2019) This inequality is directly linked to the barriers that limit attraction, retention and progression of women, girls, and gender-diverse people, including negative stereotypes, lack of positive role models, discrimination, and poor workplace practices, structure and culture (Australian Academy of Science, 2019). Programs may be able to provide underrepresented groups with the networks and mentorship to persevere in the face of structural barriers, but these are an interim solution to the cultural change required in the STEM sector.

While women's under-representation in STEM is most visible, there are structural disadvantages encountered on the basis of other factors including socioeconomic status, Indigeneity, cultural and linguistic diversity, regional or rural background, disability, neurodiversity, caring responsibilities, career disruption, or identifying as LGBTQIA+. An inclusive and intersectional approach is needed to support STEM participation and success. If issues of intersectionality in STEM programs and initiatives are not addressed, many talented and diverse people will not be supported to achieve, advance, and succeed in STEM and Australia will have failed to realise the full potential of existing investments in STEM diversity programs and initiatives. ATSE recommends that investment be prioritised for programs and initiatives that apply an intersectional approach to building diversity in the STEM sector.

**Recommendation 3.2:** Invest in and scale up successful programs that apply an intersectional lens to address a range of inequities and build diversity in STEM.

### **Leveraging STEM leadership to create an inclusive culture**

Leaders in STEM-focused organisations, such as CEOs, Directors, Vice-Chancellors, and middle managers, have significant influence on the culture and policies of the organisations that they lead. It is therefore vital to engage with leaders when developing diversity programs and support them to take positive and effective action. By providing evidence-based direction and support, leaders can ensure that diversity and inclusion is actively prioritised within the organisations through best practice approaches. Having leaders who are genuinely committed to diversity also ensures that diversity in STEM programs do not place the responsibility for diversity purely on under-represented groups. One program that takes this

approach and supports leaders to drive change in their organisations is the [Champions of Change Coalition](#), which has resulted in improved gender balance in 90.1% of member organisations (Champions of Change Coalition, 2022). ATSE recommends investing in and supporting programs and tools that provide best practice support, and advice on practical action for leaders of STEM organisations. The inclusion of middle management in these programs is vital, as often it is this layer of leadership which presents the greatest barrier to equality (Williamson et al., 2018). Inclusion and diversity programs must, similarly, not just be the domain of women and minorities. Leadership on these issues by men and other members of the dominant groups is necessary for these programs to demonstrate long-term success in improving inclusion and diversity. These programs and tools must have shown evidence of success, enabling a supportive environment for women and diverse people to succeed.

**Recommendation 3.3:** Invest in and scale up successful programs that engage with mid-to-senior leaders of STEM sector organisations, including Directors, Vice Chancellors, CEOs and Board chairs, and support them to build a culture of support for diverse people to advance in STEM.

## References

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