ACIL ALLEN

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Report to
Department of Industry, Science and Resources

Women in STEM Evaluation

Final Report

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ACIL Allen acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land and its waters. We pay our respects to Elders, past and present, and to the youth, for the future. We extend this to all Aboriginal and Torres Strait Islander peoples reading this report.

Goomup, by Jarni McGuire

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Abbreviations and Glossary

ARC	Australian Research Council
ATSE	Australian Academy of Technological Sciences and Engineering
Branch	Portfolio Program Delivery Branch
CAETS	Council of the Academies of Engineering and Technological Sciences
CALD	Culturally and Linguistically Diverse
CCC-STEM	Champions of Change Coalition – STEM Group (formerly known as Male Champions of Change STEM)
CEO	Chief Executive Officer
D&I	Diversity and Inclusion
Decadal Plan	Women in STEM Decadal Plan
Division	Grants Delivery and Business Services Division
EAG	Elevate Advisory Group
Elevate	Elevate: Boosting Women in STEM
ESA	Education Services Australia
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GiST	Girls in STEM Toolkit
HER	Higher Education and Research
IT	Information Technology
KEQs	Key Evaluation Questions
LGBTQIA+	Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, Asexual
MCC	Male Champions of Change (now known as the Champions of Change Coalition)
MEL	Monitoring, Evaluation and Learning
MOOC	Massive Open Online Course
(The) monitor	STEM Equity Monitor
MRIs	Medical Research Institutions

NAPLAN	National Assessment Program – Literacy and Numeracy
NARI	National Awareness Raising Initiative
NHMRC	National Health and Medical Research Council
NIAA	National Indigenous Australians Agency
NISA	National Innovation and Science Agenda
PFRA	Publicly Funded Research Agencies
Reference Group	WiSTEM Evaluation Reference Group
(The) Review	Pathway to Diversity in STEM Review
Review Panel	Diversity in STEM independent expert Review Panel
RRI	Rapid Research Information
SAGE	Science in Australia Gender Equity
SME	Small to Medium Enterprise
STA	Science and Technology Australia
STEM	Science, Technology, Engineering and Mathematics
STEMM	Science, Technology, Engineering, Mathematics and Medicine
SWAN	Scientific Women's Academic Network
UNSW	University of New South Wales
VET	Vocational Education and Training
WESS	Women's Economic Securities Statement
WGEA	Workplace Gender Equality Agency
WILD	Women in Leadership Development
WiSA	Women in STEM Ambassador
WiSE	Women in STEM and Entrepreneurship Grants
WiSTEM	Women in STEM
WiSTEM Strategy	Advancing Women in STEM Strategy

Executive summary

Introduction

The Australian Government is committed to reducing disparity in STEM participation and plays a key role in setting policy directions and driving change. In 2019, the Department of Industry, Innovation and Science led development of the government's Advancing Women in STEM Strategy (WiSTEM Strategy)[1], informed by the Australian Academy of Science and Australian Academy of Technological Sciences and Engineering's Women in STEM Decadal Plan (Decadal Plan).[2] The WiSTEM Strategy drew together existing women in STEM initiatives, and influenced the development of new initiatives, which collectively aimed to enable girls and women to access STEM education, to recruit and retain women in STEM careers, and to enhance the visibility of women in STEM.[3] The initiatives in this evaluation provide support for education, professional career development, scholarships and grants, and organisational change.

The initiatives have been funded by the Department of Industry, Science and Resources (the department) or its predecessors since 2016. They vary in implementation date, funding duration and scale.

This evaluation

In September 2022, the Minister for Industry and Science, the Hon Ed Husic MP, announced a Pathway to Diversity in STEM Review (the Review).[4] The Review, led by an independent panel, was tasked with evaluating existing Women in STEM initiatives in the portfolio, reflect on Australian Government activity in STEM and consider opportunities to improve diversity in STEM, STEM leadership and the STEM-skilled workforce.

The department engaged ACIL Allen to support the Review by evaluating 9 WiSTEM initiatives. The evaluation considers the extent to which the initiatives have improved diversity in STEM, were well-designed, delivered impact for girls and women, and were administered and delivered efficiently.

[1] Department of Industry, Innovation and Science (2019). *Advancing Women in STEM Strategy*. Canberra: Department of Industry, Innovation and Science.

[2] Australian Academy of Science and Australian Academy of Technological Sciences and Engineering (2019). *Women in STEM Decadal Plan*. Canberra: Australian Academy of Science.

[3] Department of Industry, Science and Resources (2023). *Women and girls in STEM*. Accessed January 2023: https://www.industry.gov.au/science-technology-and-innovation/women-and-girls-stem.

[4] Department of Industry, Science and Resources (2022a). Accessed May 2023: https://www.minister.industry.gov.au/ministers/husic/media-releases/revitalising-australias-science-priorities.

The 9 initiatives are:

— Women in STEM and Entrepreneurship Grants (WiSE)
— Champions of Change STEM Group (CCC-STEM)[5]
— Science in Australia Gender Equity (SAGE)
— Superstars of STEM
— Girls in STEM Toolkit (GiST)
— Women in STEM Ambassador (WiSA)
— STEM Equity Monitor
— Future You
— Elevate: Boosting Women in STEM (Elevate).

The evaluation was guided by the WiSTEM Evaluation and Monitoring Framework (WiSTEM Framework)[6] and addressed Key Evaluation Questions (KEQs) across the following domains:

1. *Appropriateness*: How appropriate was the design of the initiatives in terms of the rationale and context, design, inclusion, and continuing need for intervention?
2. *Efficiency and effectiveness*: Were the initiatives administered and delivered efficiently?
3. *Outcomes and impact*: Did the initiatives work when considering their short-, medium- and long-term impacts and unintended impacts on girls and women?

Methodology and data sources

The evaluation involved 3 phases: Project Inception, Data collection and analysis, and Reporting. The methodology was overseen by the department, the WiSTEM Evaluation Reference Group (Reference Group) and the Diversity in STEM independent expert Review Panel (Review Panel).

The method included an overarching analysis of the WiSTEM initiatives and an initiative-specific analysis.

The evaluation used a mixed-methods approach to gather and analyse qualitative and quantitative data. This drew on publicly available data from the STEM Equity Monitor,[7] Workplace Gender Equality Agency (WGEA)[8] and YouthInsight,[9] a survey of initiative participants, consultation with the department, delivery partners, government and industry representatives and CCC-STEM members, and initiative data and information.

[5] Previously referred to as the Male Champions of Change STEM.

[6] Developed by Nous Group (2022). *Evaluation and Monitoring Framework*. A report for the Department of Industry, Science, Energy and Resources. Sydney: Nous Group. Subsequently updated by the department and Review Panel, with updated version provided in the appendices.

[7] Department of Industry, Science and Resources (n.d.). *STEM Equity Monitor*. Accessed January 2023: https://www.industry.gov.au/publications/stem-equity-monitor.

[8] Workplace Gender Equality Agency (n.d.). *WGEA Data Explorer*. Accessed January 2023: https://www.wgea.gov.au/data-statistics/data-explorer.

[9] Youth Insight (n.d.). *Advancing Women in STEM*. Accessed January 2023: https://youthinsight.com.au/advancing-women-stem/.

Key findings

Foundations for the initiatives

Girls and women are underrepresented at all stages of the STEM pathway, from schooling through to tertiary education and employment. There is a growing need for STEM skills in Australia to foster innovation, international competitiveness and productivity. This demand will be difficult to meet with the current levels of participation of girls and women in STEM education and careers.

Women face multi-faceted, complex and deeply embedded barriers to participation, retention and progression at all stages of the STEM pathway. These barriers are compounded for women from underrepresented groups. Barriers negatively affect girls' and women's perceptions of their STEM abilities, reduce their interest, confidence and motivation to pursue STEM study and careers, and hinder long-term STEM engagement.

There is a core role for government as a key change agent in addressing gender inequality in STEM. However, improving gender equity and diversity in STEM is a complex challenge that requires collective action and coordination across the government, industry, and research sectors and the community.

The WiSTEM initiatives broadly align with the evidence base that positive outcomes can be supported by focusing on girls in the early years of schooling, building the capacity of parents/carers and teachers, creating visible anti-stereotypical role models, enabling women with scholarships, and engaging leaders to effect organisational change. However, there is a gap in the focus of the initiatives regarding middle managers, intersectionality and mid-career women.

The WiSTEM initiatives' objectives are clear and consistent, with their policies intent on improving gender equality in STEM participation, retention and progression across the STEM pathway. There has been no overarching policy to guide the design or delivery of the initiatives and as such, they do not operate as a consistent, holistic suite. The prevalence of intersectionality as a policy consideration has increased in recent years and more can be done in the future to embed intersectionality into the design phase.

Resourcing has not been sufficient to achieve the intended long-term outcomes. Delivering these outcomes requires more significant investment and sustained funding. Resourcing must recognise the scale, complexity and embedded nature of the problem these initiatives address.

Delivery of the initiatives

Overall, most initiatives have been delivered on time and on budget. The COVID-19 pandemic and short-term contract arrangements created some delays for 3 initiatives and underspending for 2 initiatives. Greater certainty around timeframes and funding would improve the delivery efficiency, noting that departmental flexibility (including to re-profile funding) has been valued.

Reporting requirements have been effective in measuring activity, output and shorter-term outcomes without creating an undue administrative burden for delivery partners. However, there are inconsistencies and gaps in the initiatives' evaluation readiness (particularly medium- and long-term outcomes), creating challenges for the current and future evaluations when aggregating and comparing across initiatives. Collective evaluation needs to be embedded into initiative design and delivery if the initiatives are to be evaluated as a suite.

The initiatives have together reached participants across the education sector, parents/carers, the university and research sector, the STEM industry and workforce and government. However, the initiatives have had limited reach across mid-career women, middle-management, and women from underrepresented groups and there is limited evidence to suggest their reach extends beyond the initiative participants to drive broader social impacts.

Impact of the initiatives

The evaluation measured the impact of the initiatives as a suite against overarching short-, medium-, and long-term outcomes in the domains of education, employment, government and cultural change.

There are limitations in the data available to assess impact. Data is typically self-reported, captured at a point in time and does not track whether motivation, interest or policy changes were sustained in order to generate behavioural or cultural change.

There are signs of positive impacts for participants but it is clear sustainable cultural change will take further time and support. Despite the investment to date, girls and women continue to be underrepresented across all stages of the STEM pathway.

Assessing the effectiveness of the 9 initiatives by their direct impact at this stage would be premature. Many of these initiatives are generational change initiatives and it will take time for the impacts to be observable at the aggregate level. The evidence to date is positive and identifies both the critical need for change and the need to continue to drive change so the next generation no longer needs support of this sort. Given the multifaceted barriers to participation, no single initiative or stakeholder will be able to generate the systemic change required.

Education outcomes

Participants from Future You, Elevate, Superstars and GiST reported positive short-term education outcomes, including improved motivation and ability to pursue STEM education.

Despite this, public data shows there has not been substantial movement in the attitudes of girls and women to STEM study and careers or teachers' confidence, with a decrease in the level of importance parents place on STEM skills for the acquisition of a good job.[10] There was variation in STEM career aspirations across cohorts.

While the gender balance has increased in tertiary STEM education, there has been little change in the proportion of women selecting STEM subjects over other subject areas.[11] Furthermore, the grouping of STEM subject areas (Science, Technology, Engineering and Maths) often masks the fact that women are underrepresented only in Engineering and IT.

[10] Youth Insight (n.d.). *Advancing Women in STEM*. Accessed January 2023: https://youthinsight.com.au/advancing-women-stem/.

[11] Department of Industry, Science and Resources (n.d.) *STEM Equity Monitor – University enrolment and completion in STEM and other fields*. Accessed February 2023. https://www.industry.gov.au/publications/stem-equity-monitor/higher-education-data/university-enrolment-and-completion-stem-and-other-fields.

Employment outcomes

Participants from Elevate, Superstars, GiST, SAGE and WiSE reported positive short-term employment outcomes, including improved motivation to pursue STEM careers and being better positioned to employ, retain and progress STEM-qualified women.

Public data shows an increase in the number of women in STEM-qualified occupations and an uplift in the proportion of organisations with formal policies/strategies targeting women's recruitment and retention.[12] It is unlikely that the WiSTEM initiatives have driven this broader change given their relative reach; however, organisations involved in WiSTEM initiatives start from a higher base of female participation and implement policies faster than other organisations but demonstrate slower changes in employee outcomes.

Government outcomes

The WiSTEM initiatives have delivered positive outcomes to government, predominantly in the short term. This was demonstrated through the development of an evidence base to inform government and sector-wide policy, strategy and program development and scale-up. Key examples include the use of the STEM Equity Monitor informing the design of Elevate and WiSE, and the use of evaluation data to inform program improvements for WiSE, Future You, Superstars and WiSA.

It should be noted that much of this evidence has specifically addressed the needs of individual initiatives.

Contribution to longer-term outcomes and cultural change

The initiatives have contributed to a broader cultural change movement, with participants across all WiSTEM initiatives reporting improvements in attitudes toward the participation of girls and women in STEM. However, these improvements in attitudes are likely to have been localised rather than extending to broader community-wide societal, attitudinal or cultural change.

Continuing rationale for the WiSTEM initiatives

The WiSTEM initiatives met most participants' needs and contributed to the positive outcomes outlined above. However, there has been limited progress more broadly in improving the participation of girls and women along the STEM pathway. There is a clear ongoing need for government investment to address the underrepresentation of girls and women in STEM.

[12] Workplace Gender Equality Agency. *WGEA Data Explorer*. Accessed February 2023. https://www.wgea.gov.au/data-statistics/data-explorer.

Opportunities

There are opportunities to improve the policy and program measures in place to promote and support diversity in STEM, both at the initiative and system levels. The opportunities below focus on supporting improved outcomes and ensuring that progress and momentum to date are maintained.

Continuing role for Australian Government

Data on the participation of women and girls in STEM education and careers indicate this cohort continues to be underrepresented. Significant and continued effort is required to address cultural and structural barriers across early education, schooling, tertiary education and employment.

This will require the Australian Government to have a continued role in bringing together industry, the research sector and the community to support systemic change.

Scaffolded approach to provide whole-of-lifecycle support

The evaluation found limited connectivity between the 9 initiatives, either structurally or operationally. There is a need for greater coherence across initiatives funded by the Australian Government to ensure scaffolded, whole-of-lifecycle support is provided for participants as they transition from education to employment.

This should be driven by an overarching strategy that provides a coherent suite of policy objectives aligned to address the barriers to participation across the STEM pathway.

Tailored programs to address intersectionality

The 9 initiatives have evolved over the course of their implementation, with an increasing focus on intersectionality and improving the participation of people from underrepresented cohorts. While this is a positive step, the 9 initiatives are generally designed from a mainstream perspective rather than targeting the nuanced barriers experienced by different cohorts.

Future directions should consider the specific experiences of underrepresented cohorts to determine where tailored programs are needed to provide effective support and address specific systemic barriers. Key to this will be considering the specific experiences of First Nations peoples, migrant and refugee populations, non-binary participants and others in the broader LGBTQIA+ community.

Use of diversified government levers

The Australian Government has explored program measures to promote inclusion and diversity in STEM which show some signs of immediate impact. Driving systemic change will require the consideration of broader policy measures to encourage industry engagement and ownership of the employment-related aspects of STEM participation.

The Australian Government should explore other levers to deliver on these policy objectives. This could include embedding gender equity measures in procurement arrangements, research funding agreements and program-specific arrangements.

Improved initiative design

The 9 initiatives currently use a variety of approaches to monitor performance, linked to their grant agreements and the level of maturity of the initiative. Few initiatives had clearly defined reach targets, outcomes or data sources to support the assessment of efficiency and effectiveness. This made it challenging to assess the effectiveness of government investment.

Future grant agreements should include defined requirements for reach and impact assessment, linked to an overarching evaluation framework to support a consistent approach across initiatives. Grant agreements should embed requirements for data collection and monitoring, including appropriate funding to support quality evaluation of initiatives.

Strengthened data systems

Current systems, for both government and initiative delivery partners, lack the nuanced fields required to support a deeper understanding of what works for whom and in what context.

Data systems should be strengthened by including the collection of demographic information, where possible, while managing privacy implications.

Greater outcomes measurement

The evaluation was limited in its ability to comment on the collective impact of the 9 initiatives due to data availability. There is a need to improve the measurement of outcomes, both in terms of the rigour of evidence collected and the tracking of participants over time.

One key change here would be a shift from reliance on self-reported perspectives to data on participant behaviour and actions. Opportunities to support longitudinal tracking should be explored to confirm whether motivation is actually translating into behavioural change and organisational change

1 Introduction

This chapter outlines the background to the evaluation, the evaluation methodology and the structure of this final report.

1.1 Women in STEM initiatives

The Australian Government is committed to reducing disparity in STEM participation and plays a key role in setting policy directions and driving change. In 2019, the Department of Industry, Innovation and Science led the development of the government's Advancing Women in STEM Strategy (WiSTEM Strategy)[13], informed by the Australian Academy of Science and Australian Academy of Technological Sciences and Engineering's Women in STEM Decadal Plan (Decadal Plan)[14]. The government's approach also aims to address broader diversity representation by increasing STEM participation overall.

The Women in STEM (WiSTEM) initiatives are a focus of current efforts. The WiSTEM initiatives are co-led by the government and the STEM sector and collectively seek to improve the participation of girls and women in STEM. In turn, this will help to realise Australia's economic potential and research capability and close the gender gap in STEM participation by 2030. The WiSTEM initiatives have been funded by the Department of Industry, Science and Resources (the department) or its predecessors since 2016, with initiatives commencing implementation at different points in time and varying in maturity, scope and funding scale.

The WiSTEM initiatives aim to enable girls and women to access STEM education, to recruit and retain women in STEM careers, and to enhance the visibility of women in STEM.[15] They provide outreach and education to promote STEM opportunities, break down gender-based stereotypes and support greater participation of women in STEM from early education through to professional career development. The WiSTEM initiatives provide girls and women with access to support over their careers, including information on opportunities in STEM as well as scholarships and grants for women, targeting particular age groups.

[13] Department of Industry, Innovation and Science (2019). Op. cit.

[14] Australian Academy of Science and Australian Academy of Technological Sciences and Engineering (2019). Op. cit.

[15] Department of Industry, Science and Resources (2023). Op. cit.

The WiSTEM initiatives cover a range of programs, 9 of which were in the scope of this evaluation:

- Women in STEM and Entrepreneurship Grants (WiSE)
- Champions of Change STEM Group (CCC-STEM)
- Science in Australia Gender Equity (SAGE)
- Superstars of STEM
- Girls in STEM Toolkit (GiST)
- Women in STEM Ambassador (WiSA)
- STEM Equity Monitor
- Future You
- Elevate: Boosting Women in STEM (Elevate).

1.2 This evaluation

In September 2022, the Minister for Industry and Science, the Hon Ed Husic MP, announced a Pathway to Diversity in STEM Review (the Review).[16] The Review, led by an independent panel, is considering opportunities to improve diversity in STEM, STEM leadership and the STEM-skilled workforce.

The department engaged ACIL Allen to support the Review by conducting an evaluation of 9 WiSTEM initiatives. The evaluation considers the extent to which the WiSTEM initiatives were well designed, were administered and delivered efficiently, deliver an impact for girls and women (including contribution to systemic and cultural change), and improve diversity in STEM.

The evaluation was guided by the WiSTEM Evaluation and Monitoring Framework (WiSTEM Framework)[17] presented in Appendix A. The evaluation addresses Key Evaluation Questions (KEQs) across the following domains:

1. *Appropriateness*: How appropriate was the design of the initiatives in terms of the rationale and context, design, inclusion, and continuing need for intervention?
2. *Efficiency and effectiveness*: Were the initiatives administered and delivered efficiently?
3. *Outcomes and impact*: Did the initiatives work when considering their short-, medium-, and long-term impacts and unintended impacts on girls and women?

The WiSTEM Framework presents an aggregate perspective of the department's intended achievements regarding the WiSTEM initiatives as a suite. It was developed retrospectively in 2022, several years after some initiatives commenced. Delivery partners had some engagement during the development of the WiSTEM Framework but have not been required to collect data or report against the KEQs. This evaluation measures each initiative according to the outcomes identified in the framework.

[16] Department of Industry, Science and Resources (2022a). Op. cit.

[17] Nous Group (2022). Op. cit. Subsequently updated by the department and Review Panel, with the updated version provided in the appendices.

1.2.1 Methodology

The evaluation involved 3 phases: Project Inception, Data collection and analysis, and Reporting. The methodology was overseen by the department, the WiSTEM Evaluation Reference Group (Reference Group) and the Diversity in STEM independent expert Review Panel (Review Panel).

The method was organised around 2 key analyses:

— *Overarching analysis of the WiSTEM initiatives*, focused on assessing and aggregating initiative-specific analyses to form a collective assessment of the WiSTEM initiatives. This also explored the connectivity between the initiatives, including the nature of their impact and co-contribution to outcomes. This report presents the overarching analysis.

— *Initiative-specific analysis*, aligned with the nested initiative logic structure outlined in the WiSTEM Framework. This focused on evaluating each initiative individually and alongside similar WiSTEM initiatives to understand their short-, medium- and long-term impacts. This involved consideration of the scale, budget and maturity of each initiative. The initiative-specific analyses are presented in Appendices D to L.

1.2.2 Data sources

The evaluation used a mixed methods approach to gather and analyse qualitative and quantitative data. Core data sources and limitations are described below.

Public data

The evaluation drew on publicly available data from the STEM Equity Monitor,[18] Workplace Gender Equality Agency (WGEA)[19] and YouthInsight.[20] These sources provided insight on changes over time in:

— girls' and women's enrolment in STEM subjects in senior secondary school, vocational education, and undergraduate and postgraduate degrees (including PhDs)

— women's participation, retention and progression in the workforce

— organisational performance, separated by organisations that have participated in WiSTEM initiatives (CCC-STEM and SAGE, 41 organisations), STEM organisations (730) and all organisations (6,883).

The limitations of the public data were:

— limited granularity of age and demographic breakdown for Wave 1 of the YouthInsight Perception of STEM survey

— tertiary enrolment and completion data was only available at an aggregate not individual level

— post-graduation occupation data was only available between 2011 and 2016

— gender pay balance was only available at an aggregate not organisational level

— limited number of organisations participating in the WiSTEM initiatives

[18] Department of Industry, Science and Resources (n.d.). *STEM Equity Monitor*. Op. cit.

[19] Workplace Gender Equality Agency (n.d.). *WGEA Data Explorer*. Accessed January 2023: https://www.wgea.gov.au/data-statistics/data-explorer.

[20] Youth Insight (n.d.). *Advancing Women in STEM.* Accessed January 2023: https://youthinsight.com.au/advancing-women-stem/.

— data on gender identity is limited to men/women as other gender identities were not provided due to small sample sizes.

Survey

A survey was administered via delivery partners to gather insights from initiative participants. The survey aligned with the WiSTEM Framework and gathered data on respondents' awareness, the quality and usefulness of the resources, supports provided, outcomes achieved, opportunities for improvements and the ongoing need for similar initiatives. The survey received 152 responses from participants in Superstars of STEM (62), SAGE (31), Elevate (22), WiSE (20), GiST (13) and CCC-STEM (4). Future You, WiSA and STEM Equity Monitor had all recently conducted surveys and as such were not included.

Limitations of the survey were:

— low response rate overall (13% of the total 1,127 recipients)

— low response numbers for some initiatives.

Consultation

A total of 46 stakeholders were engaged for the evaluation, including the department, delivery partners, government and industry representatives, and CCC-STEM members. Consultations focused on the context for the initiatives, their design, outcomes delivered, opportunities for improvement and future directions. Details of stakeholders engaged are provided in Appendix B. Stakeholder perspectives were limited to their experiences with the initiatives and their involvement in the sector.

Initiative data

This evaluation drew on initiative data obtained from a range of sources, including project plans, financial statements, and progress, final and evaluation reports. This contained information on initiative design and objectives, reporting requirements, financial arrangements and outcomes achieved.

Initiative data was limited by:

— the availability and consistency of data collection and reporting across initiatives and over time

— limited outcomes data, with a focus on immediate outcomes where such data were available

— lack of a requirement for delivery partners to collect data against the WiSTEM Framework (see Appendix A)

— limited initiative data available for Elevate, as the initiative is relatively new.

1.3 Structure of this report

This Final Evaluation Report is structured as follows:

- *Chapter 2: Women in STEM initiatives*, which presents an overview of the nature of the challenge, the policy context and the 9 WiSTEM initiatives in scope for the evaluation.
- *Chapter 3: Foundations for the initiatives*, which outlines the initiatives' purpose and rationale, design considerations, and connectivity between the initiatives.
- *Chapter 4: Delivery of the initiatives*, which discusses the effectiveness and efficiency of the initiatives' delivery, and evaluation readiness.
- *Chapter 5: Impact of the initiatives*, which addresses the initiatives' reach, outcomes and value delivered.
- *Chapter 6: Key findings and conclusions* which provides the conclusions and key findings from the evaluation.
- Appendix A: Evaluation framework
- Appendix B: Additional methodology and data sources
- Appendix C: Additional survey information
- Appendix D: References
- Appendix E: Women in STEM and Entrepreneurship grants
- Appendix F: Champions of Change Coalition STEM Group
- Appendix G: Science in Australia Gender Equity
- Appendix H: Superstars of STEM
- Appendix I: Girls in STEM Toolkit
- Appendix J: Women in STEM Ambassador
- Appendix K: STEM Equity Monitor
- Appendix L: Future you
- Appendix M: Elevate: Boosting Women in STEM.

2 Women in STEM initiatives

This chapter presents an overview of the policy context and the 9 WiSTEM initiatives in scope for the evaluation.

2.1 Policy context

The Australian Government recognises a need to enable full participation by girls and women in STEM education and careers. The policy landscape is complex, with several strategies and plans guiding efforts. An overview of the policy context is provided in Figure 2.1.

The Australian Government supported the development of the Decadal Plan to provide a roadmap for sustained increases in women's participation in STEM over the next decade. The Decadal Plan was released in 2019 and provides a guiding framework for the STEM sector to act on gender inequity. It aims to create a diverse, inclusive and equitable STEM ecosystem, free of gender barriers to participation and progression. It sets out 6 opportunities to support improved STEM gender equity: leadership, evaluation, workplace culture, visibility, education and industry action.

The WiSTEM Strategy responds to the issues presented in the Decadal Plan and forms the government's commitment to the sector and to future generations. It outlines government's role in supporting increased gender equity across the STEM sector and the government's enduring vision for an Australian society that provides equal opportunity for people of all genders to learn, work and engage in STEM. The 2020 WiSTEM Strategy Action Plan identified priorities from the WiSTEM Strategy and Decadal Plan to set the foundations for a national, coordinated approach to achieving sustained increases in gender equity in STEM.[21]

[21] Department of Industry, Innovation and Science (2019). Op. cit.

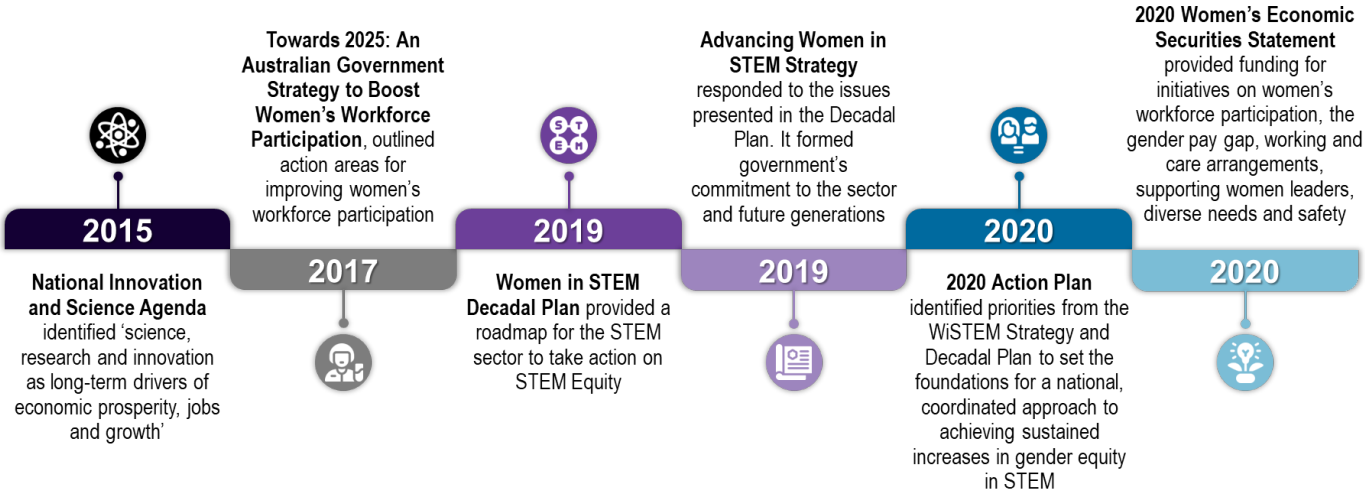
Other relevant policies include:

— The National Innovation and Science Agenda 2015, which identified 'science, research and innovation as long-term drivers of economic prosperity, jobs and growth'.[22] It included funding to enhance girls' and women's participation in research, industry, startups and entrepreneurial firms and funding to support teacher professional development in STEM.

— The 2020 Women's Economic Securities Statement, which provided dedicated funding for initiatives focused on women's workforce participation, the gender pay gap, working and care arrangements, supporting women leaders, diverse needs and safety.[23]

— Towards 2025: An Australian Government Strategy to Boost Women's Workforce Participation,[24] which outlines action areas for improving women's workforce participation.

Figure 2.1 Overview of the policy context



Source: ACIL Allen

[22] Department of Industry, Science and Resources (2015). *National Innovation and Science Agenda report*. Canberra: Department of Industry, Science and Resources.

[23] Department of the Prime Minister and Cabinet (2020). *Women's Economic Security Statement: 2020*. Accessed May 2023: https://www.voced.edu.au/content/ngv%3A92002.

[24] Department of the Prime Minister and Cabinet (2017). *Towards 2025 An Australian Government Strategy to Boost Women's Workforce Participation*. Canberra: Department of the Prime Minister and Cabinet.

2.2 Overview of the WiSTEM initiatives

The 9 initiatives aim to improve the participation of girls and women in STEM by enabling girls and women to access STEM education, recruiting and retaining women in STEM careers, and enhancing the visibility of women in STEM.[25] The initiatives provide support for education, professional career development, scholarships and grants, and organisational change.

Table 2.1 Overview of the WiSTEM initiatives

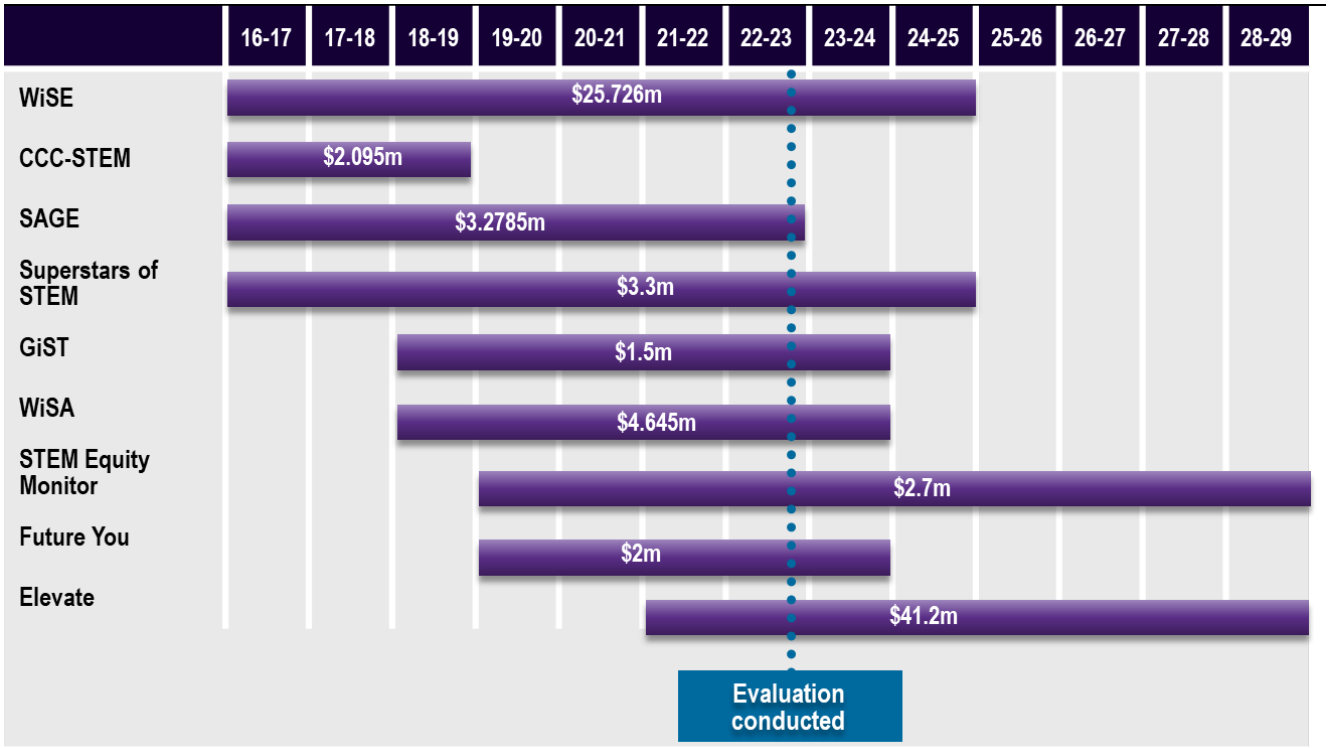
WiSTEM initiative	Overview
WiSE	A competitive grants initiative funding community-driven projects to deliver lasting systemic change and support girls and women by eliminating barriers to participation in STEM education, careers, and entrepreneurship.
CCC-STEM	An organisational capability-building initiative, designed to recruit established industry leaders in the STEM sector to drive the cultural change required to improve the participation of women in STEM.
SAGE	An organisational cultural change and capability-building initiative that intends to address the underrepresentation of women in STEM-based careers in academia and research by driving cultural change.
Superstars of STEM	A mentorship and media training initiative that seeks to address the underrepresentation of women STEM experts in the Australian media by building a critical mass of high-profile women and non-binary role models in STEM and giving them communications training and media opportunities.
GiST	An educational initiative delivered via a website that provides girls with tools for understanding how their existing skills and interests can link to STEM careers and study pathways.
WiSA	An awareness-raising initiative that seeks to address drivers of underrepresentation of girls and women in STEM, including limited role models and visibility, poor workplace attitudes, and limited evidence base, best-practice tools and expert advice.
STEM Equity Monitor	A national data resource on the current state of STEM gender equity in Australia and changes over time. It seeks to address gaps in the availability of a centralised and provide a consistent evidence base to inform decision-making.
Future You	An early intervention initiative that seeks to address drivers of underrepresentation of girls and women in STEM by improving awareness and visibility of diverse female role models. Future You is funded by the WiSTEM NARI grant.
Elevate	An education initiative that awards undergraduate and postgraduate scholarships to women in STEM and provides them with additional mentoring, networking, internship, leadership development and research opportunities.

Source: ACIL Allen

[25] Department of Industry, Science and Resources (2023). Op. cit.

The 9 WiSTEM initiatives in scope for the evaluation commenced at different times and vary in funding duration and scale (see Figure 2.2). All these initiatives have been funded by the department. Funding for 8 initiatives is ongoing, while government funding for CCC-STEM ended in 2019 as the initiative became self-sustaining. The earliest projects commenced in the 2016-17 financial year, with newer initiatives receiving initial funding as recently as 2021-22. Funding across the initiatives is set to cease in 2028-29 when the STEM Equity Monitor and Elevate conclude.

Figure 2.2 Funding and timeframes for the 9 WiSTEM initiatives



Source: ACIL Allen, various sources

3 Foundations for the initiatives

This chapter outlines the rationale for the initiatives, need for government support, design considerations, and connectivity between the initiatives.

3.1 Nature of the problem

Key Finding 1 Nature of the problem

There is a growing demand for STEM skills to foster innovation, international competitiveness and productivity. Low participation rates for girls and women in STEM will make these demands difficult to meet, now and into the future.

The gap in STEM academic participation and performance for girls is present from early education and clear differences persist in high school, tertiary education and the workforce. Women face multi-faceted, complex and deeply embedded barriers to participation, retention and progression.

Barriers negatively affect girls' and women's perceptions of their own STEM abilities and career aspirations, reduce their interest and confidence in STEM, undermine their motivation to pursue STEM-related opportunities and hinder their long-term engagement with STEM.

3.1.1 Need for STEM skills and capabilities

The need for STEM capabilities is becoming increasingly widespread as many industries become more reliant on technology. Strong STEM skills and research capabilities are central to Australia's international competitiveness and productivity. Fast-paced advancements in technology are fuelling workforce demand, both in terms of jobs and skills.

From 2000 to 2022, employment in STEM occupations increased by 85%, more than double the growth in non-STEM occupations (40%).[26] STEM jobs are expected to continue to grow quickly, with a 14% increase expected between 2021-26, twice as much as non-STEM jobs (7%).[27]

STEM skills, including both technical skills and the supporting problem-solving, critical thinking and communication skills, are essential to fostering innovation, a primary catalyst

[26] National Skills Commission (2021). *State of Australia's Skills 2021: now and into the future*. Accessed May 2023: https://www.nationalskillscommission.gov.au/reports/state-australias-skills-2021-now-and-future/executive-summary.

[27] National Skills Commission (2022). *Projecting employment to 2026*. Accessed May 2023: https://www.nationalskillscommission.gov.au/sites/default/files/2022-03/NSC22-0041_Employ%20Projections_glossy_FA_ACC.pdf.

for economic growth.[28] These skills are recognised as driving success in manufacturing, mining, agriculture, the service sector[29] and a wide range of other jobs.[30]

Current and projected skills shortages highlight the challenges in meeting the growing demand for skills and capabilities needed for future research, technology and innovation. In addition, it is estimated that increasing the proportion of women in the workforce by 6% could contribute up to $25 billion to 'Australia's Gross Domestic Product (GDP).[31]

Despite the clear need for improved workforce participation, women remain under-represented across the STEM pathway. The current underrepresentation of girls and women in STEM education and careers must be addressed if Australia is to meet this demand.[32]

3.1.2 Underrepresentation of girls and women

The gap in STEM academic participation and performance for girls is present from early education[33] and clear participation differences persist in high school, tertiary education and the workforce.[34] These trends and barriers are not unique to Australia and are experienced by comparable international jurisdictions.

In the early years, fewer girls achieve at the highest levels in National Assessment Program – Literacy and Numeracy (NAPLAN) year 3 and 5 numeracy tests compared to boys (15% of girls compared with 19% of boys at band 6 and above in year 3 and 7% of girls and 11% of boys at band 8 and above in year 5). By secondary school,[35] girls account for more than 50% of enrolments in year 12 Science, yet only 26% of year 12 girls enrol in ICT and Design and Technology compared with 39% of boys.[36] Boys also outnumber girls in year 12 physics by a ratio of 3 to 1 and in advanced mathematics by 2 to 1.[37]

Trends in secondary education continue in tertiary education, where women account for 15% of undergraduate course enrolments and completions in Engineering and Related Technologies and 11% in vocational education course enrolments and completions in

[28] Office of the Chief Scientist (2014). *Science, Technology, Engineering and Mathematics: Australia's Future*. Accessed May 2023: https://www.chiefscientist.gov.au/2014/09/professor-chubb-releases-science-technology-engineering-and-mathematics-australias-future.

[29] Australian Council of Learned Academies (2016). *Skills and Capabilities for Australian Enterprise Innovation 10*. Accessed May 2023: https://acola.org.au/wp/saf10/.

[30] Office of the Chief Scientist (2014).

[31] Daley, J, McGannon, C, & Ginnivan, L (2012). *Game-changers: Economic reform priorities for Australia.* Melbourne: Grattan Institute.

[32] Office of the Women in STEM Ambassador (2020). *Women in STEM National Awareness Raising Initiative 'Future You' Evaluation Report 2019-2020*. Sydney: Office of the Australian Government's Women in STEM Ambassador.

[33] Australian Curriculum, Assessment and Reporting Authority (2017). *NAPLAN Achievement in Reading, Writing, Language Conventions and Numeracy: National Report for 2017*. Sydney: ACARA.

[34] Department of Industry, Innovation and Science (2019). Op. cit.

[35] Department of Industry, Innovation and Science (2019). Op. cit.

[36] Australian Curriculum Assessment and Reporting Authority (2017). *National Report, Year 12 Enrolments*. Accessed May 2023: https://dataandreporting.blob.core.windows.net/anrdataportal/ANR-Documents/nationalreportonschoolinginaustralia_2017.pdf.

[37] Office of the Chief Scientist (2016). *Occasional Paper: Busting myths about women in STEM*. Canberra: Office of the Chief Scientist. January 2019. https://www.chiefscientist.gov.au/2016/11/occasional-paper-busting-myths-about-women-in-stem/.

2016. Women comprised 37% of domestic undergraduate and postgraduate completions in Mathematical Sciences and 29% in Physics and Astronomy.[38]

The low levels of participation in STEM education reduce the number of women entering the STEM workforce. Women comprised 17% of the STEM-qualified population in 2016.[39] This included 31% of STEM academics,[40] 29% of the university-educated STEM workforce and 8% of the VET STEM workforce.[41] Women are also underrepresented in leadership, with 24% of senior management and 11% of Chief Executive Officer (CEO) positions being held by women in STEM industries in 2021.[42]

These disparities are stronger for some STEM disciplines. For example, 12% of the engineering workforce in 2016[43] and 28% of the IT workforce in 2017[44] were women. Women also earn less than men, with the weekly pay gap at 14.2% in 2018.[45] This gap is higher in STEM industries (18%)[46] and IT (20%).[47]

The gap in participation, retention and progression is higher among girls and women from underrepresented groups. For example, in 2011:

— First Nations peoples comprised 2.7% of the population, yet less than 1% of the university graduate cohort

— overall, 16% of graduates completed a STEM qualification as opposed to a qualification in another field. Among First Nations graduates, only 10% completed a STEM qualification.[48]

3.1.3 Drivers of underrepresentation

The causes of gender disparity in STEM are multi-faceted, complex and deeply embedded. Drivers of underrepresentation often start early and are continually reinforced

[38] Department of Industry, Innovation and Science (2019). Op. cit.

[39] Department of Industry, Innovation and Science (2019). Op. cit.

[40] Department of Industry, Innovation and Science (2019). Op. cit.

[41] Office of the Chief Scientist (2020). *Australia's STEM Workforce Report*. Accessed May 2023: https://www.chiefscientist.gov.au/sites/default/files/2020-07/australias_stem_workforce_-_final.pdf.

[42] Workplace Gender Equality Agency. *WGEA Data Explorer.* Accessed February 2023. https://www.wgea.gov.au/data-statistics/data-explorer

[43] Kaspura, A, (2017). *The Engineering Profession: A Statistical Overview 3rd Edn*. Barton: Engineers Australia.

Australian Professionals Engineers Australia (2017). *Professional Engineers Employment and Remuneration Report*. Melbourne: APEA.

[44] Australian Computer Society (2018). *Australia's Digital Pulse - Driving Australia's international ICT competitiveness and digital growth*, Accessed May 2023: https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html.

[45] Australian Bureau of Statistics (2018). *Average Weekly Earnings, November 2018, cat no. 6302.0*. Accessed May 2023: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6302.0Main+Features1Nov%202018?OpenDocument.

Department of Industry, Science and Resources (2022b). *STEM Equity Monitor: Data report 2022.* Canberra: Department of Industry, Science and Resources

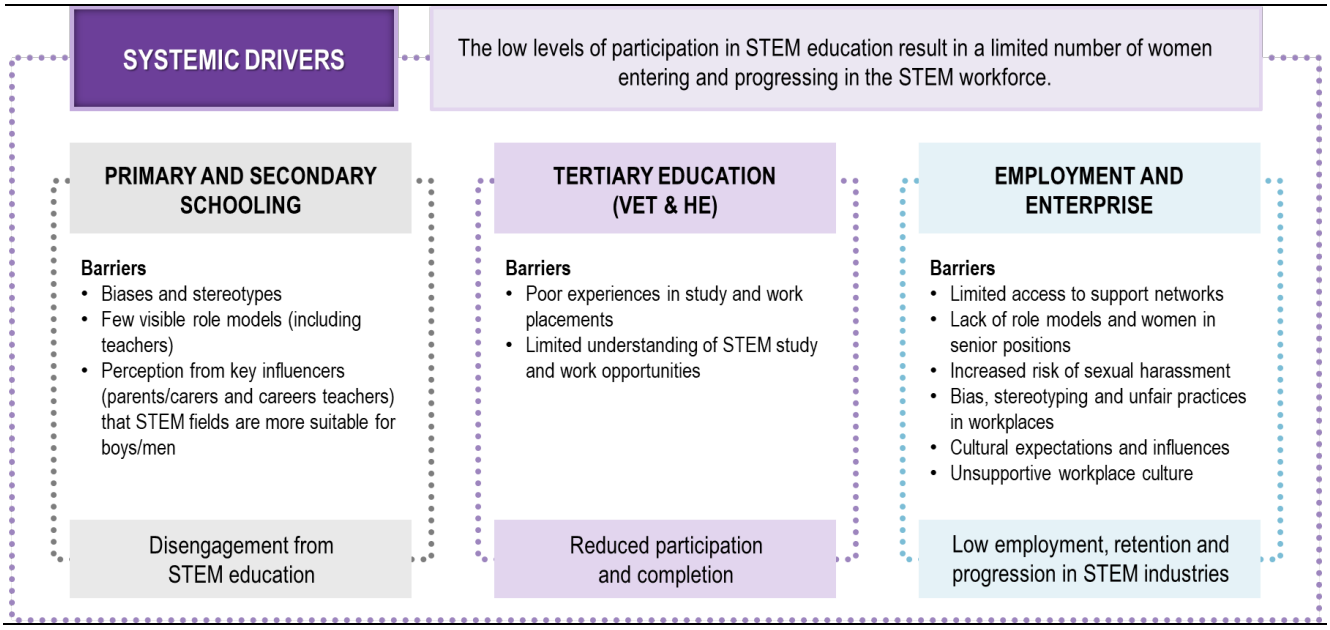
[46] Department of Industry, Science and Resources (2022b). Op. cit.

[47] Professionals Australia (2018*). All Talk: Gap between policy and practice a key obstacle to gender equity in STEM-2018 Women in STEM Professions Survey Report.* Victoria: Professionals Australia.

[48] Department of Industry, Science and Resources (n.d.). *STEM Equity Monitor. In focus: understanding the progression of different demographic groups through STEM.* Accessed February 2023. https://www.industry.gov.au/publications/stem-equity-monitor/data-focus/focus-understanding-progression-different-demographic-groups-through-stem

throughout the transition from schooling to employment, resulting in a limited pool of women to progress to STEM-related employment (see Figure 3.1).

Figure 3.1 Key drivers of underrepresentation for girls and women in STEM



Source: ACIL Allen

Girls' views of STEM are shaped at an early age by biases and stereotypes.[49] Gender stereotypes direct girls towards developing social skills and engaging in activities around interpersonal relationships and boys towards acquiring problem-solving skills, exploring the physical world and engaging in activities that emphasise logical thinking and analysis.[50]

There are few visible role models,[51] limited understanding of STEM career opportunities,[52] and perceptions from key influencers (parents/carers, educators and career counsellors) that certain STEM fields are more suitable for males[53] or are too challenging for women.[54]

> *"People don't know what STEM is. So, if you're not aware of STEM careers you're not going to have a conversation with your students about it. You're going to have a*

[49] Ceci, SJ et al. (2009). Women's underrepresentation in science: Sociocultural and biological considerations. *Psychological Bulletin*, 135, p. 218–261.

Dee, T and Gershenson, S (2017). *Unconscious Bias in the Classroom: Evidence and Opportunities*. United States: Stanford Center for Education Policy Analysis.

[50] Dasgupta, N., & Stout, J. G. (2014). Girls and women in science, technology, engineering, and mathematics: STEMing the tide and broadening participation in STEM careers. *Policy Insights from the Behavioral and Brain Sciences*, 1(1), 21-29.

[51] Kassova, L (2020). *The Missing Perspectives of Women in News*. International Women's Media Foundation.

[52] Blotnicky, K, Franz-Odendaal, T & French, F. & Joy P. (2018). A study of the correlation between STEM career knowledge, mathematics self-efficacy, career interests, and career activities on the likelihood of pursuing a STEM career among middle school students. *IJ STEM Ed*, vol. 5 pp. 22.

[53] Google Inc. and Gallup Inc. (2016). *Diversity Gaps in Computer Science: Exploring the Underrepresentation of Girls, Blacks and Hispanics.* Accessed May 2023: http://hdl.voced.edu.au/10707/426492.

[54] Rattan, A., Good, C., & Dweck, C. S. (2012). "It's ok – Not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. *Journal of Experimental Social Psychology*.

conversation about the professions that you're familiar with, which are teaching, dentistry, economists, lawyers, doctors and so forth."

Government or peak body stakeholder, ACIL Allen evaluation

These factors negatively affect girls' perceptions of their own STEM abilities and career aspirations,[55] reduce their interest and confidence in STEM study,[56] impact their ability to envision themselves in STEM fields, undermine their motivation to pursue STEM-related opportunities[57] and hinder the long-term engagement of girls and women in STEM.[58]

The drivers of the underrepresentation experienced in secondary education extend into tertiary education. Additional drivers include women's negative experiences of study and work placements which can impact engagement, motivation and willingness to transition into employment.[59]

For those who progress to working in the sector, women's experiences in the workplace and access to support networks exacerbate the isolation experienced by women in STEM fields and can negatively affect progression and retention.[60] Women in STEM professions report a lack of role models and women in senior positions present as an obstacle to career advancement.[61] Access to senior positions in STEM academia and industry have been impacted by perceptions: career breaks, part-time duties and maternity leave are seen as detrimental.[62]

Further, women experience a higher rate of sexual harassment than men (41% compared to 26%) and this is more likely to occur in male-dominated workplaces and industries with strong hierarchical structures.[63] For example, an estimated 71% of women (compared to 30% of men) in electricity, gas, water and waste services and 62% of women (compared to 25% of men) in mining have been sexually harassed.[64]

Girls and women encounter additional complex and unique barriers to STEM participation when they are from First Nations communities, culturally and linguistically diverse communities, rural and remote areas, are living with a disability, non-binary gender

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[55] Garriott PO, Hultgren KM, Frazier J. (2017). STEM stereotypes and high school students' math/science career goals. *J Career Assess*. 25(4):585–600. 87

Miller DI, Nolla KM, Eagly AH, Uttal DH. (2018). The development of children's gender-science stereotypes: a meta-analysis of 5 decades of U.S. draw-a-scientist studies. *Child Dev*. 89(6):1943–55. 88.

[56] Office of the Women in STEM Ambassador (2020). Op. cit.

[57] Harvey-Smith, L, The hunt for the Superstars of STEM to engage more women in science, The Conversation, May 2017, viewed 12 February 2019, https://theconversation.com/the-hunt-for-the-superstars-of-stem-toengage-more-women-in-science-76854.

[58] Google Inc. and Gallup Inc. (2016). Op. cit.

[59] Prieto-Rodriguez, E., Sincock, K., Berretta, R., Todd, J., Johnson, S., Blackmore, K.,... & Gibson, L. (2022). A study of factors affecting women's lived experiences in STEM. *Humanities and Social Sciences Communications*, 9(1), 1-11.

[60] Shedlosky-Shoemaker, R & Fautch, J 2015, Who Leaves, Who Stays? Psychological Predictors of Undergraduate Chemistry Students' Persistence. *Journal of Chemical Education*, vol. 92, no. 3, pp. 408-414.

[61] Vila-Concejo, A., Gallop, S. L., Hamylton, S. M., Esteves, L. S., Bryan, K. R., Delgado-Fernandez, I.,... & Splinter, K. (2018). Steps to improve gender diversity in coastal geoscience and engineering. *Palgrave Communications*, 4(1), 1-9.

Professionals Australia (2018). Op. cit.

[62] Professionals Australia (2018). Op. cit.

[63] National Academies of Sciences, Engineering, and Medicine (2018). *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*. Washington, DC: The National Academies Press.

[64] Prevalence of lifetime sexual harassment (not limited to the workplace).

identities, the LGBTIQA+ community, and disadvantaged backgrounds. Intersectional barriers include:

— *Culture:* unsupportive cultural beliefs about gender roles, women and workforce participation

— *Education institutions and workplaces:* unconscious biases, discrimination, prejudices, stereotypes, harassment, lack of role models and diverse leadership representation

— *Accessibility:* communication barriers, physical infrastructure

— *Entrenched disadvantage:* lack of resources, including lack of access to technology and the internet.

For example, women of colour experience more harassment than men and white women, are more likely to be professionally and socially excluded from networking and report having to work harder to gain similar recognition to their peers.[65]

[65] Nash, M., & Moore, R. (2022). In/visible: The intersectional experiences of women of color in science, technology, engineering, mathematics, and medicine in Australia. *Gender, Work & Organization*.

3.2 Need for government intervention

Key Finding 2 Need for government intervention

> Improving gender quality and diversity in STEM is a collective challenge that needs to be addressed by the government, industry, research and community sectors. There is a core role for government as a key change agent in addressing gender inequality in STEM as both a public good and economic imperative.

Government intervention has been, and will likely continue to be, necessary to drive change across the STEM sector.

There has been a long-term underrepresentation of girls and women in STEM. The challenges in section 3.1 do not have straightforward or quick solutions. Addressing the underrepresentation of girls and women will require improvement across multiple change agents including parents/carers, teachers and careers advisors, tertiary education providers, employers and leadership. Significant sustained and coordinated efforts are required to increase gender equity and diversity in STEM.

"Everyone (parents, schools, universities, government and industry) has a role."

Government or peak body stakeholder, ACIL Allen evaluation

Government has an overarching role in driving gender equality. There is an economic imperative to address gender equality in STEM, given it will contribute significantly to global economic development, competitiveness, job creation and GDP.[66] Government efforts can be in the form of programs (such as these initiatives) and changes to policy, funding and legislation. Government and peak body stakeholders engaged in the evaluation highlighted the core role of government in driving and coordinating change across sectors and life stages.

"Government has a role in helping to create incentives for a top-down culture shift to get businesses and industries on board."

Government or peak body stakeholder, ACIL Allen evaluation

"Government can incentivise the sector as they hold the levers (e.g., research funding from the Australian Research Council and National Health and Medical Research Council, and government procurement)."

Government or peak body stakeholder, ACIL Allen evaluation

There is a role for government in addressing information failure, as the costs of information provision are usually high and the benefits broadly distributed. A key example is the paucity of detailed information available on gender equality in STEM, which hinders the effective allocation of resources, and targeted coordination and collaboration across sectors. There is a need for government investment to support the provision of information to enable all sectors to understand the differences in key metrics across diverse groups and life stages and identify the biggest challenges and opportunities for impact.

[66] Kiviniemi, M. (2015). *Why a push for gender equality makes sound economic sense*. Accessed May 2023: https://www.oecd.org/social/push-gender-equality-economic-sense.htm.

> *"Action requires measurement. Evidence-based policy-making requires the systematic collection of data, aimed at identifying priorities and defining and monitoring key lines of action. Fostering the addition of gender-related dimensions in official statistics is important in this respect."*[67]

Industry has a role in creating cultural change within organisations and across the sector. There is a strong economic case for industry involvement to create diverse workforces to meet future demands. For example, the corporate-social-responsibility programs of some large companies (Google, Boeing, Microsoft) go some way to addressing diversity. However, industry has not coordinated or scaled its investment, despite the growing need for STEM skills in the workforce. This is because the outcomes are likely to be realised in the distant future, reducing the perceived value of investments in the immediate term.

> *"There's a lot the industry could be doing, and I think there is a lack of motivation, particularly in some male-dominated industries, which is why government needs to step in."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

Many government and peak body stakeholders consulted for this evaluation consider that industry can do more. Industry has a key part to play, working in partnership with government to bring about systemic change and overcome coordination challenges that arise due to market competitiveness, contest over limited potential employees and different STEM pathway needs.

> *"There are limitations as to how much government can do without having those entry points into industry."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

[67] Organisation for Economic Co-operation and Development (2018). *Bridging the digital gender divide include, upskill, innovate*. Report for the Australian Government. Paris: OECD.

3.3 Appropriateness of design

Key Finding 3 Design considerations

The initiatives broadly align with the evidence base for effective practice in addressing barriers to participation for girls and women.

Individually, the objectives of each WiSTEM initiative are clear and consistent with the associated policy intent. However, when considered collectively as whole-of-lifecycle supports, there are gaps in the support for early years education, middle management and mid-career women.

Similarly, the initiatives are collectively designed from a mainstream perspective, meaning there are no tailored programs that address the needs of specific cohorts or the nuanced barriers they may encounter.

There is a connection between the initiatives' inputs and activities yet a limited connection with expected outcomes which are long-term and require more significant and sustained funding to deliver.

The design of most initiatives did not incorporate representation of diverse and underrepresented groups and more could be done to address this gap.

3.3.1 Alignment with the evidence base

The design of the initiatives reflects the evidence base for gender equality programs as identified in contemporary literature and research.

Schooling

Introducing children to STEM fields at an early age to nurture their curiosity in STEM can significantly shape girls' career paths.[68] Evidence shows:

— focusing on girls at the primary school level can increase girls' self-efficacy and interest in STEM and may influence their future study and career choices[69]

— teachers, parents and carers play an important role in reinforcing or challenging stereotypes about career and study choices[70] and can influence girls' perception of their STEM abilities and careers[71] [72]

[68] Master, A, Cheryan, S, Moscatelli, A & Meltzoff, A (2017). Programming experience promotes higher STEM motivation among first-grade girls. *Journal of Experimental Child Psychology*, vol. 160, pp. 92-106.

[69] Sullivan, A. & Bers, M. U. (2018). Investigating the use of robotics to increase girls' interest in engineering during early elementary school. *International Journal of Technology and Design Education*.

[70] van Tuijl C, van der Molen JHW (2016). Study choice and career development in STEM fields: an overview and integration of the research. *Int J Technol Des Educ*. 26(2):159–83. 105.
Archer L, DeWitt J, Wong B. (2014). Spheres of influence: what shapes young people's aspirations at age 12/13 and what are the implications for education policy? *J Educ Policy*. 29(1):58–85

[71] Google Inc. and Gallup Inc. (2016). Op. cit.
United Nations Educational, Scientific and Cultural Organisation (2017). *Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM)*. UNESCO. Accessed May 2023: http://unesdoc.unesco.org/images/0025/002534/253479E.pdf.
Google Inc. & Gallup Inc. (2017). *K-12 Computer Science Education*. Accessed May 2023: https://csedu.gallup.com/home.aspx.
The Invergowrie Foundation (2017). *STEM Report, Girls' Future – Our future*. Melbourne: The Invergowrie Foundation.

[72] Google Inc. and Gallup Inc. (2016). Op. cit.
United Nations Educational, Scientific and Cultural Organisation (2017). *Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM)*. UNESCO. Accessed May 2023: http://unesdoc.unesco.org/images/0025/002534/253479E.pdf.

— exposure to diverse anti-stereotypical role models of different ages, genders, cultural backgrounds and appearances can positively influence girls' perception of STEM fields and increase their interest, belonging, confidence, attitudes and self-efficacy in STEM.[73]

Future You, GiST, WiSA and Superstars of STEM clearly align with the evidence base by targeting school-aged students, including diverse role models and engaging teachers and parents/carers.

Tertiary education

The provision of scholarships can greatly benefit university students including women, especially those with diverse and disadvantaged backgrounds.[74] [75] [76] Scholarships enable women to advance professionally and develop the personal attributes, vision and broad range of skills needed for leadership.

Elevate embeds the evidence base in the program design, as an initiative focused on the provision of scholarships and support to women entering STEM studies.

Employment

Evidence shows the increasing women's presence on radio, television and in print is likely to provide positive role models for women,[77] increase confidence among women to act as experts and interviewees and increase the number of women in the audience.[78]

Research on organisational change towards gender equity indicates inclusive leadership is increasingly needed to effect organisational change and is recognised as an essential aspect of effective leadership in business.[79]

Some initiatives focus on organisational change and are aligned with the evidence base that engaging with leaders is necessary to effect organisational change toward improved gender equality (e.g., CCC-STEM and SAGE).[80]

Google Inc. & Gallup Inc. (2017). *K-12 Computer Science Education*. Accessed May 2023: https://csedu.gallup.com/home.aspx.
The Invergowrie Foundation (2017). *STEM Report, Girls' Future – Our future*. Melbourne: The Invergowrie Foundation.

[73] Shin JEL, Levy SR, London B. (2016). Effects of role model exposure on STEM and non-STEM student engagement. *J Appl Soc Psychol*. 46:410–27.
Drury BJ, Siy JO, Cheryan S. (2011). When do female role models benefit women? The importance of differentiating recruitment from retention in STEM. *Psychol Inq*. 22(1):265–9.

[74] Department of Foreign Affairs and Trade (2015). *Building women's leadership: Evaluation of the contribution of Australia Awards Scholarships*. Accessed May 2023: https://www.dfat.gov.au/sites/default/files/ode-brief-womens-leadership.pdf.

[75] Tsui, L. (2007). Effective strategies to increase diversity in STEM fields: A review of the research literature. *The Journal of Negro Education*, 555-581.

[76] Washburn, K., & Bragg, D. D. (2022). How NSF S-STEM scholarship students experience college during COVID-19: Lessons to improve STEM education. *Community College Journal of Research and Practice*, 46(1-2), 49-59.

[77] Shin JEL, Levy SR, London B. (2016). Op. cit.
Drury BJ, Siy JO, Cheryan S. (2011). Op. cit.

[78] Kangas, A., Haider, H., & Fraser, E. (2014). *Gender: Topic Guide.* Revised edition with E. Browne. Birmingham: GSDRC, University of Birmingham, UK.

[79] Coe, I.R., Wiley, R. and Bekker, L.G. (2019). Organisational best practices towards gender equality in science and medicine. *The Lancet*, 393(10171), pp.587-593.

[80] Ibid.

SAGE implements and aligns with the evidence base of the Athena SWAN Charter. Superstars of STEM's focus on women's visibility and capability building aligns with evidence that women's presence in the media provides positive role models for women and girls[81] and increased confidence among women to act as experts and interviewees.[82]

Addressing intersectionality

The evidence base identifies that acknowledging and promoting girls' and women's identities can support improved participation and engagement for those from underrepresented groups. For example, cultural heritage and racial and ethnic identity are crucial to students' emotional wellbeing and academic success.[83]

GiST's inclusion of content for underrepresented groups and Superstars of STEM's focus on selecting diverse women aligns with this conclusion. Rounds 3 and 4 of WiSE have also had a focus on intersectionality and used diverse panel members to assess and award funding.

3.3.2 Clarity and consistency of the WiSTEM initiative objectives

The objectives of each WiSTEM initiative are clear and consistent with the policy intent; however, there are gaps when considered as a suite that aims to address the breadth of barriers for girls and women.

Alignment with policy intent

There is a clear link between government's policy intent and the initiative objectives, which provides the foundation for initiatives to deliver against the identified need.

Most of the initiatives were delivered under the WiSTEM Strategy and NISA. Some initiatives also relate to the WiSTEM Decadal Plan, 2020 WiSTEM Strategy Action Plan, Women's Economic Securities Statement (WESS) and the Towards 2025 Strategy. As noted in section 2.1, these policies and strategies provide the foundation for Australian Government support to improve STEM gender equity.

Whole-of-lifecycle support

The initiatives collectively aim to advocate for and improve gender equality in STEM participation, retention and progression.

Five initiatives have explicit objectives to enhance the visibility of girls and women in STEM as role models and improve girls' and women's awareness and understanding of STEM study and career pathways. Three initiatives provide training and skill development to better equip women to progress in STEM study and careers. Two aim to address organisational and cultural barriers and one aims to provide an evidence base for informed decision-making.

While there was strong support for the range of objectives targeted by the initiatives, government and peak body stakeholders were critical of the focus on visibility and upskilling women. They advocated for the need for a stronger focus on systemic changes

[81] Shin JEL, Levy SR, London B. (2016). Op. cit.
Drury BJ, Siy JO, Cheryan S. (2011). Op. cit.

[82] Kangas, A., Haider, H., & Fraser, E. (2014). Op. cit.

[83] Hung Yee, Kam (2015). *STEM Education For Girls Of Color.* Accessed May 2023: https://commons.und.edu/cgi/viewcontent.cgi?article=2984&context=theses.

at the organisational and societal level, for example, through procurement, funding arrangements and targets.

> *"Training of women is great, but it should not be the main factor that seeks to create change, it needs to be coupled with systemic changes."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

None of the initiatives focus on early-years education, mid-career women or middle-management stakeholders and there is limited focused engagement of underrepresented groups. There is also limited focus on organisational change outside of CCC-STEM, meaning few initiatives address employment structures or environments. The existing initiatives predominantly focus on the STEM pathway from the later years of schooling which creates missed opportunities for early engagement. In addition, the limited concentration on other change agents in the early years of education may limit the collective impact on young women.

> *"A single conversation can open their mind and eyes to the prospects of STEM...we need to be targeting teachers, careers advisors and parents … because they're the people who are likely to have the conversations with school kids."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

There is insufficient focus on middle managers as key influencers of change within organisations. These managers are typically responsible for employment and professional development decisions and drive day-to-day culture. As such, they can be a barrier to realising opportunities for junior staff and to ensuring senior management decisions are implemented (e.g., role modelling policies and procedures).

> *If your line manager is not aware of policies and procedures and not role modelling it, then it doesn't matter what's happening at the higher level.*
>
> Government or peak body stakeholder, ACIL Allen evaluation

Intersectionality

Most of the initiatives were not designed to address intersectionality which is evident in the broad audiences for all initiatives.

There has been an increasing focus on intersectionality over time. However, it is typically applied as a lens to a mainstream initiative rather than embedded in the design and core functionality of the initiative.

Stakeholders reported varied views about the best way to support diverse groups to participate in STEM studies and careers. Some considered individually tailored initiatives are required, while others supported special targeting within existing initiatives.

Respondents to ACIL Allen's survey highlighted the mixed focus on intersectionality across the initiatives. For example, a small number of qualitative responses from SAGE participants showed SAGE could better communicate about, be inclusive of and support organisations to consider diversity.

> *"SAGE has provided an invaluable platform for advancing gender equity in higher education, but has been slow to respond to its community feedback regarding Aboriginal and Torres Strait Islander, gender diversity, and intersectional priorities."*
>
> *SAGE participant, ACIL Allen 2023 evaluation survey*

"Intersectionality is important, but they [SAGE] very strongly talk about LGBTIQA+ and less about race, disability, age, First Nations etc."

SAGE participant, ACIL Allen 2023 evaluation survey

3.3.3 Connection between initiative inputs, activities and expected outcomes

There are limited connections between the inputs, activities and expected outcomes of the initiatives.

Inputs include government funding and, for some initiatives, additional cash and in-kind support from the sector. Inputs have enabled the initiatives to conduct activities, including developing and promoting resources, promoting the visibility of women in STEM, providing advice to the government, organisations and key influencers, developing an evidence base and identifying and removing structural, systemic and cultural barriers in STEM organisations and academia.

While there are strong links between the inputs and activities across the WiSTEM initiatives, there is a significant disconnect between the inputs and expected outcomes of the initiatives. Many of the initiatives aim to achieve long-term systemic and attitudinal change in the STEM sector but were not designed with sufficient reach in mind and subsequently fail to provide proportionate or sustained resources to do so. The types of challenges the WiSTEM initiatives target are highly complex, and these types of outcomes typically require sustained investment and activity over an extended period of time.

"With many programs, we don't give enough continuity of funding to show impact over time."

Government or peak body stakeholder, ACIL Allen evaluation

WiSE is an example of an initiative that has evolved to establish better connections between inputs, activities and expected outcomes. WiSE Rounds 1 and 2 provided small and short-term funding for pilot projects. Rounds 3 and 4 had longer-term and larger grants; this has positioned grantees to scale and deliver broader change.

Some government and peak body stakeholders questioned the ability of these initiatives to deliver outcomes at scale. Under-resourcing of some initiatives has hindered the concentration of effort required to make substantial change. For example, WiSE was oversubscribed across its funding rounds (7% success rate). There is clearly strong demand for support in the sector.

"Through these types of programs…. [there is misalignment between] the magnitude of the problem and the scale at which we are approaching it."

Government or peak body stakeholder, ACIL Allen evaluation

3.3.4 Selecting participants and projects

The mechanisms used by Elevate and WiSE to select projects and participants for initiatives have been largely successful.

The application, assessment and selection processes for Elevate scholarships are underpinned by inclusivity, accessibility and racial empathy. Elevate's application process

is short, simple and hosted on a user-friendly platform.[84] The application process is supported by a robust communications plan that clearly outlines communication objectives, key messages, target audiences, budgets, timelines and a monitoring and evaluation approach. This process was very well received by application assessors.

WiSE has been largely successful in selecting projects. However, the Grant Committee became inefficient when it increased from 4 people in Round 2 to 25 people in Round 3. While this aimed to better distribute the workload and diversify the views of the assessors, it created administrative burdens and inconsistencies. A better balance was achieved for Round 4 when the Grant Committee was reduced to 11 people. This process could be improved to reduce oversubscription and minimise the associated burden on the sector, for example, through more focused grant eligibility and assessment criteria or expressions of interest stages.

3.3.5 Inclusion of underrepresented groups in the initiatives' design and delivery

The design and delivery of most initiatives did not incorporate the representation of diverse and underrepresented groups.

The design process collectively involved consultation with stakeholders across and outside the STEM ecosystem, including those in industry, the research sector, government and those with lived experience. However, underrepresented groups were poorly represented in this process for most initiatives.

Underrepresented groups were involved in the initial design processes of Elevate, with the Australian Academy of Technological Sciences and Engineering (ATSE) demonstrating a strong focus on diversity and inclusion during the application process and assessment process (including assessors who were inclusive and part of underrepresented communities). The commitment of the Elevate design process to the inclusion of diverse groups is reflected in the Elevate Monitoring, Evaluation and Learning (MEL) plan, which aims to have representation from at least 5% First Nations, 5% regional/rural, 5% low SES, 5% scholars identifying with a disability and 5% LGBTQI+ scholars.

For WiSE, underrepresented groups were not a specific focus of the initial initiative design. However, the National Indigenous Australians Agency (NIAA) were involved in supporting a focus on intersectionality in the delivery of WiSE Rounds 3 and 4. While intersectionality was identified as a focus for these rounds, grant guidelines lacked explicit mention of different diverse groups.

Initiatives had implemented varying approaches to program governance, with some leveraging existing structures and others convening groups. Arrangements also differed in the level of formality, with some meeting regularly and others on an as-needs basis. There was no evidence that initiatives had consistently accounted for diversity in the representation of governing bodies.

3.3.6 Adequacy of resourcing for design

The resourcing for the design of most initiatives was appropriate but often conducted within compressed timeframes.

[84] Australian Academy of Technological Sciences Engineering (2022). *Case study: Diversifying our STEM future for impact*. Canberra: Australian Academy of Technological Sciences and Engineering.

As discussed above, the design process generally involved consultation with stakeholders across and outside the STEM ecosystem. Effectively undertaking consultation takes time, through time to effectively plan for consultations, to undertake engagement and to authentically respond to feedback.

Delivery partners reported that the timelines for design were often quite short as a result of government reporting cycles and that these timelines did not account for deep consultation or co-design processes. For Elevate, timelines for the consultation and co-design process were adjusted to avoid risk to the quality of the design. Others were generally able to accommodate design within planned timelines but did note that there were significant impacts on staff and workload.

3.4 Initiative connectivity

Key Finding 4 Initiative connectivity and resourcing

The initiatives do not operate as a consistent, holistic suite. There has been no overarching policy to guide design or delivery and engagement between initiatives has been ad hoc and not coordinated at a strategic or operational level.

There is limited interaction with related programs operated by other departments and agencies or with state and territory investment and community organisations.

A more coordinated whole-of-government approach could reduce overlap, duplication and inefficiencies.

3.4.1 Connectivity between the initiatives

The initiatives do not operate as a consistent, holistic suite.

The initiatives were designed and delivered from a range of government policies and strategies. The department's policy team has sought to fill gaps in the collective approach over time to build a more consistent lifecycle approach. However, there has been no overarching policy to guide design or delivery.

There is some engagement between the initiatives and associated participants. For example:

- organisations involved in CCC-STEM and SAGE, with employees in Superstars of STEM
- WiSE funding the pilots of WiSA and Superstars of STEM, encouraging applicants to use the STEM Equity Monitor, and as subscribers to SAGE
- STEM Equity Monitor informed the design of areas of focus for WiSE and Elevate
- WiSA presentations at CCC-STEM meetings, delivery and promotion of Future You, involvement in the Elevate advisory committee and WiSE Grant Committee
- Superstars of STEM provided models for some of the Future You characters
- meetings between Future You and GiST to align rather than duplicate the content.

However, while the initiatives provide support across most life stages, this is not well connected, either structurally or operationally. Connections between initiatives are ad hoc; this limits the extent to which scaffolded, whole-of-lifecycle supports are provided for participants and requires participants to identify their support needs at a point-in-time, rather than access a connected pathway of support from school into employment.

Most government and peak body stakeholders reported a strong need for an overarching coordination role to coordinate the initiatives. The initiatives could better reference and promote each other to raise awareness of the supports available as a person moves across the lifecycle. This would aid cohesion and prevent initiatives from operating alone. Most stakeholders considered this an important role for government, with strong involvement from the community, research, industry and education sectors.

> *"Government's role [is to build a] cohesive approach to Women in STEM rather than this more Ad Hoc approach, [their role is to deliver a] program where there's a gap."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

3.4.2 Alignment and interaction with other government programs and initiatives

There has been limited engagement between the initiatives and related government programs.

Government and peak body stakeholders identified a range of related government programs and initiatives that could be, yet are not currently, connected with the WiSTEM initiatives. These suggestions were largely for programs operated by other departments and agencies, including but not limited to:

- Department of Education, which delivers school and higher education-focused programs (e.g., mathematics Massive Open Online Courses and Mathematics Hub) and seeks to coordinate with the states and territories to support the creation of national, Australian Curriculum-aligned and freely available resources for teachers
- National Indigenous Australians Agency, which delivers programs for First Nations girls and women (e.g., Indigenous Girls' STEM Academy, delivered in partnership with CSIRO and Career Trackers)
- Jobs and Skills Australia, which delivers skills and workforce programs
- Defence Science and Technology Group, which delivers education and skills programs (e.g., STEM Cadetship Program)
- CSIRO, which delivers school, higher education and workforce programs and programs for diverse cohorts (e.g., Indigenous STEM Education, Young Indigenous Women's STEM Academy).

> *"[We need to build] a thriving system of programs that are really effective [and] … doing their bit of the work with a really clear, deliberative focus. [For efficiency, these programs should] cross-reference each other and hand cohorts off to the next stage in the lifecycle, rather than everyone trying to copy each other's attributes or … crowd in on each other's space."*
>
> *Delivery partner, ACIL Allen evaluation*

Stakeholders noted the significant level of investment at a state and territory level and the work undertaken by community organisations, with which there is little interaction. A more coordinated, whole-of-government approach could help to reduce the risk of overlap, duplication and inefficiency. Stakeholders also identified the need for a more strategic and coordinated focus across the challenge, including public and private sector initiatives. This would reduce duplication, concentrate resources in areas that deliver the most benefit, raise awareness of the supports available and support greater collaboration rather than competition.

> *"There are too many programs for people to be across the huge number that are out there… there needs to be some sort of cohesion."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

4 Delivery of the initiatives

This chapter discusses the delivery of the initiatives, including the effectiveness and efficiency of the delivery, initiative reach, and initiative evaluation readiness.

4.1 Efficiency

Key Finding 5 Efficient delivery of the initiatives

Overall delivery timelines have been met for 6 initiatives. Delays have impacted the timely delivery of some initiatives as a result of the COVID-19 pandemic and short-term contract arrangements. Greater certainty around timeframes and funding would improve the delivery efficiency, noting departmental flexibility has been valued.

Six initiatives have delivered approximately on budget to June 30 2022 with 2 delivering under budget and one significantly over budget. Funding is ongoing and can be re-profiled for some initiatives across the remaining years. However, the significant overspending by the STEM Equity Monitor reflects the true operational costs and the need for additional funding.

The initiatives have collectively reached participants across the education sector, parents/carers, the university and research sector, the STEM industry and workforce and the government.

Some initiatives take a passive approach to reaching their audience, while others target specific groups of people through outreach and direct engagement. However, the initiatives did not set targets for the extent of reach and, as such, it is not possible to assess the effectiveness of each initiative's reach.

There is limited evidence to suggest reach extends beyond the intended initiative participants. Reach has been limited by initiative scope and resourcing, with more sustained resourcing needed to increase reach.

Overall reporting requirements have been effective in measuring activity, output and shorter-term outcomes without creating an undue administrative burden for delivery partners. Reporting for SAGE subscribers is overly burdensome and a key barrier to participation.

4.1.1 Timely delivery of the initiatives

Overall delivery timelines have been met for 6 initiatives. However, contextual factors impacted the delivery timeframes for 3 initiatives, and created delivery challenges for 3 initiatives.

Three initiatives have been impacted by the COVID-19 pandemic. For Superstars of STEM, school engagement was delayed for one cohort, leading the department and STA to agree on a 6-month extension to the funding round. SAGE participants were significantly affected by reduced revenue from international student enrolment.[85] This delayed SAGE moving to a full cost-recovery model and expanding its reach. Most WiSE

[85] Wells Advisory (2021). *Forward impact of COVID-19 on Australian higher education*. Report for Tertiary Education Quality and Standards Agency. Canberra: Wells Advisory.

Round 3 projects were delayed due to internal processes, which meant the majority were ineligible to apply for funding under WiSE Round 4 due to the requirement for projects to be completed and evaluated.

Short grant contracts created delivery challenges for 3 initiatives, noting difficulties did not impact overall delivery. For WiSA and Future You, short grant timeframes and variations resulted in employment uncertainty, higher staff turnover and delivery delays. This also impacted the types of research opportunities and partnerships WiSA could explore, with a focus on shorter-term engagements. The STEM Equity Monitor was impacted by both internal and external (in data agencies) staff shortages and turnover, noting this occurred even with greater funding certainty. This impacted the ability of the STEM Equity Monitor team to secure data from partners on time and gain approval for publishing data on time.

While the department has provided flexibility for the organisations to amend delivery arrangements, greater certainty around internal timeframes and approvals processes, as well as further funding certainty, would better support initiatives to resource and deliver as planned.

4.1.2 Delivery within scope and budget

Overall, initiative delivery has been on budget for 6 initiatives to date.

The comparison of initiative expenditure relative to budget allocation is a measure of delivery efficiency. Table 4.1 shows the budget and actual expenditure for each initiative, under or overspending and the funding end date. Six initiatives have delivered approximately on budget (less than 10% variation) to June 30 2022, noting government funding for some of these initiatives is ongoing. Three initiatives have been delivered outside the budget, ranging from 33% under to 50% over budget.

This difference can be partially attributed to differences in structure, as some delivery partners bring in additional revenue from subscriptions whereas others rely on departmental grant funding. Furthermore, as initiatives are at different stages, these figures were not directly comparable between initiatives.

Larger underspending occurred for Elevate (-14%) and SAGE (-33%). This was due to operating commencement delays for Elevate, and COVID-19 impacts for SAGE (see section 4.1.1). The STEM Equity Monitor had a significant overspend (50%) due to higher-than-anticipated labour and materials development costs.

Expenditure over or under budget can be re-profiled across the remaining years to ensure the initiative is delivered on budget overall. However, for STEM Equity Monitor, the significant overspend reflects the true operational costs of adequate staffing and the initiative likely requires additional funding to deliver on its scope.

Table 4.1 Budget and actual expenditure, by initiative, to end FY21/22

Initiative	Budget*	Actual*	% Difference	Funding end date
WiSE	$ 9,945,577	$ 10,690,556	7%	2025
CCC-STEM^	$ 969,099	$ 1,039,261	7%	2019
SAGE	$ 7,903,175	$ 5,330,947	-33%	2023
Superstars of STEM	$ 1,573,800	$ 1,485,948	1%	2025
GiST	$ 871,247	$ 803,545	-8%	2024
WiSA	$ 2,496,584	$ 2,496,466	0%	2023
STEM Equity Monitor	$ 829,000	$ 1,242,071	50%	2029
Future You	$ 1,145,701	$ 1,246,765	9%	2023
Elevate	$ 400,000	$ 286,178	-14%	2028

* Budget and actual expenditure up to the end of financial year 2021-2022.

^ Only showing figures for Phase 3 of CCC-STEM April 2018 – June 2019.

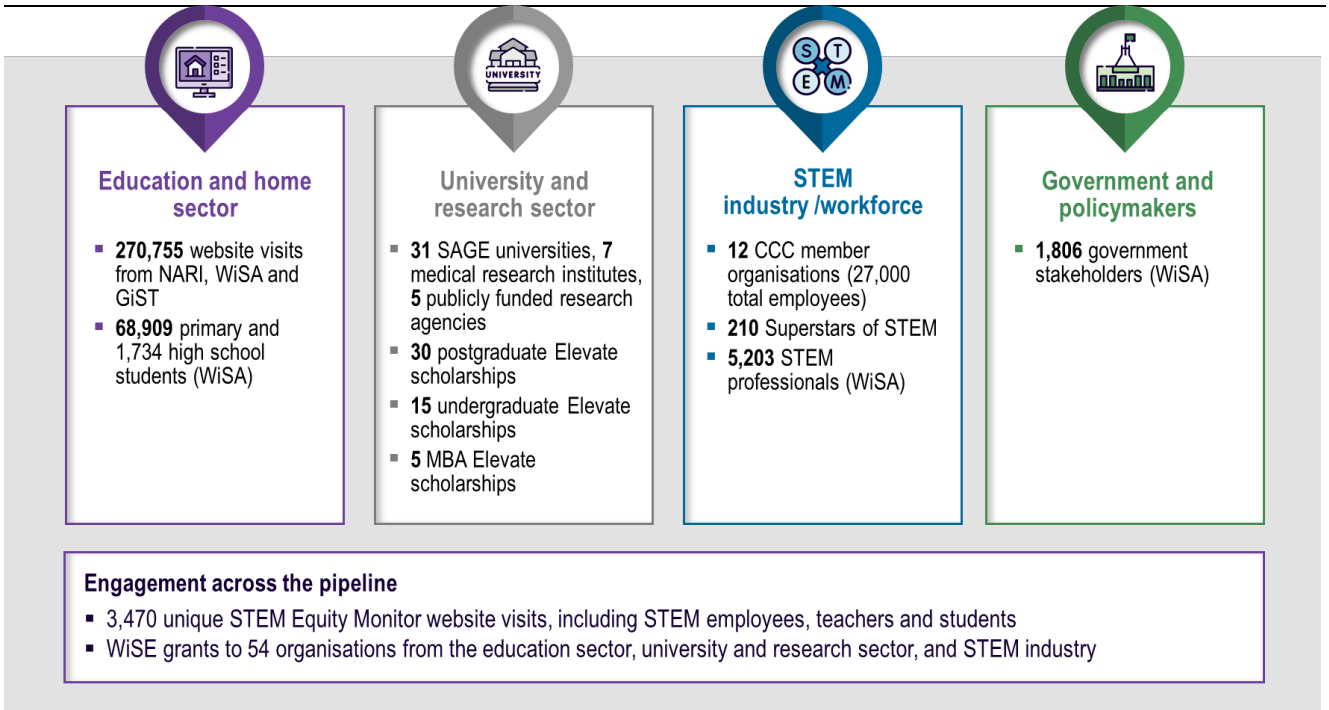
Source: ACIL Allen, initiative data and discussions

4.1.3 Initiative reach

The initiatives collectively reach direct participants, families, teachers/educators, employers and government personnel. However, it is challenging to assess their reach due to the lack of clear targets. Reach has been limited by scope and resourcing.

Figure 4.1 summarises the collective reach of the WiSTEM initiatives to date by the intended target audience.

Figure 4.1 Reach of the WiSTEM initiatives



Note: figures represent the data available at the time of finalising this report, noting some initiatives have only begun collecting data from a point in time – see appendices for details.

Source: ACIL Allen, various sources

Some initiatives were designed to reach stakeholders across all sectors (i.e., STEM Equity Monitor, WiSE and WiSA), while others focus on specific audiences (i.e., SAGE, CCC-STEM). Elevate is the only initiative with a clear target and reporting requirement, as outlined in its Grant Agreement (i.e., 500 scholarships over the delivery period). The lack of clearly defined targets for other initiatives makes it challenging to assess whether the initiatives were meeting expectations.

The initiatives reach their audiences using different approaches. The website and portal initiatives (Future You, GiST and STEM Equity Monitor) have a large but passive reach, where users must respond to awareness-raising efforts or individually seek out the initiatives. Some initiatives also maintain social media accounts and newsletters.

At present, parents/carers, teachers and school-aged girls have predominantly been reached through passive initiatives. The university and research sector has targeted engagement through SAGE, Elevate and WiSE. STEM industry employees receive targeted engagement for early (Superstars of STEM) and late (CCC-STEM) career employees and, indirectly, broader organisational staff (CCC-STEM). Government stakeholders have been reached through the STEM Equity Monitor and WiSA.

There is limited evidence to suggest initiative reach extends beyond direct initiative participants. The extent of initiative reach, engagement and impact also operates as a spectrum across the initiatives. For example, broad, passive reach is unlikely to allow for sufficient focused and sustained engagement to deliver outcomes (e.g., GiST, Future You, WiSA, STEM Equity Monitor). In contrast, focused support with repeated engagement over a long period of time is likely to result in lower reach yet more sustained engagement and potential for change (e.g., Superstars of STEM, CCC-STEM, SAGE).

Reach has been limited by the scope and resourcing of the initiatives. More sustained resourcing may lead to increased reach across the intended audience.

4.1.4 Reporting requirements

Overall, reporting requirements have been largely effective in measuring activity, output and shorter-term outcomes without creating undue administrative burdens.

The 7 initiatives delivered by external delivery partners have provided routine progress reports and final reports to the department, in line with the grant agreements. These reporting requirements were broadly consistent and included reporting on progress toward milestones, engagement activities, outcomes and expenditures. These requirements have captured initiative outputs and short-term outcomes without creating an undue administrative burden. Medium- and long-term outcomes were not captured clearly across initiatives (see section 5.1). The progress reports provide data for the department to identify and discuss delivery risks (e.g., engagement challenges during the COVID-19 pandemic), funding (e.g., to re-profile funding over time), and support future evaluation (see section 4.2.2).

CCC-STEM no longer has active reporting requirements as grant funding ended in 2019 when the initiative became self-sustaining through industry funding. During the grant period, the initiative had straightforward reporting processes that captured activities, outputs and short-term outcomes without creating an administrative burden. Since completing the grant, CCC-STEM reports on member outcomes at an organisational level, relating to recruitment, retention, progression and representation, and staff perspectives on policies.

The STEM Equity Monitor reports internally to the department's policy team. Reporting requirements include project planning, progress, risks, financials and timelines and are

not perceived as overly burdensome. The WiSE program is delivered by Grants Delivery and Business Services Division[86] and individual projects are evaluated against the grant agreements. The department undertook an internal evaluation of the WiSE program in 2022 and found no evidence the cost of compliance was not commensurate with perceived benefits to either the program or stakeholders.[87]

Reporting requirements for some initiative participants have been more burdensome. SAGE subscribers complete a comprehensive process for assessing baseline status and progress and creating action plans to apply for awards (see Appendix F). Subscribers report the administrative processes were labour-intensive, burdensome and not proportionate. This was identified by several subscribers as a key barrier to participation. Reporting for WiSE grantees for Rounds 1 and 2 was similar to those described at the WiSTEM initiative level, for the externally delivered initiatives and did not cause an undue administrative burden. Rounds 3 and 4 required more comprehensive reporting through the WiSA self-evaluation tool[88] which enabled more detailed reporting on outputs and outcomes and the assessment of impact (see Appendix I).

Embedding reporting processes early in delivery has enabled the department to monitor progress and identify and mitigate delivery challenges with delivery partners. Reporting is not administratively burdensome yet could have been expanded to capture more fulsome outcomes reporting to support future evaluations (see section 4.2).

[86] Previously AusIndustry Division

[87] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[88] Office of the Women in STEM Ambassador (2023). *STEM Equity Evaluation Portal*. Accessed May 2023: https://evaluation.womeninstem.org.au/.

4.2 Initiative evaluation readiness

Key Finding 6 Initiative monitoring and evaluation readiness

The level of evaluation planning varies across initiatives. This creates inconsistencies for this, and future, evaluations when aggregating and comparing across initiatives.

Evaluation readiness has been hindered by a lack of reporting requirements against a collective evaluation framework for the initiatives. There is limited alignment between each initiative's intended outcomes outlined in their foundational documents (e.g., grant agreement, project plan), the data collection and reporting practices, and the measured outcomes in the WiSTEM Framework.

Initiatives were evaluation-ready in the context of short-term outcomes but most were not ready to be evaluated for progress toward medium- and long-term outcomes.

Collective evaluation design needs to be embedded into initiative design and delivery if the initiatives are to be evaluated as a suite moving forward.

4.2.1 Evaluation planning

The level of evaluation planning and associated data collection processes varies across initiatives.

This is to be expected given the variation in commencement dates and initiative approaches. Some initiatives have embedded evaluation as a core focus (e.g., WiSA), with planning documents developed early in the initiative.

The department included evaluation requirements in grant agreements with delivery partners. This has guided evaluation and ongoing data collection. Evaluation requirements were not initially included for GiST, STEM Equity Monitor or WiSE, noting the department has internal evaluation guidelines that specify timing for evaluations.[89] Initiatives have added evaluation considerations over time, together with ad hoc stakeholder engagement, but do not have ongoing data collection mechanisms.

Variation in the initiatives' approach to evaluation provides flexibility for each initiative to collect the appropriate datasets when needed. However, it creates inconsistencies when seeking to aggregate or compare delivery and achievements across initiatives. This can hinder future evaluation processes.

More considered planning for evaluation during the design phase would allow for more routine and effective data collection processes to be established and standardised across initiatives, where appropriate. It would also support better use of evaluation insights for ongoing review and planning.

4.2.2 Evaluation readiness

Initiatives were ready for an evaluation of short-term outcomes but not medium- and long-term outcomes.

All initiatives were assessed as evaluation-ready in the context of short-term outcomes (see Table 4.2). All initiatives have sufficient data collection and reporting in place to measure the success of activities, outputs and outcomes in the short term. However, most initiatives were not ready to be evaluated for progress toward medium- and long-term outcomes because:

[89] Department of Industry, Innovation and Science and Office of the Chief Economist (2017). *Evaluation Strategy 2017-21*. Canberra: Department of Industry, Innovation and Science.

— initiatives have not been in place long enough for these outcomes to emerge
— initiatives do not have data collection mechanisms in place to determine whether outcomes were being achieved
— outcomes delivered were difficult to attribute impact to a single initiative and within the broader cultural change occurring within society
— there are challenges in measuring the contribution to generational attitudinal change, particularly in the short term.

Although many medium- and long-term outcomes were not ready to be evaluated, some initiatives were better prepared for future evaluation using the WiSTEM Framework than others, as outlined in Table 4.2. If the initiatives are to be evaluated as a suite, with key metrics aggregated and compared, collective evaluation design will need to be embedded into initiative design and delivery moving forward.

Table 4.2 Evaluation readiness of short-, medium- and long-term outcomes, by initiative

Initiative	Short-term outcomes		Medium-term outcomes		Long-term outcomes	
	Evaluation readiness	Reason	Evaluation readiness	Reason	Evaluation readiness	Reason
WiSE	●	Sufficient data collected and outcome demonstrated	◑	Some anecdotal data collected and some mechanisms in place (annual internal evaluation)	○	No data collected and no mechanisms in place
CCC-STEM	◑	As above	◑	Some data collected and mechanisms in place (data analysis, consultations)	○	No data collected and no mechanisms in place for broader STEM sector
SAGE	●	As above	◑	Some data collected and some survey mechanisms in place	◑	Some data collected and some survey mechanisms in place
Superstars of STEM	●	As above	◑	Some data collected and some mechanisms in place (ad hoc evaluation and regular surveys)	◔	No data collected with limited survey mechanisms in place
GiST	●	As above	◔	Limited data collected and limited mechanisms in place (ad hoc stakeholder engagement)	○	No data collected and no mechanisms in place
WiSA	●	As above	◔	Limited anecdotal data collected and limited mechanisms in place (ad hoc evaluation)	○	No data collected and no mechanisms in place
STEM Equity Monitor	●	As above	◔	Limited data collected and limited mechanisms in place (ad hoc evaluation)	○	No data collected and no mechanisms in place
Future You	●	As above	◔	Limited data collected, with limited mechanisms in place (ad hoc evaluation)	○	No data collected and no mechanisms in place
Elevate	●	As above	◑	Some data collected (early stages), with survey mechanisms in place	◔	No data collected with limited survey mechanisms in place

Note: ○ No data collection mechanisms in place ◔ Limited data collection mechanisms in place; ◑ Some data collection mechanisms in place; ● Strong data collection mechanisms in place

Source: ACIL Allen analysis of initiative data

5 Impact of the initiatives

This chapter addresses the initiatives' outcomes and value delivered.

5.1 Evidence base for assessment

Key Finding 7 Overview of outcomes

There are positive impacts for participants, but it is clear sustainable cultural change will take time. Assessing the effectiveness of the 9 initiatives at this stage would be premature. Many of these initiatives are generational change initiatives and it will take time for the impacts to be observable at the aggregate level. The evidence to date is positive and identifies both the critical need, and the need to continue, to drive change so the next generation no longer needs support of this sort.

The WiSTEM initiatives as a suite have been measured according to overarching short-, medium-, and long-term outcomes. These outcomes have been categorised for the purpose of this assessment into 4 domains:

- education, including girls' and women's motivation, ability and choice to study STEM, teachers' and parents'/carers' ability to support girls, and equal opportunity and improved participation, retention and progression in STEM studies
- employment, including girls' and women's motivation, ability and choice to pursue STEM careers, better positioning of organisations to employ, retain and progress STEM-qualified women, reduced barriers and equal opportunity to participate, retain and progress in STEM
- government, including better-informed government interventions
- cultural change, including sustainable change in cultural and societal expectations for girls and women in STEM.

A summary of the evidence available to assess relevant outcomes for each initiative is provided in Table 5.1. This shows the paucity of information available to assess outcomes. The table also demonstrates the outcomes each initiative was measured against, noting some initiatives have a narrower focus than others. The assessment drew on initiative documents, evaluation data collected by delivery partners, a survey conducted by ACIL Allen, publicly available data and insights from consultations with government and peak body stakeholders. The quality of evidence also varied across outcomes, in terms of sample size, granularity and data relevance.

At this stage, it is only possible to assess the contribution of some WiSTEM initiatives to short-term outcomes, as discussed in section 4.2.2. Where available, comments have been included on the leading indicators of progress toward medium- and long-term outcomes. Note that the data below on gender identity is limited to male/female as other gender identities were not provided due to small sample sizes.

Table 5.1 WiSTEM initiatives and availability of evidence to assess outcomes

	WiSE	CCC-STEM	SAGE	Superstars of STEM	GiST	WiSA	STEM Equity Monitor	Future You	Elevate
Education									
Short-term outcomes									
3.1.1. Extent to which more girls and women are motivated and able to study STEM subjects and courses	◔	N/A	N/A	◑	◑	◔	N/A	◑	●
3.1.3. Extent to which teachers and parents better support girls to pursue STEM studies and careers	◔	N/A	N/A	N/A	◑	○	N/A	◑	N/A
Medium-term outcomes									
3.2.1. Extent to which more girls and women choose to study STEM subjects or courses	○	N/A	N/A	◔	◑	○	N/A	○	●
Long-term outcomes									
3.3.1. Extent to which there are equal opportunity and improved participation, retention, and progression in STEM studies	○	N/A	◔	○	◑	○	○	○	◑
Employment									
Short-term outcomes									
3.1.2. Extent to which more girls and women are motivated and able to pursue STEM careers	◔	○	○	●	○	○	N/A	◑	◑
3.1.5. Extent to which organisations are better positioned to employ, retain, and progress STEM-qualified women	◔	◑	●	N/A	N/A	○	N/A	N/A	N/A
Medium-term outcomes									
3.2.2. Extent to which more women choose to pursue STEM careers	○	○	○	○	N/A	○	N/A	N/A	◑
3.2.3. Extent to which more women continue and progress in STEM careers	○	◑	◑	●	N/A	○	N/A	N/A	○
3.2.5. Extent to which societal and organisational barriers to participation, retention, and progression are	○	◑	◑	◑	○	◔	N/A	N/A	N/A

reduced in STEM careers									
Long-term outcomes									
3.3.2. Extent to which there are equal opportunity and improved participation, retention, and progression in STEM careers	○	◑	◑	○	N/A	○	○	N/A	○
Government									
Short-term outcomes									
3.1.4. Extent to which government interventions are better informed by the evidence base and pilot results	◔	N/A	N/A	N/A	N/A	◔	◔	N/A	N/A
Cultural change									
Long-term outcomes									
3.3.3. Extent to which there are sustainable change in societal expectations in girls and women' STEM studies and careers	○	○	N/A	○	N/A	○	○	N/A	N/A

Note: KEQ 3.2.4 Extent to which government interventions (i.e., WiSTEM initiatives) operate as a consistent, holistic suite with a proportionate focus on critical issues is discussed collectively in section 3.4.

The Harvey balls demonstrate the availability of evidence the project has achieved each outcome.

● strong quantitative and qualitative evidence available through an external evaluation, ◑ some evidence available through internal quantitative or qualitative data, ◔ limited evidence available or only qualitative evidence, ○ no evidence available, N/A initiative is not measured against the outcome.

Source: ACIL Allen analysis of initiative data

5.2 Education outcomes

Key Finding 8 Education outcomes

Participants in the WiSTEM initiatives reported positive short-term education outcomes from their involvement. These include improved motivation and ability to pursue STEM education. However, data is typically self-reported at a point in time and does not track whether the motivation was sustained or led to behavioural change.

Public data shows there has not been substantial movement over time in the attitudes of girls and women to STEM study and careers. There was a clear difference in STEM career aspirations between cohorts of diverse women. There has been no change in teachers' confidence and a decrease in the importance that parents/carers place on STEM education for the acquisition of a good job.

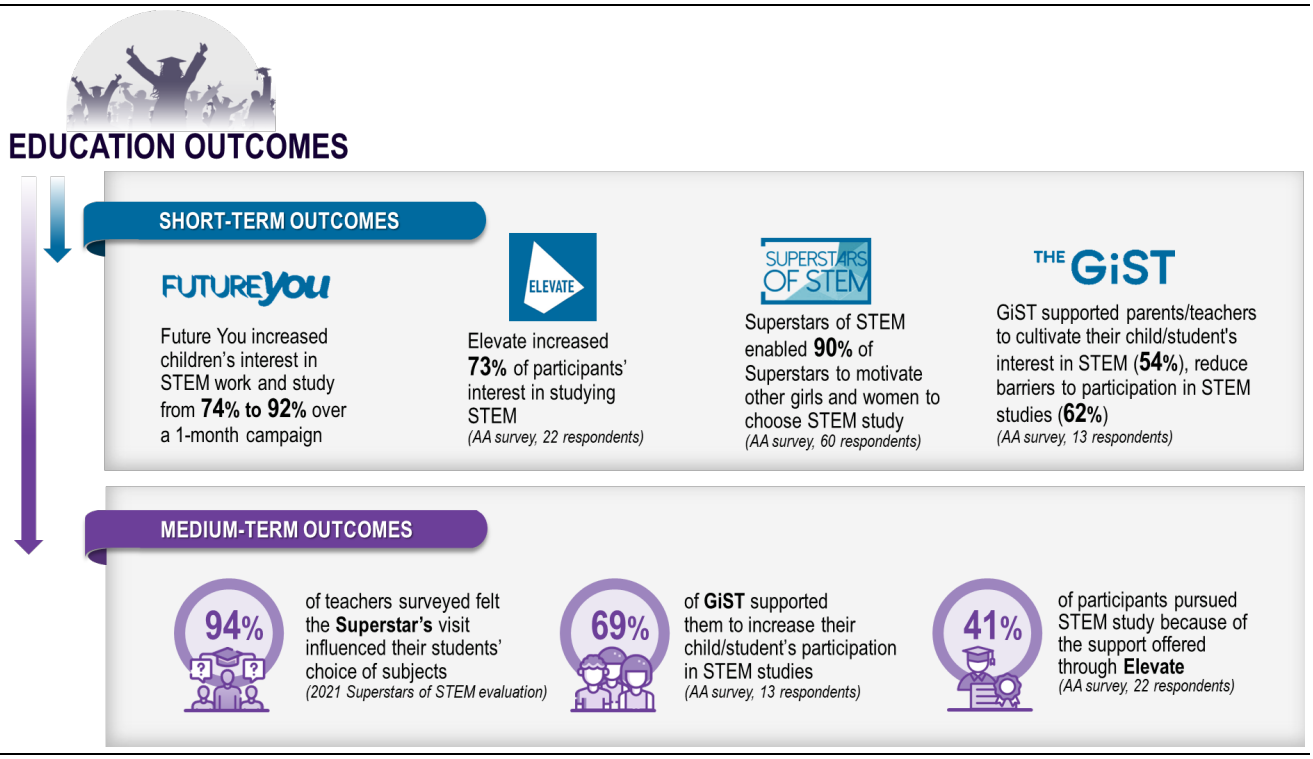
The gender balance in post-school STEM study has grown. However, there has been slow growth in the proportion of women choosing to study STEM. This is likely due to an increase in women undertaking tertiary study more generally.

5.2.1 Initiative outcomes

The WiSTEM initiatives have delivered education outcomes, predominantly in the short term. A summary of educational outcomes delivered by the initiatives is provided in Figure 5.1.

The initiatives have improved awareness and motivation to study STEM among participating girls and women. This is evidenced through self-reported increased interest among girls and women and the increased capability of parents/carers, teachers and Superstars to build girls' and women's interest and motivation. Participants also self-reported that the initiatives enabled them to pursue STEM studies by reducing barriers to participation.

Figure 5.1 Education outcomes



Note: * ACIL Allen survey, ^ Future You evaluation, # Superstars of STEM evaluation

Source: ACIL Allen, various sources, Office of the Women in STEM Ambassador (2020). Op. cit., Science and Technology Australia (2021). Superstars of STEM Evaluation Report 2019-21. *Canberra: Science and Technology Australia.*

There are caveats on these data that should be considered. Firstly, most initiatives collect point-in-time data and do not track whether this leads to action. For initiative participants, it was not possible to track whether their motivation translated into pursuing, continuing in and progressing in STEM studies. For parents/carers and teachers, it was not possible to determine whether their participation led them to increase the interest and motivation of girls and women. Secondly, the data used to evidence short-term impacts was largely self-reported. This means it is not possible to independently verify the information provided.

In the medium term, participants of some initiatives reported the initiatives supported more girls and women to choose to study STEM subjects or courses. However, this was typically self-reported by influencers (parents/carers, teachers, Superstars), rather than by the girls and women themselves. Further, outcomes can appear in the long term after the initiative has ended and may not be tracked.

5.2.2 Outcomes across Australia

Taken as an aggregate, there has not been substantial movement in the attitudes of girls and women to STEM study and careers in 2018, 2019 and 2021.

Further, participants in the YouthInsight surveys cannot be individually linked with any WiSTEM initiative and no conclusions can be made regarding the impact of the initiatives from this data. However, this data does present insights into the broader changes in the sector.

Perspectives of young people, teachers and parents/carers

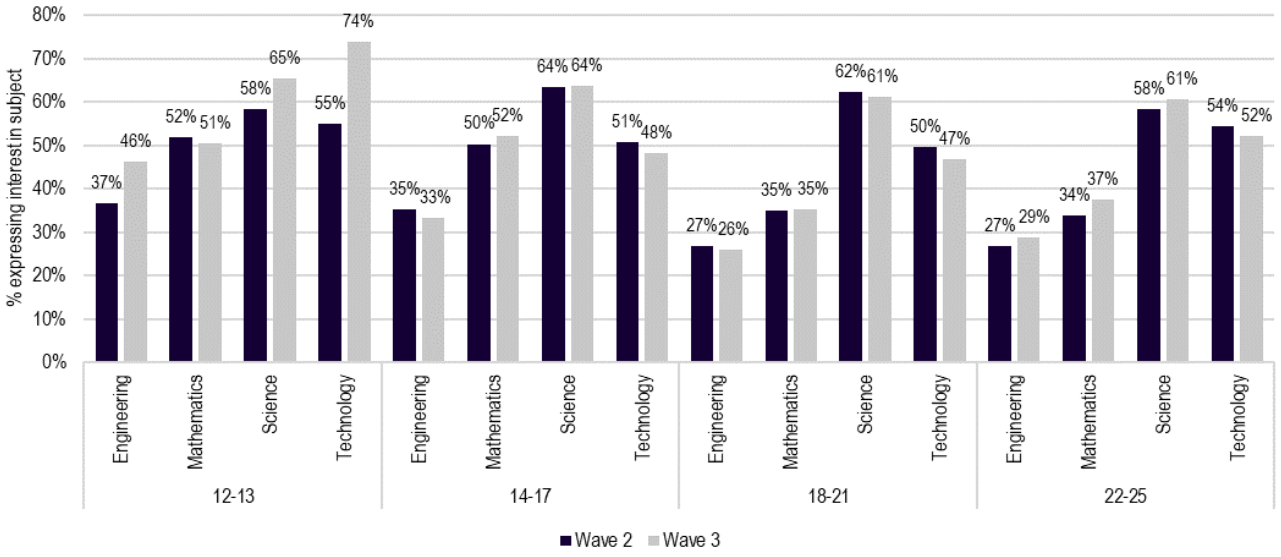
Young people

There has been an increase in girls' and women's confidence in their ability to achieve good marks in STEM subjects but no change or a decrease was seen in importance, interest and aspiration. However, there are only 2 time points available for analysis due to the limited granularity of Wave 1 data.

Interest in STEM subjects for girls and women declines with age across all STEM disciplines (see Figure 5.2). A similar age-based decline was seen for boys and men but the level of interest starts from a higher base. Interest also varies across STEM disciplines, with girls and women expressing higher interest in science and technology than engineering and maths.

There is limited change between Waves 2 and 3. The strongest changes can be seen in the level of interest in engineering, science and technology for girls aged 12-13 years. Further data is needed to determine whether this will continue.

Figure 5.2 Girls' and women's interest in STEM subjects – Waves 2 and 3



Source: YouthInsight

Girls aged 14-17 reported not pursuing STEM because it does not interest them or align with their career plans (see Table 5.2). Girls were more likely to say they were not good at science while boys were more likely to say they were not good at maths. However, this varies widely across age groups.

There is limited change in girls' reasons between Waves 2 and 3. The strongest changes were a decrease in girls reporting they are not good at science/maths and the perception they are not smart enough. Further data is needed to determine whether this change will be sustained.

Table 5.2 Reasons for not studying STEM subjects – Waves 2 and 3, ages 14-17

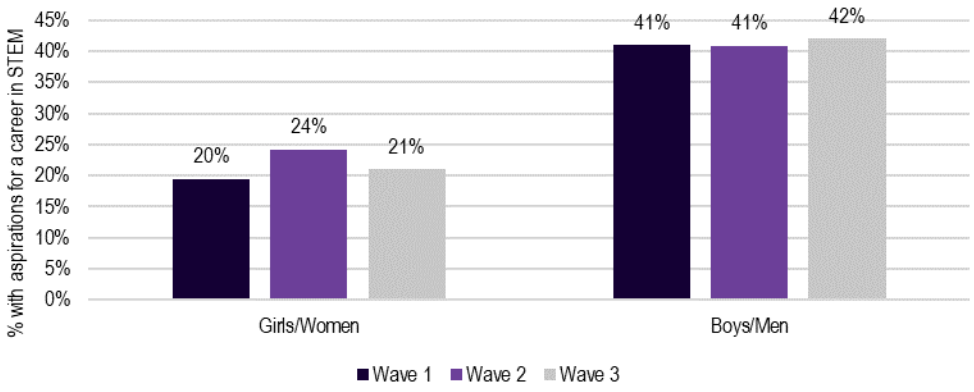
Reason for not studying STEM	Girls/women		Boys/men	
	Wave 2	Wave 3	Wave 2	Wave 3
It's not related to the career I want	78%	78%	56%	66%
I'm not really interested in these subjects	77%	72%	48%	70%
I'm not very good at science	55%	45%	41%	36%
They are too hard for me	50%	44%	33%	47%
Don't think I'm smart enough	40%	33%	38%	47%
I'm not very good at math	39%	31%	35%	44%
None of my friends are doing these subjects	14%	23%	27%	32%
The teachers/lecturers of these subjects are not very good	22%	30%	20%	29%

Source: YouthInsight

Girls and boys will place roughly the same level of importance on mathematics and science knowledge and skills but girls will underweight the importance of engineering and technology skills (see Figure C.4).

There has been limited change in STEM career aspirations over time for both girls/women and boys/men (see Figure 5.3). The STEM career aspirations of girls and women remain significantly lower than for boys and men.

Figure 5.3 STEM career aspirations – ages 12-25 years



Source: YouthInsight

Underrepresented groups

There were clear differences in STEM career aspirations between cohorts of diverse women.

Granular data available for Wave 3 allows an analysis of how aspiration, importance, interest and confidence in STEM study differ between cohorts of girls and women. The data was not sufficiently granular for Waves 1 and 2 to allow similar analysis. This shows:

- Girls and women from lower socio-economic areas were less confident and interested in STEM study compared with those from higher socio-economic areas. Levels of importance of STEM study were similar.
- Girls and women in regional and rural areas were less confident, expressed less interest in and placed less importance on STEM study than those from metropolitan areas.
- Girls and women from culturally and linguistically diverse backgrounds were more confident, interested and placed more importance on STEM study than those from non-diverse backgrounds.
- First Nations girls and women were less confident and interested and placed less importance on STEM study than those who did not identify as First Nations.

The most pronounced difference was a lower level of aspiration among First Nations girls and women and non-First Nations girls and women (see Figure C.5), where only 10% of First Nations girls expressed interest in STEM as compared with 21% of non-First Nations girls.

Most girls and women across underrepresented groups place similar levels of importance on STEM skills for acquiring a good job. The most pronounced difference across the STEM disciplines was for First Nations girls and women who were less likely to express the importance of STEM skills to acquire a good job than non-First Nations girls and women (see Figure C.6).

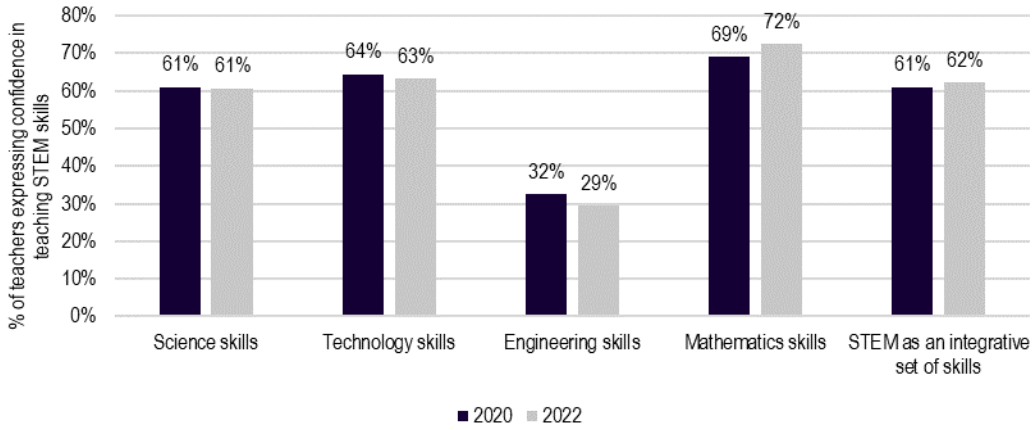
While all girls and women express similar reasons for not wanting to study STEM subjects (i.e., “I’m not really interested in these subjects” and “It’s not related to the career I want”), girls and women from lower socio-economic backgrounds were far more likely to report STEM as too difficult or they were not smart enough than those from higher socio-economic backgrounds (see Figure C.7). The same was true for girls and women from regional compared to metro areas, and First Nations girls and women and compared to non-First Nations girls and women.

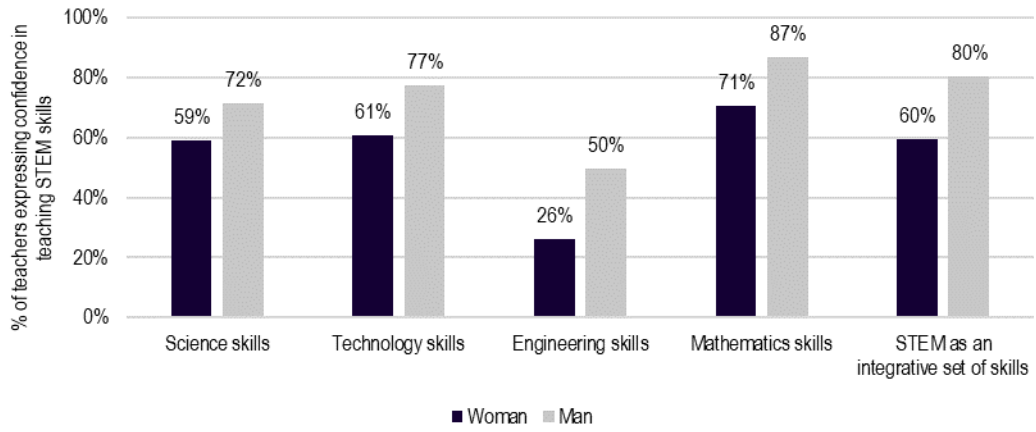
Teachers and parents/carers

Overall, there has been no change in teachers' confidence in teaching STEM and a decrease in parents' rating of the importance of STEM skills in their children's future careers.

Between 2020 and 2022, there has been little change in teachers' confidence to deliver STEM skills (see Figure 5.4, top chart). Confidence was particularly low for engineering skills. Men were more likely to teach STEM subjects in secondary school and were more confident teaching STEM (see Figure 5.4, bottom chart). This shows how young people's exposure to women role models can be reduced from an early age which influences their perceptions about gender norms.

Figure 5.4 Teachers' confidence in teaching STEM – by survey year and gender (2022)

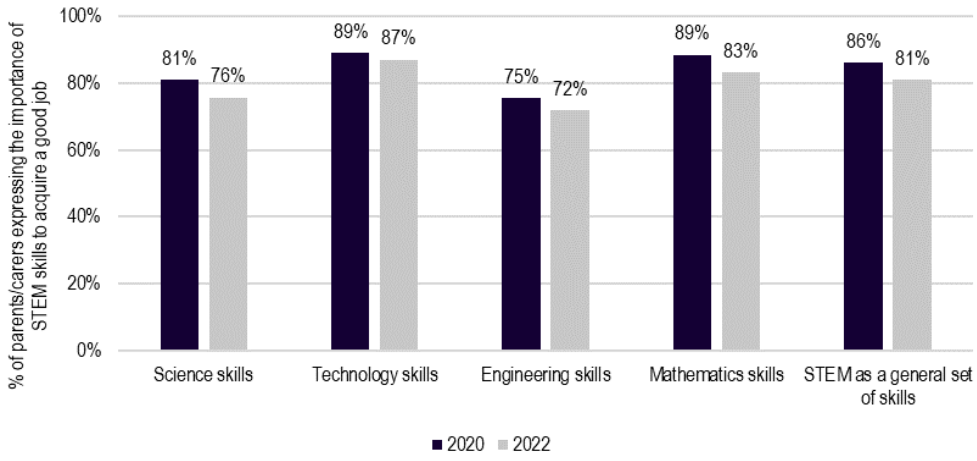


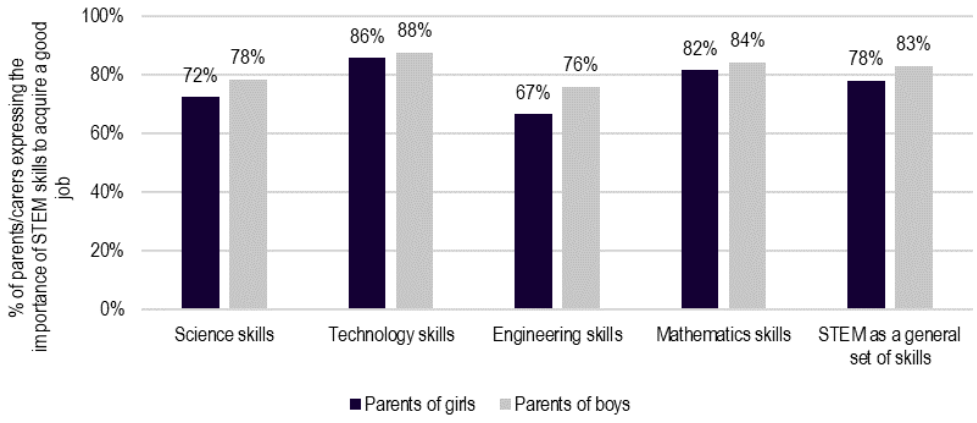


Source: YouthInsight

Parents' and carers' perceptions of the importance of STEM subjects declined from 2020 to 2022 (see Figure 5.5, top chart). Importance was highest for technology and mathematics skills and lowest for engineering skills. While fathers were more likely than mothers to rate these subjects as important in 2022, parents of girls placed lower importance on STEM subjects than parents of boys (see Figure 5.5, bottom chart). Engineering skills were seen as the least important and showed the most prominent difference between parents of boys and girls. This shows the different barriers across STEM disciplines and the need to raise awareness of the value of each discipline.

Figure 5.5 STEM skills perceived as important in order for their child to acquire a good job in the future – by survey year and gender of eldest child (2022)





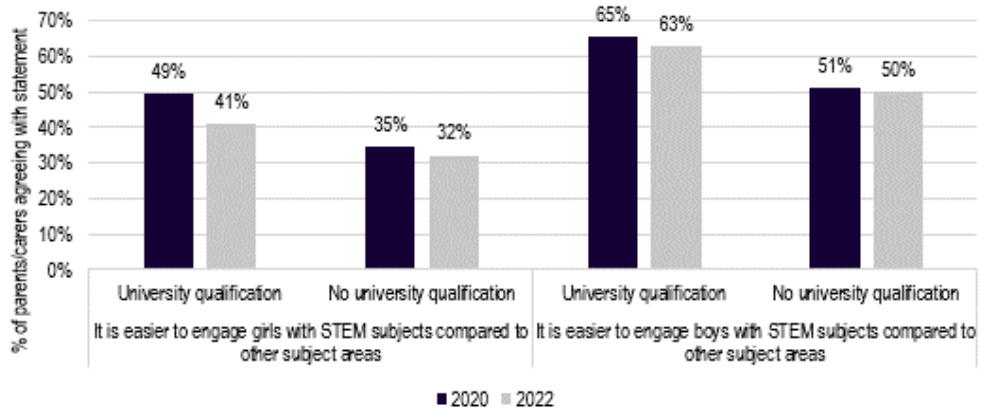
Source: YouthInsight

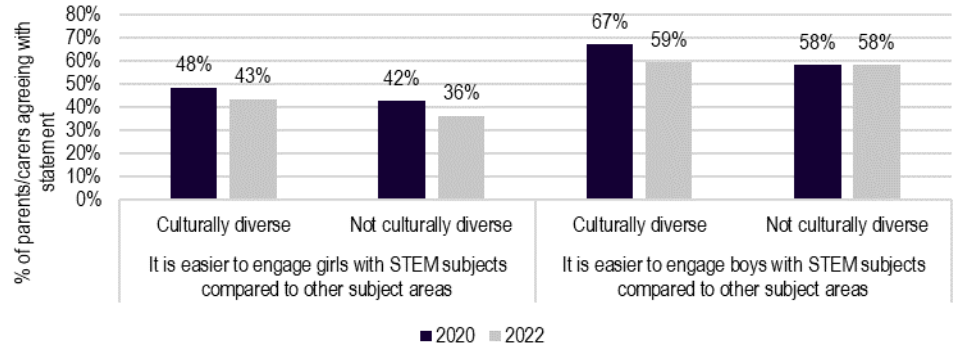
There were different perceptions of the ease of engaging girls with STEM subjects compared to other subject areas. Parents with university degrees and parents from culturally and linguistically diverse backgrounds were more likely to report girls as easier to engage in STEM compared with parents without university degrees or from non-diverse backgrounds (see Figure 5.6). Across all parent groupings, parents had more frequent conversations with their children about STEM topics in 2022 compared with 2020.

According to 2022 data, First Nations parents place less importance on STEM skills in future career paths than non-First Nations parents. Parents with STEM qualifications were more likely to believe STEM skills will provide job security and interest in STEM was cultivated from an earlier age than those without STEM qualifications.

This shows the diverse expectations across parents and the need to engage with and provide different supports to underrepresented groups to ensure girls and women are appropriately supported (see section 3.1).

Figure 5.6 Parents' perceptions of whether it is easier to engage girls with STEM subjects compared to other subject areas – University degree and culturally diverse status





Source: YouthInsight

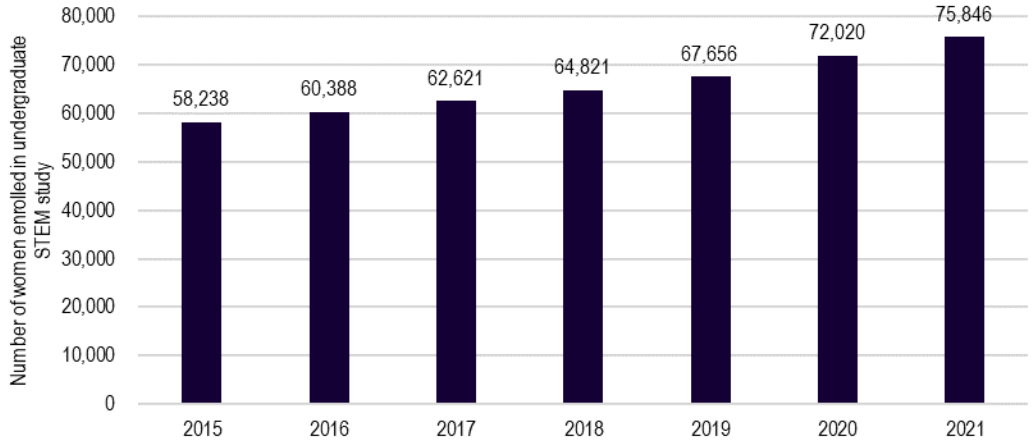
Tertiary education

The number of women enrolling in post-school STEM study has increased over the last 6 years, however, it has done little to shift the gender balance of STEM enrolments. There has also been minimal change in the proportion of women choosing STEM programs over other non-STEM programs.

University

The absolute number of women undertaking STEM courses at Australian universities has increased by 30% from 2015 to 2021 (see Figure 5.7).

Figure 5.7 Number of women enrolled in undergraduate STEM study

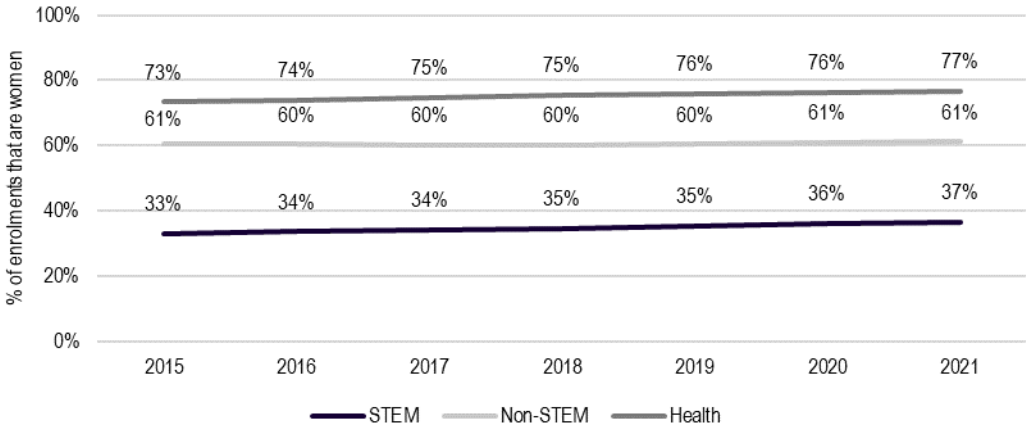


Note: STEM subjects include Agriculture Environmental and Related Studies; Engineering and Related Technologies; Information Technology; and Natural and Physical Sciences.

Source: STEM Equity Monitor, Department of Education

However, women remain underrepresented as a share of enrolments. Figure 5.8 shows women represented 33% of undergraduate university enrolments in STEM in 2015 and this increased by 4 percentage points to 37% in 2021. This was similar for postgraduate STEM enrolments where the proportion of women increased from 37% to 38%. Enrolment in STEM remains far lower than in other subject areas. This suggests that there was an opportunity to promote STEM to girls and women, over other subject areas, to increase the proportion of women enrolling in STEM.

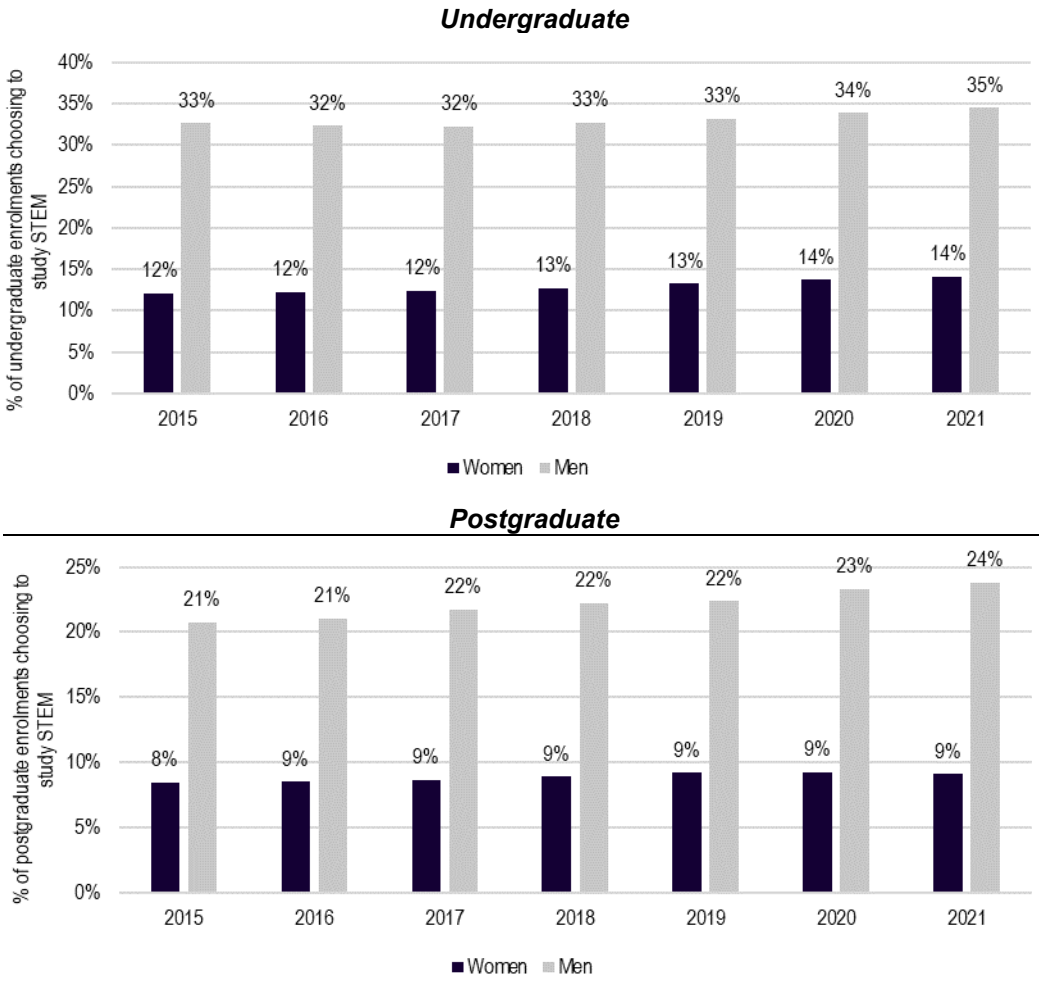
Figure 5.8 Proportion of enrolments in undergraduate university courses that were women



Source: STEM Equity Monitor, Department of Education

In percentage terms, there was a marginal increase in women choosing to undertake STEM study at an undergraduate level in 2021 compared with 2015. However, the figures remain significantly lower than the proportion of men choosing to enrol in STEM courses and only increased by 2 percentage points (see Figure 5.9, top chart). This was similar to postgraduate study, where the growth in men choosing STEM was faster than in women (see Figure 5.9, bottom chart). While larger numbers of women were enrolling in STEM programs at universities, the increase did little to shift the percentage of women enrolling in STEM programs relative to all other university programs.

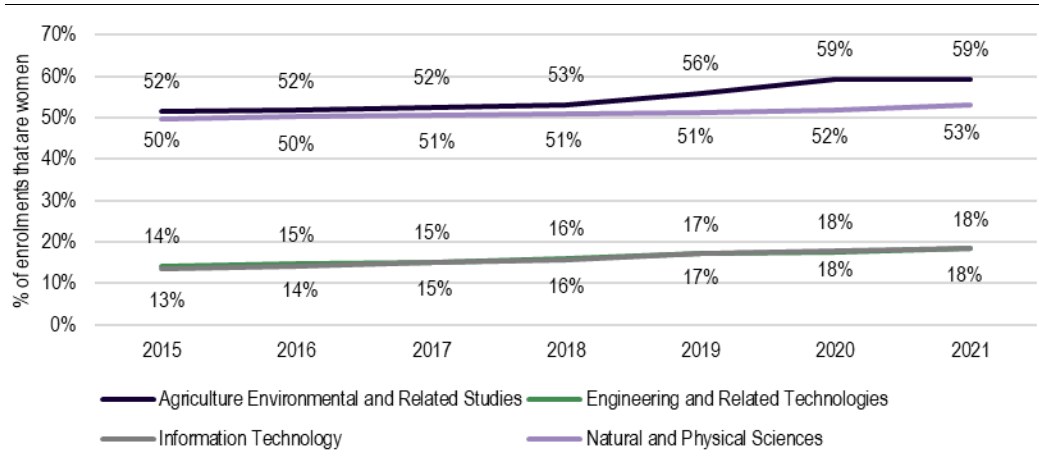
Figure 5.9 Percentage of enrolments choosing STEM courses



Source: STEM Equity Monitor, Department of Education

Considered across individual STEM disciplines, women were equally or over-represented in both Agriculture Environmental and Related studies and Natural and Physical Science yet underrepresented in Engineering and Related Technologies and IT (see Figure 5.10).

Figure 5.10 Proportion of enrolments in undergraduate university subjects that were women



Source: STEM Equity Monitor, Department of Education

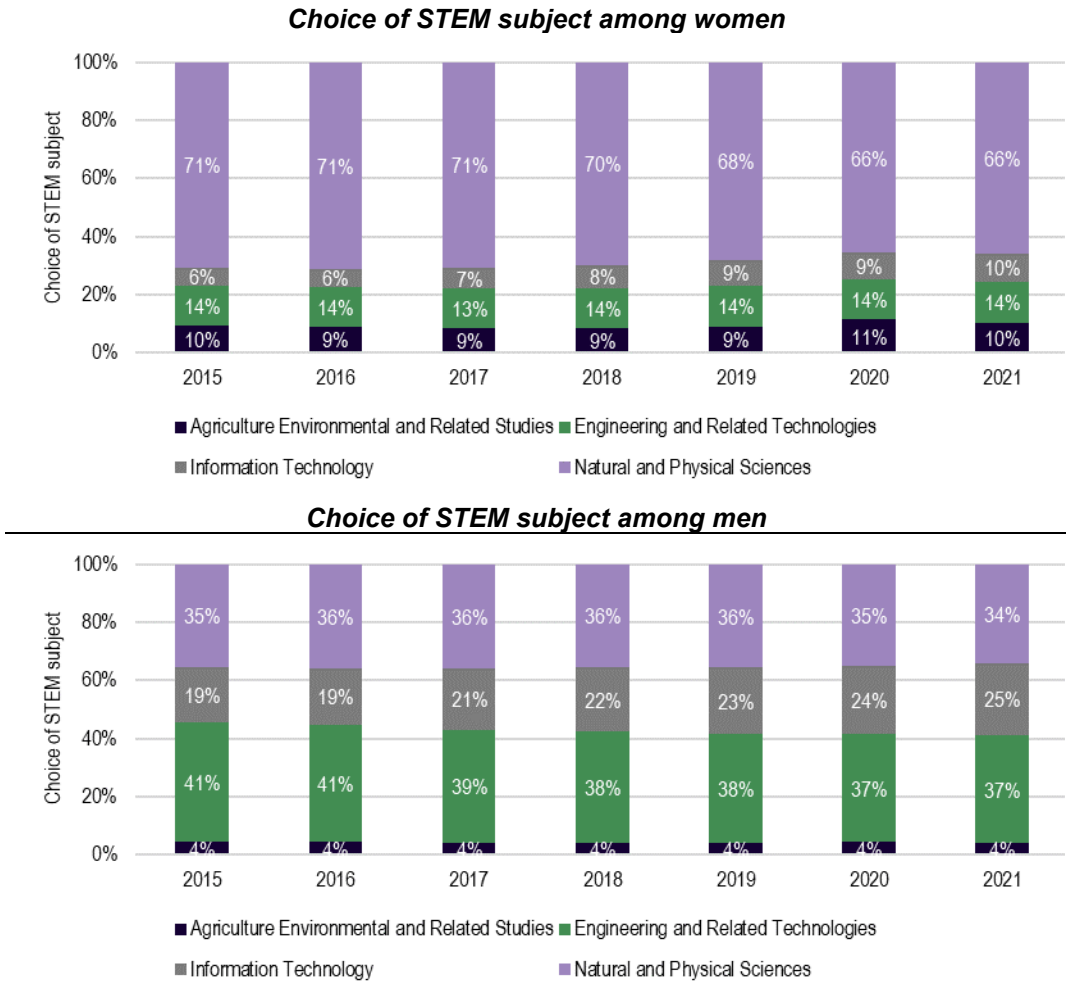
Of the women who choose to study STEM courses, most opt to study Natural and Physical Science. However, there has been growth in the proportion of women pursuing IT, from 6% to 10% of STEM women from 2015 to 2021 (see Figure 5.11).

Together, Figure 5.10 and Figure 5.11 show there were differences in the level of engagement with STEM disciplines. This reflects government and peak body stakeholder perspectives that there were distinct differences between the disciplines; therefore, a deeper consideration of the unique challenges faced by women entering study and careers for each discipline is needed.

> *"Decoupling STEM would be really useful because the problems in the S, the T, the E and the M are very different to each other."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

> *"The problems which exist within science or engineering are very different to each other. Science does not have an intake issue. Science has a thriving issue. Whereas for engineers, the numbers which are coming in are very low, but the [people] usually come and tend to stay."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

Figure 5.11 Choice of STEM subject – undergraduate students



Source: STEM Equity Monitor, Department of Education

Detailed data was not available to track the progress of individual students throughout their courses. However, analysis of the gender ratios of enrolments and completions of STEM courses shows the ratio of women enrolling in STEM courses was lower than the ratio of women completing STEM courses. This suggests a higher proportion of women complete STEM courses than men and more effort is needed to increase the intake of women into STEM study rather than increase retention (see Table 5.3).

Table 5.3 Proportion of women at enrolment and completion in undergraduate university STEM programs

	2015	2016	2017	2018	2019	2020	2021
Enrolment	33%	34%	34%	35%	35%	36%	37%
Completion	37%	37%	38%	37%	38%	38%	40%

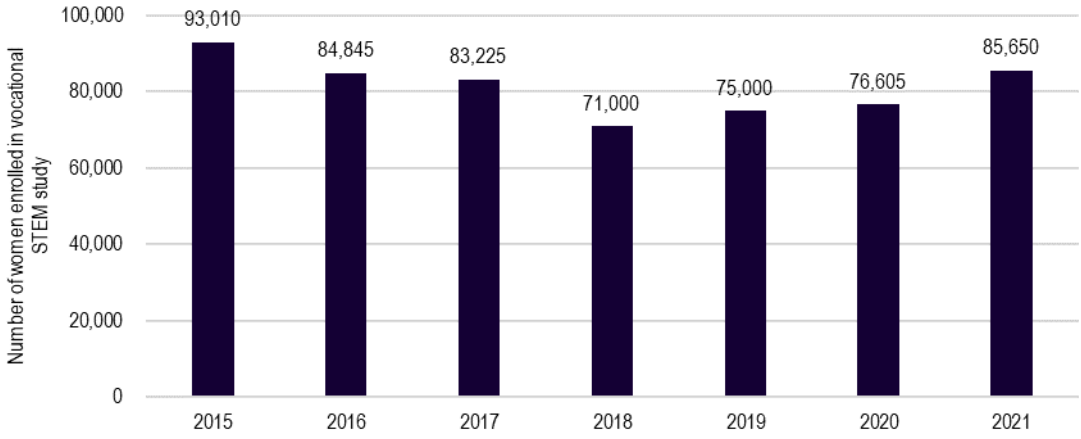
Source: STEM Equity Monitor, Department of Education

Vocational Education and Training

Overall, the results for VET largely align with university education. VET enrolments include qualifications that range from a Certificate I to an Advanced Diploma, with a small number of Graduate Certificate qualifications included.

The number of women enrolling in vocational STEM study decreased sharply from 2015 to 2018 before steadily increasing since 2019 (see Figure 5.12).

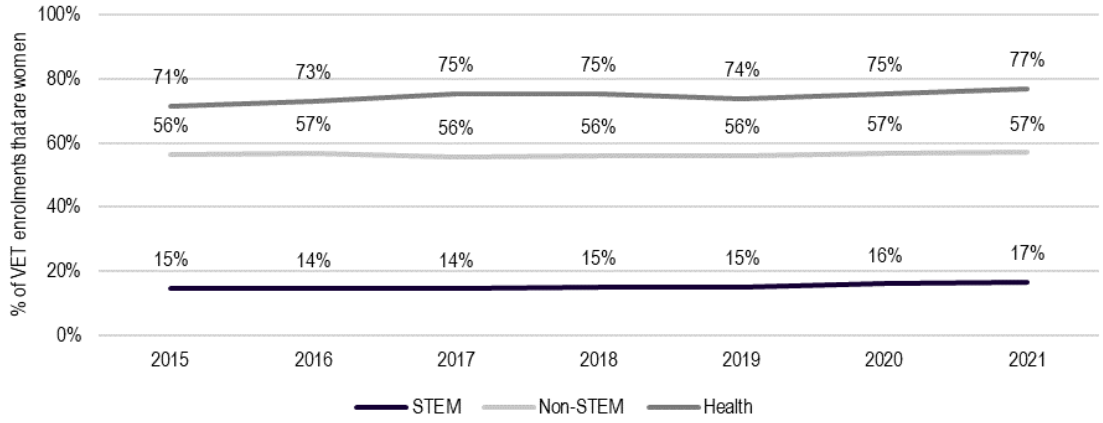
Figure 5.12 Women enrolling in vocational STEM study



Source: STEM Equity Monitor, National Centre for Vocational Education Research

The gender balance of VET course enrolments was similar to university enrolments. The proportion of women's STEM enrolments increased from 14% to 17% from 2016 to 2021 (see Figure 5.13). As for university education, there is an opportunity to promote and encourage girls' and women's participation in STEM subjects over non-STEM subjects to help strengthen the pathway of STEM-educated women.

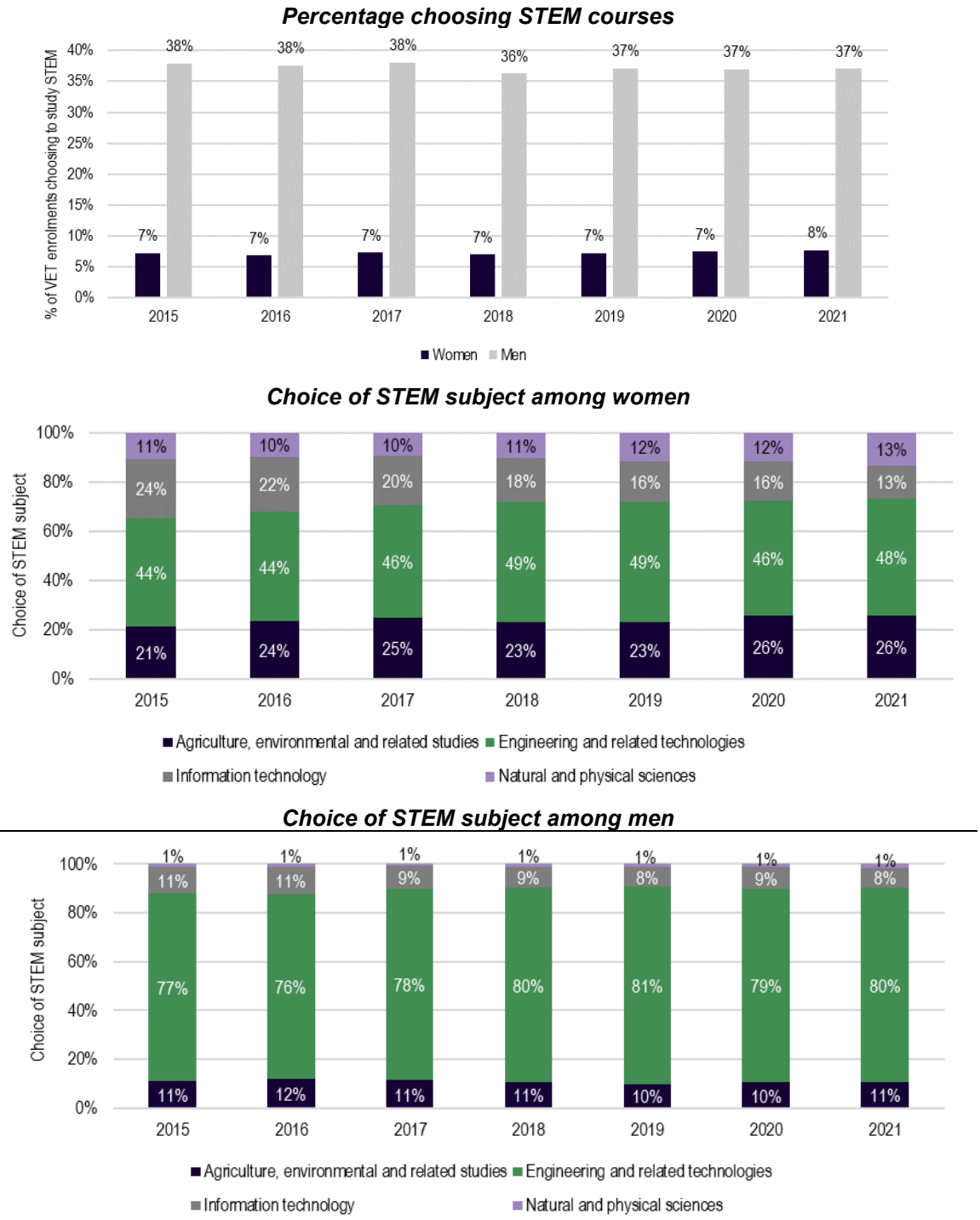
Figure 5.13 Proportion of enrolments in VET courses that were women



Source: STEM Equity Monitor, National Centre for Vocational Education Research

Of the women choosing to undertake vocational study, 8% select STEM courses. This has not changed over time. For men, just over a third of all VET enrolments choose to pursue STEM courses (see Figure 5.14, top chart). The choice of STEM subjects also differs between men and women and, unlike university study (see Figure 5.11), most women choosing STEM pursue Engineering and Related Technologies. This has grown over time but there is a decrease in the proportion of women choosing IT (see Figure 5.14, bottom chart). As for university education, there is an opportunity to consider the unique challenges and motivating factors across STEM disciplines to better design support.

Figure 5.14 STEM selection in VET enrolments



Source: STEM Equity Monitor, National Centre for Vocational Education Research

5.3 Employment outcomes

Key Finding 9 Employment outcomes

Participants in the WiSTEM initiatives reported positive short-term employment outcomes from their involvement. These include improved motivation to pursue STEM careers. Participants in the initiatives also report being better positioned to employ, retain and progress STEM-qualified women through improved policy arrangements.

However, data was typically self-reported at a point in time. For individual-focused initiatives, data does not track whether motivation was sustained or led to behavioural change. For organisationally-focused initiatives, there was no data to determine whether the implementation of policies has led to the required cultural change.

Public data shows an increase in the number of women in STEM-qualified occupations and an uplift in the proportion of organisations with formal policies/strategies that target women's recruitment and retention. WiSTEM organisations start from a higher base and implement policies faster than other organisations but demonstrate slower changes in employee outcomes.

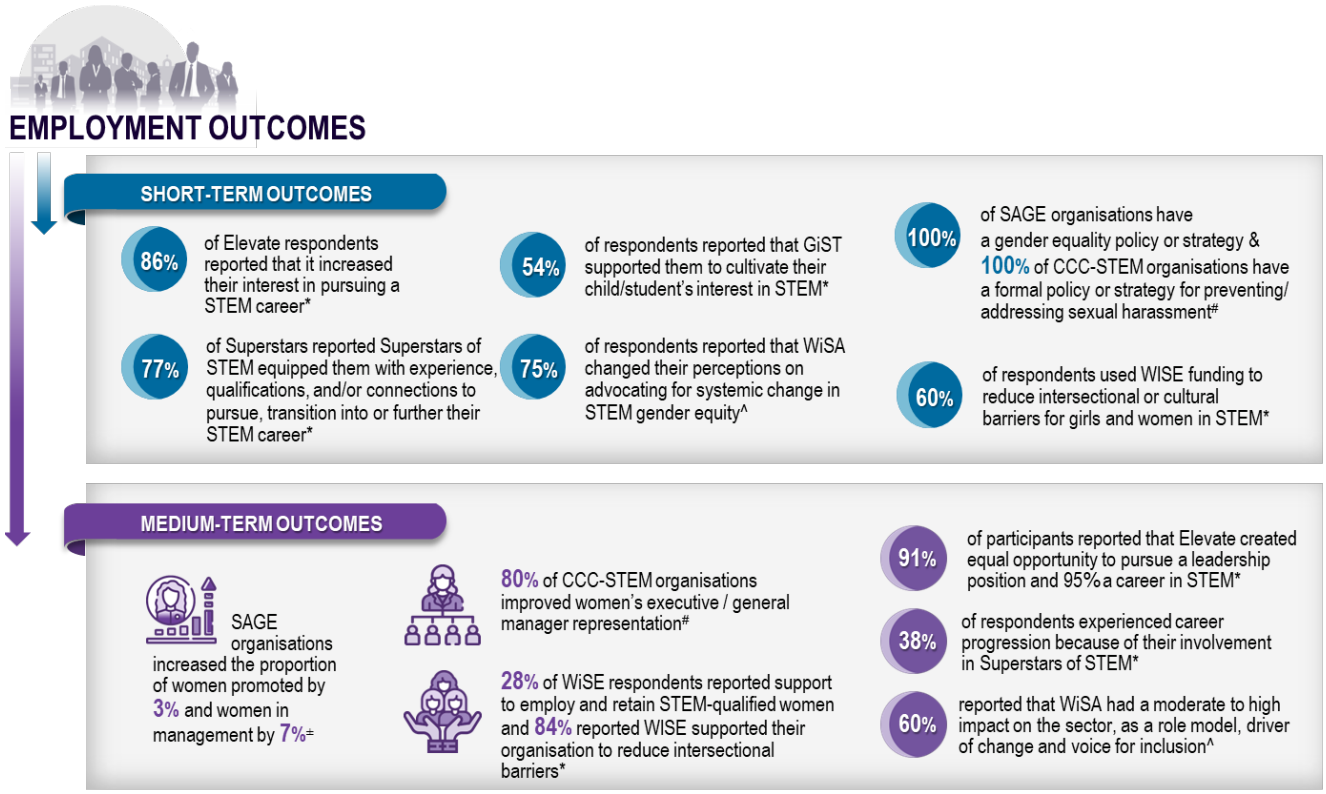
5.3.1 Initiative outcomes

The WiSTEM initiatives have delivered positive employment outcomes, predominantly in the short- and medium-term. A summary of these outcomes is provided in Figure 5.15.

Across participating girls and women, initiatives have improved awareness and motivation to pursue STEM careers. This was evidenced through self-reported increased interest among girls and women and the increased capability of parents/carers, teachers and Superstars to build girls' and women's interest. Superstars also reported being better able to transition into or further their STEM careers, as they were equipped with the relevant qualifications, experience and/or connections.

The initiatives have better positioned organisations to employ, retain and progress STEM-qualified women. This was evidenced by an increase in the number of organisations that self-reported the implementation of policies and strategies on gender equality and sexual harassment (particularly related to SAGE and CCC-STEM) and their commitment to advocate for systemic change and reduce intersectional or cultural barriers.

Figure 5.15 Employment outcomes



Note: * ACIL Allen survey, ^ WiSA 2022 evaluation survey, [90] # CCC-STEM 2019 impact report.[91] ±

Source: ACIL Allen, various sources

There are caveats on this data that should be considered. As for education outcomes (see section 5.2.1), most initiatives collect point-in-time data and do not track whether it leads to action. For individuals, this means it was not possible to track the impact on participation in STEM careers.

Secondly, the data used to evidence short-term impacts was largely self-reported. This means it was not possible to independently verify the information provided. This was particularly important for organisationally focused initiatives. Consultation with government and peak body stakeholders provided anecdotal evidence that self-reported improvements were not reflected in true cultural change, reduced barriers or support for more women to participate and progress in STEM careers.

> *"You can have all of the policies and the procedures in the world but if your line manager is not aware of what the policies and procedures are… that's the first barrier."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

In the medium term, participants of some initiatives reported the initiatives had helped reduce societal and organisational barriers to participation, retention and progression in STEM careers. However, this was difficult to quantify in a meaningful way, was subject to individual interpretation and was challenging to attribute to the initiatives. Government and peak body stakeholders engaged in the evaluation reported the initiatives have made

[90] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). *Evaluation of 'The Australian Government Women in STEM Ambassador' initiative: 2021-2022*. Sydney: Centre for Social Impact, University of New South Wales.

[91] Male Champions of Change (2019). *2019 Impact Report Male Champions of Change*.

progress in improving women's visibility, as evidenced through more equal representation of women in the media and on expert panels and boards.

5.3.2 Outcomes across Australia

There has been an uplift in the number of women employed in STEM-qualified occupations, the proportion of organisations with formal policies/strategies that target women's recruitment and retention and progression of women into senior roles. This change has occurred across all industries and represents a broader cultural movement.

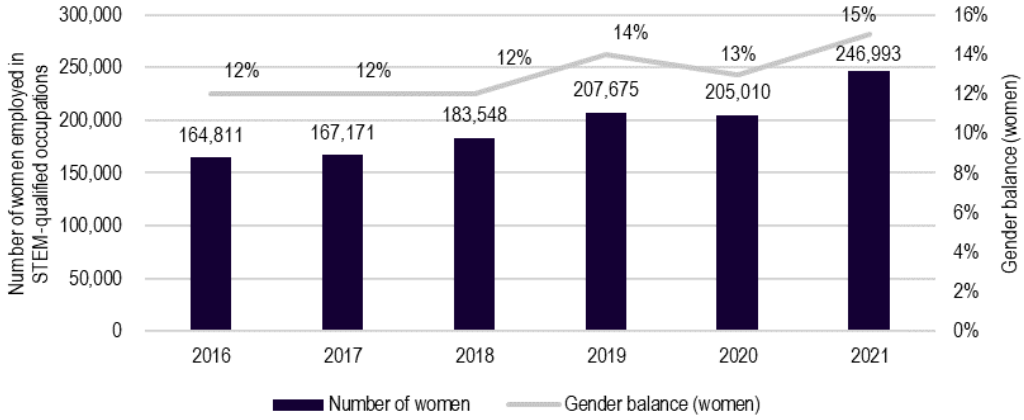
Workforce participation

The number of women employed in STEM-qualified occupations has grown since 2016, with slight improvements in the gender balance (see Figure 5.16). This growth likely reflects the increase in enrolments of women in tertiary education (see Figure 5.7), noting the data was not sufficiently granular to determine whether this is due to new entrants or better retention.

While this is positive, government and peak body stakeholders highlighted supporting more women to enter STEM was not sufficient to address the problem. Women who encounter STEM workplaces that were not inclusive, diverse or supportive, may leave STEM, hindering retention and progression.

> *"[Where industry is not equipped to support diversity] you can attract, but then retention would be the ultimate problem and then you've got a bunch of people disenfranchised wanting to go back if they've already had that experience."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

Figure 5.16 Number of women employed and gender balance in STEM-qualified occupations



STEM-qualified occupations as defined by the methodology of the STEM Equity Monitor https://www.industry.gov.au/publications/stem-equity-monitor/methodology.

Source: STEM Equity Monitor, ABS

Workplace policy and strategy

Analysis was undertaken on the uptake of 16 policies and actions to support women in the workplace that were assessed as most representative of gender equity issues. These include policies for leave and flexible working, the recruitment, retention and promotion of women, harassment and discrimination, and pay gap analysis. Comparisons were made across all reporting organisations, organisations in STEM-qualified industries,[92] and organisations involved in WiSTEM initiatives (termed WiSTEM organisations).

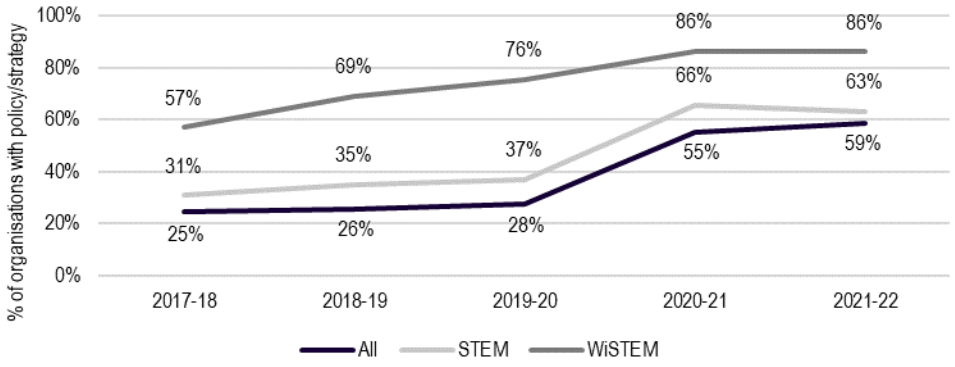
Implementation of these policies has become increasingly common across all organisations. Policies that were being implemented include access to paid domestic violence leave/support for employees experiencing domestic violence and formal policies for gender pay equity (see Figure 5.17). A notable increase was evident across all organisations between the financial years 2019-20 and 2020-21. This could be a result of changes in the policy and regulatory landscape, including:

— Victoria's Gender Equality Act (announced in 2020 and commenced in 2021), which required entities to develop and implement a Gender Equality Action Plan

— December 2021 release of the WGEA Review Report, which provided 10 recommendations to enhance the Workplace Gender Equality Act 2012 (including reporting by public agencies from 2022-23) and make it easier for employers to report to WGEA

— 2020 release of the Australian Human Rights Commission's report Respect@Work: National Inquiry into Sexual Harassment in Australian Workplaces, which made 55 recommendations to government and the private sector for policy and legislative reforms to prevent and address workplace sexual harassment.

Figure 5.17 Formal policy or strategy includes objectives for gender pay equity



Source: WGEA

WiSTEM organisations already had many policies in place prior to their involvement in WiSTEM initiatives and, therefore, start from a higher base compared with all organisations and STEM organisations. This can be clearly seen in Table 5.4 which shows a higher proportion of WiSTEM organisations had policies for gender equality overall, recruitment and retention in place in 2017-18 and in 2021-22.

[92] The definition of STEM-qualified industries is aligned with the definition used by the STEM Equity Monitor (https://www.industry.gov.au/publications/stem-equity-monitor/methodology) (Accessed May 2023).

Table 5.4 Proportion of organisations with gender-based policy or strategy in place

Policy or strategy	All organisations		STEM Industries		WiSTEM Organisations	
	2017-18	2021-22	2017-18	2021-22	2017-18	2021-22
Gender equality overall	74%	78%	78%	84%	95%	100%
Recruitment	83%	87%	84%	89%	98%	100%
Retention	63%	69%	67%	75%	88%	95%
Objectives for gender pay equity	25%	59%	31%	63%	57%	86%
Formal selection policy/strategy for body/board members	42%	55%	40%	54%	60%	79%
Target % for representation of women on governing board	-	13%	-	18%	-	29%

Source: WGEA

Involvement in WiSTEM initiatives increases the rate of implementation for some policies, including policies for overall gender equity; formal policies for retention; gender equity as a Key Performance Indicator for managers; and formal selection policies for body/board members.

Leadership representation

WiSTEM organisations have better performance on representation in leadership positions. Table 5.5 shows the proportion of women holding senior roles increased between 2017-18 and 2021-22. When compared with all organisations and STEM industries, WiSTEM organisations have a higher proportion of women holding the most senior roles, at both time points.

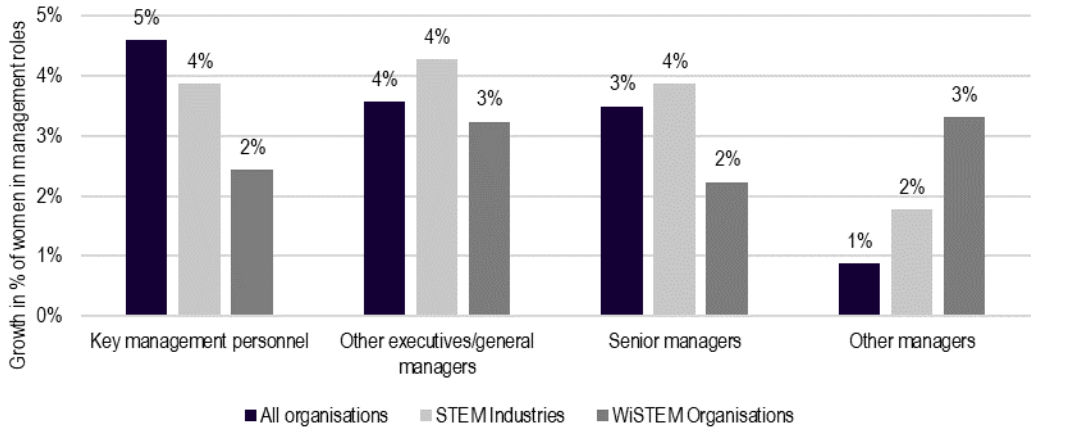
Table 5.5 Proportion of women in organisational roles

Position	All organisations		STEM Industries		WiSTEM Organisations	
	2017-18	2021-22	2017-18	2021-22	2017-18	2021-22
CEO	-	22%	-	11%	-	28%
Head of business	-	29%	-	19%	-	50%
Key management personnel	30%	35%	22%	25%	37%	39%
Other executives/general managers	31%	35%	19%	24%	41%	44%
Senior managers	35%	39%	20%	24%	40%	43%
Other managers	43%	43%	23%	24%	49%	52%
Clerical and administrative staff	74%	72%	72%	68%	70%	70%
Community and personal service	72%	71%	58%	64%	66%	70%
Labourers	32%	37%	11%	14%	21%	52%
Machinery operators and drivers	13%	14%	9%	11%	26%	32%
Professionals	53%	55%	29%	31%	55%	57%
Technicians and trade	15%	16%	10%	12%	43%	45%
Sales staff	60%	59%	31%	33%	65%	37%
Other staff	40%	42%	28%	16%	61%	58%

Source: WGEA

However, being a WiSTEM organisation does not improve the speed at which equity was achieved at higher management positions. The 5-year growth in the proportion of women in organisational roles is shown in Figure 5.18. This suggests being a WiSTEM organisation is self-selecting and they likely have a more advanced culture whereby involvement in the WiSTEM initiatives may have accelerated rather than instigated change.

Figure 5.18 5-year growth (2017-18 to 2021-22) for the proportion of women in organisational roles



Source: WGEA

5.3.3 Underrepresented groups

The availability of public data on underrepresented groups of women was limited. Further, information on non-binary gender identities was often not collected, was aggregated with other genders or was excluded due to small sample sizes. As such, there is poor clarity on how underrepresented groups were impacted.

Future data collection is needed to clearly distinguish between these underrepresented groups to enable a greater understanding of the unique experiences and barriers to participation, interest and outcomes. This is crucial in understanding the extent of the challenge for underrepresented groups and designing appropriate initiatives.

5.4 Government-focused outcomes

Key Finding 10 Government-focused outcomes

> The WiSTEM initiatives have delivered positive government-focused outcomes, predominantly in the short term. This was demonstrated by the development of an evidence base to inform government and sector-wide policy, strategy and program development and scale-up. However, much of this evidence has specifically addressed the needs of individual initiatives.

The WiSTEM initiatives have delivered positive government-focused outcomes, predominantly in the short term. A summary of government outcomes delivered by the initiatives is provided in Figure 5.19.

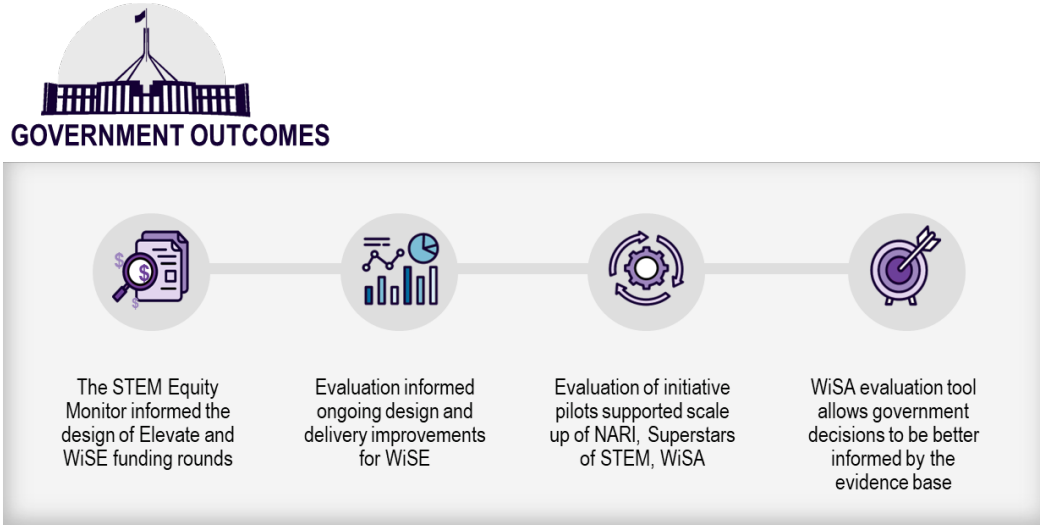
The short-term outcomes of the initiatives were positive. The initiatives have provided an evidence base and early results to inform government and sector-wide policy, strategy and program development and scale-up. This was evidenced through the influence of the evidence base on WiSTEM initiative design, informed policies and decisions.

However, evidence and evaluation data gathered by initiatives has specifically addressed the needs of each initiative, with no connection to other initiatives. For example, this has informed the scale-up of initiatives that commenced as pilots (e.g., Future You, Superstars of STEM, WiSA), informed ongoing design and delivery improvements (e.g., between WiSE funding rounds) or was used to understand the progress made.

There are caveats on this data that should be considered. The direct use and influence of evidence in informing government or sector decisions was not always clearly evident or directly attributed to the initiatives. Further, the level of impact was difficult to quantify in a meaningful way.

Secondly, information on use was largely self-reported; this means it was subject to individual interpretation and it was not possible to independently verify the information provided.

Figure 5.19 Government outcomes



Source: ACIL Allen, various sources

5.5 Contribution to long-term outcomes and cultural change

Key Finding 12 Long-term outcomes

> Initiative participants were positive about the contribution of the initiatives to cultural change and sustainable change. However, these initiatives are one of many factors contributing to broader societal, attitudinal or cultural change.

The WiSTEM initiatives have provided some support toward long-term cultural change.

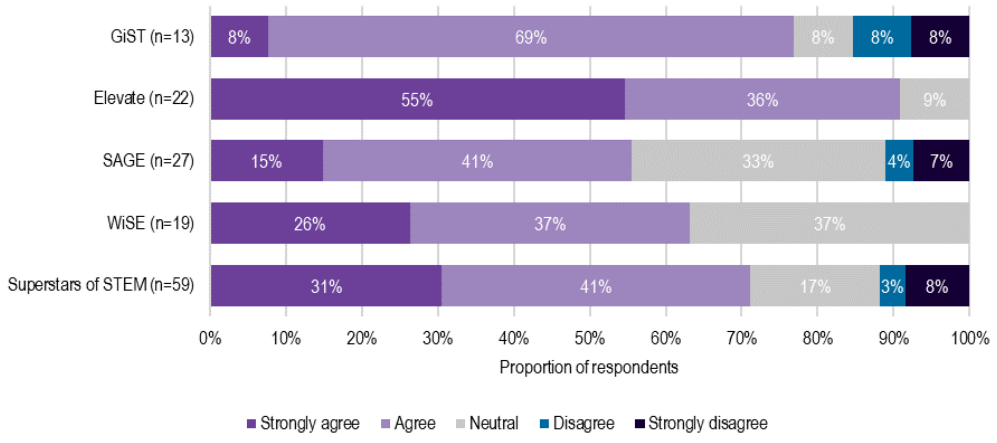
ACIL Allen's survey gathered early perspectives on the contribution to meaningful change in how society expects girls and women to engage in STEM (see Figure 5.20). Most respondents reported the positive contribution of the initiatives. Respondents from Elevate were most positive, followed by GiST. Most respondents across all initiatives considered this change to be sustainable (see Figure C.2). This was highest among Superstars of STEM, followed by Elevate.

The proportion of neutral and negative responses shows the varying experiences of the initiatives.

> *"I think Superstars of STEM has helped to move the dial in terms of breaking down societal biases around STEM and gender, particularly in terms of increasing female experts in the media. However, I think there is still a long way to go to engage more girls in STEM particularly in the early years of schooling where biases and attitudes begin to develop."*
>
> Superstars of STEM participant, ACIL Allen 2023 evaluation survey

> *"I am still the 'token' female at times and the culture in the organisation is still paying lip service to women and actively recruiting men into executive or senior leadership positions. I have come to the realisation that this is a cultural concern and encouraging women to pursue studies and careers in STEM may lead to the same roadblock."*
>
> Superstars of STEM participant, ACIL Allen 2023 evaluation survey

Figure 5.20 To what extent do you agree that the initiative contributed meaningful change in how society expects girls and women to engage in STEM?



Source: ACIL Allen survey of WiSTEM initiative participants, 2023

The strong positive self-reported results demonstrate the value of the initiatives to direct participants. However, participants also recognised changes may have been localised and much more progress is needed to drive change across the sector.

> *"I think SAGE predominantly influences how research institutes and universities operate. I don't think that SAGE has had a direct impact on broader society."*
>
> SAGE participant, ACIL Allen 2023 evaluation survey

> *"Efforts to build capacity in this area within institutions could help shift the culture and implement local policies that would be effective at shifting the dial."*
>
> SAGE participant, ACIL Allen 2023 evaluation survey

Government and peak body stakeholders considered the initiatives were delivering a positive impact for direct participants and were contributing to the national dialogue on gender equality in STEM. For example, 2 stakeholders highlighted the significant role SAGE played in advocating for recent action by the National Health and Medical Research Council in setting targets to award Investigator Grants to 40% women, 40% men and 20% any gender.[93]

Stakeholders highlighted evidence of cultural change occurring in society, indicating these initiatives are part of a broader movement in support of gender equality. This included, for example, recent changes to increase the childcare subsidy for most families making it easier for the primary carer to return to work[94] and making mathematics mandatory to year 12 in NSW.[95]

> *"There are more organisations in [the] STEM sector that are pushing equal access to parental leave – this is a measure of cultural change. If we start to share that care load, then that does provide more opportunities for women who want both a family and career."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

> *"[The] NSW government recently made mathematics mandatory to Year 12… That's a huge policy change which is going to have really profound effects, probably more than any program that we could ever run."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

While there have been some limited, positive contributions to long-term outcomes, it will take time and better tracking of longitudinal data to be able to link societal and cultural change outcomes to the initiatives.

[93] Butler, M. (2022). *Working towards gender equity in health and medical research*. Accessed May 2023: https://www.health.gov.au/ministers/the-hon-mark-butler-mp/media/working-towards-gender-equity-in-health-and-medical-research.

[94] Department of Education (2023). *Child Care Subsidy*. Accessed May 2023: https://www.education.gov.au/early-childhood/child-care-subsidy.

[95] NSW Department of Education (2019). *Maths to be compulsory for students*. Accessed May 2023: https://education.nsw.gov.au/news/media-releases/maths-to-be-compulsory-for-students.

5.6 Value delivered to participants

Key Finding 11 Value delivered to participants

> The WiSTEM initiatives have delivered value to direct participants and have met most participants' needs.
>
> There are opportunities to increase the value delivered to participants through the better use of the initiatives to drive change, more strategic resourcing and coordination of efforts in the sector and focus on cultural change and intersectionality.

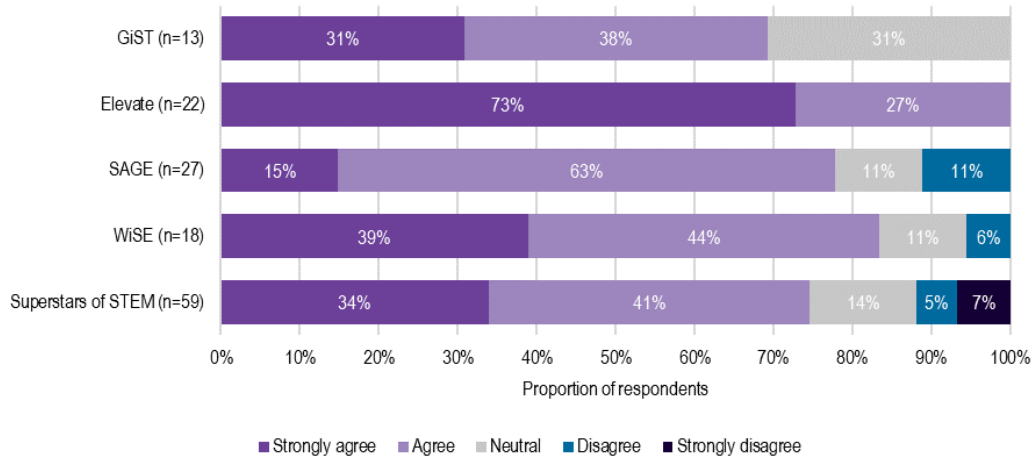
Initiative participants received value from their involvement in the initiatives.

Most survey respondents agreed or strongly agreed the initiative met their needs (see Figure 5.21). Elevate showed the most positive response (100% agree and strongly agree), followed by WiSE (83%), SAGE (78%), Superstars of STEM (75%) and GiST (69%). A small proportion of respondents from Superstars of STEM, SAGE and WiSE disagreed or strongly disagreed.

Respondents provided qualitative feedback on the value delivered. This included high-quality training, mentoring and networking enabled by Superstars of STEM (6 responses), the importance of Elevate in financially enabling scholars to attend university (4 responses), the quality and usefulness of GiST's resources (3 responses), the role of SAGE in providing a platform for change (2 responses) and the value of WiSE in increasing access to STEM for girls and in regional areas (2 responses). It should be noted this represents the views of a small sample of respondents.

Participants and government and peak body stakeholders considered the initiatives could deliver additional value if initiatives such as CCC-STEM, SAGE and WiSA were more effectively leveraged as a platform for advocacy and change within the sector and if funding was long-term and used more strategically to scale effective initiatives. Stakeholders saw value in stronger collaboration across the sector to deliver more coordinated and streamlined support with less duplication of effort, a stronger focus on cultural change rather than upskilling women, and more support for women impacted by intersectionality.

Figure 5.21 To what extent do you agree that the initiative met your needs?



Source: ACIL Allen survey of WiSTEM initiative participants, 2023

5.7 Unintended consequences of the initiatives

Key Finding 12 Unintended consequences of the initiatives

> Positive and negative unintended consequences occurred from initiative delivery. Positive unintended consequences included larger than expected impacts (e.g., from collaboration and international recognition). Negative consequences related to the disproportionate burden borne by women and harassment toward some participants, stemming from increased public presence as a result of participating in WiSTEM initiatives.

Positive and negative unintended consequences occurred as a result of initiative delivery.

Positive unintended consequences related to larger-than-expected impacts from collaboration, international recognition, support and employment of First Nations women, and improvements to data quality.

> *"By linking STEM and entrepreneurship to food and agriculture (and native foods in particular) we have been able to attract many more Indigenous women to consider and explore career pathways as native foods is of specific cultural importance… This funding has enabled us to create new career opportunities and to employ our first female Indigenous employee."*
>
> *WiSE grantee, ACIL Allen 2023 evaluation survey*

Negative unintended consequences related to the disproportionate burden borne by women and online harassment toward WiSTEM participants from individuals outside the WiSTEM initiatives as a result of visible participation and an increased public profile (see Table 5.6).

Collectively, initiatives were criticised for not sufficiently focusing on diverse women, which can have the unintended consequence of alienating girls and women from STEM studies and careers. For example, the initiatives that focused on women with high aptitude and performance were seen to contribute to the exclusion of women with strong interest and capacity who are not currently seen as high performing. This criticism highlights the importance of broad messaging and inclusive approaches to create an impact for all women.

> *"The scholarships are aimed at the high performers. When you have programs… [that] pick the high performers, and we miss this huge cohort of girls that could really be engaged [in STEM]."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

> *"We need a broader set of faces and experiences to be able to relate to."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

Most of the initiatives position women as key influencers of inclusion and diversity. This places an undue burden on girls and women, particularly women from underrepresented groups, to be responsible for generating and leading change or to become more adept at operating within an inequitable sector.

> *"[CCC-STEM is] critically needed, …[to] not place this burden of equity and diversity on women's shoulders, …[and] bring other genders into this conversation."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

The initiatives were flexible in adapting to some unintended consequences yet could do more to mitigate negative unintended consequences in the future and better leverage positive unintended consequences.

Table 5.6 Unintended consequences by initiative

Initiative	Unintended consequences
WiSE	⊖ funding rounds were highly oversubscribed (7% success rate), which could negatively impact the reputation of the initiative and dissuade applicants from applying
CCC-STEM	⊕ collaboration with SAGE was successful and organisations engaged with both initiatives made greater progress toward gender equality and workplace flexibility for carers during the COVID-19 pandemic.
SAGE	⊕ attracted international attention (e.g., Canada, US, India, and South Korea) for its effectiveness in increasing gender equity. ⊖ encourages/requires women to change and bear most of the burden, rather than creating organisational change.
Superstars of STEM	⊖ participants have experienced harassment online (e.g., for 'unfairly' being promoted). The initiative now includes 'social media self-defence'. ⊖ women were positioned as a key influencer of inclusion and diversity, which creates undue responsibility and burden, and reduces time available for work tasks.
WiSA	⊕ supported an assessment and awareness raising of issues and opportunities experienced by First Nations peoples.
STEM Equity Monitor	⊕ created a platform to engage with data providers on data quality and representativeness, which is improving data disaggregation (e.g., inclusion of non-binary data separately from women) and more granular reporting.
Elevate	⊕ encouraging Elevate scholars to connect and share learnings is likely to improve their experience at university and create lasting connections.

Note: ⊕ positive unintended consequence ⊖ negative unintended consequence. No unintended consequences were identified for Future You or GiST.

Source: ACIL Allen

5.8 Continuing rationale for the WiSTEM initiatives

Key Finding 13 Continuing rationale for the WiSTEM initiatives

> The initiatives have had a positive impact on their participants. They are established and deliver positive short-term outcomes. However, there is limited evidence of improvement in the participation of girls and women outside of direct participants.
>
> There is a clear ongoing need for government investment to address the underrepresentation of girls and women in STEM.

There is a clear ongoing need to address the underrepresentation of girls and women in STEM.

The initiatives have had a positive impact on direct participants. Almost all respondents to the evaluation surveys agreed or strongly agreed there is an ongoing need for their or similar initiatives (see Figure C.1). Most respondents across all initiatives also reported they would have been unlikely to have received similar support from other sources or to have taken the actions they took if they did not participate (see Figure C.3). This, combined with the discussion on the role of government in section 3.2, indicates there are few existing mechanisms that could be relied on to achieve similar outcomes.

There are positive signs of impact for participants, but assessing the effectiveness of the 9 initiatives by their direct impact at this stage would be premature. Many of these initiatives are generational change initiatives and it is clear sustainable cultural change will take further time and support. Despite the investment to date, girls and women continue to be underrepresented across all stages of the STEM pathway.

The publicly available data and engagement with government and peak body stakeholders show progress has been limited and slow. This is due, in part, to the scale of the problem, limited resourcing and time available to deliver the required social and cultural change.

> *"When it comes to gender equality, we've been having the same conversations for about 40 years. Change is happening and we do see progress in the data, very slowly, but particularly for STEM."*
>
> Government or peak body stakeholder, ACIL Allen

The challenge requires coordinated and focused investment and effort by government, industry, education, research, not-for-profit and community sectors to create change. Given the multifaceted barriers to participation, no single initiative or stakeholder will be able to generate the systemic change required. This highlights the importance of exploring the range of mechanisms that can be used to drive change, including those outside of government-funded programs. Such examples include procurement levers, funding levers and legislative or regulatory interventions.

> *"The government will do what it can to create the environment to make a difference here, but it can't just be the government leading this. It takes government, industry, business, education, and all facets of society to buy in and make cultural change."*
>
> Government or peak body stakeholder, ACIL Allen evaluation

6 Key findings and conclusions

This chapter provides the conclusion for the evaluation, identifying key findings and future directions for the department and the Review Panel.

6.1 Key findings

This report provides an independent assessment of the design, delivery and impact of 9 WiSTEM initiatives funded by the Australian Government.

There is a clear need for action in addressing the underrepresentation of women and girls in STEM. Data on educational motivation, participation and performance and employment outcomes demonstrate significant gaps for girls and women. The drivers of underrepresentation are systemic, complex and compounded by intersectionality.

The intricate and deeply embedded nature of the problem requires a collective commitment to change from government, industry, the research sector and the community. There is a core and ongoing role for government in intervening in areas of market failure and promoting public good but there is an increasing need for industry to take a more active role in growing the workforce and improving retention to meet skill needs.

The 9 evaluated initiatives aim to address a range of barriers and span from foundational initiatives in building awareness of STEM and exposure to STEM learning, through to supports for participation in tertiary education, to the transition into employment and finally retention in STEM. This breadth of work is important in attempting to address the full range of cultural and structural barriers that impede the participation and retention of women in STEM education and careers.

There is limited connectivity between the 9 initiatives, either structurally or operationally, which prevents the implementation of scaffolded, whole-of-lifecycle supports for participants. Connections between initiatives are uncommon, which means efforts to coordinate activity across government departments and with industry are ad hoc. This can create challenges for initiative participants, who must find and access initiatives relevant to their needs at a point-in-time, rather than being able to access a supported pathway from school into employment.

At a system level, the limited coordination results in missed opportunities for initiatives to learn and build from each other. There is a clear need for engagement across government and industry to support a strategic approach that addresses the diverse drivers of underrepresentation. Given the multifaceted barriers to participation, no single initiative or stakeholder will be able to generate the systemic change required.

While the breadth of work underway is valuable, there remain gaps in the suite of initiatives. There is a lack of emphasis on addressing the cultural and systemic barriers within STEM industries that limit the attraction and retention of women into STEM careers. A significant number of the initiatives aim to build awareness and capacity in girls and women which places the responsibility for driving change on the shoulders of participants. While there are initiatives that target leadership, none of the initiatives reach

middle management who are essential change agents in building inclusive environments necessary to increase diversity in STEM. There are few elements of the initiatives that specifically address the needs of individuals impacted by intersectionality, including First Nations and culturally and linguistically diverse communities. There are also gaps in the level of focus applied toward early-years education, parents/carers and mid-career women. The initiatives generally treat STEM as a collective, without targeting the specific problems associated with each of the disciplines.

There are positive signs of impact for participants but it is clear sustainable cultural change will take further time and support. Despite the investment to date, girls and women continue to be underrepresented across all stages of the STEM pathway.

Despite this, assessing the effectiveness of the 9 initiatives by their direct impact at this stage would be premature. Many of these initiatives are generational change initiatives and it will take time for the impacts to be observable at the aggregate level. The evidence to date is positive and identifies both the critical need for, and the need to continue, to drive change so the next generation no longer needs support of this sort.

In addition, the evidence base on ‘what works, for whom, and when’ for these 9 initiatives is relatively limited. The available data concentrate on immediate impacts at the individual level and there is no longitudinal evidence that tracks whether changes in knowledge or motivation are translating into behavioural change for initiative participants. This applies to changes in behaviour for women and girls in pursuing STEM and for organisations in driving meaningful change within their enterprises.

6.2 Opportunities

The findings of this evaluation highlight the need for improvements in the policy and program measures in place to promote and support diversity in STEM, both in terms of the initiatives themselves and the system-level coordination. The opportunities below have been designed to ensure the progress and momentum to date is maintained, and improved outcomes will be supported.

Continuing role for Australian Government

Data on the participation of women and girls in STEM education and careers indicates this cohort continues to be underrepresented. Significant and continued effort is required to address cultural and structural barriers across early education, schooling, tertiary education and employment.

This will require the Australian Government to have a continued role in bringing together industry, the research sector and the community to support systemic change.

Scaffolded approach to provide whole-of-lifecycle support

The evaluation found there is limited connectivity between the 9 initiatives, either structurally or operationally. There is a need for greater coherence across initiatives funded by the Australian Government to ensure scaffolded, whole-of-lifecycle support is provided for participants as they transition from education to employment.

This should be driven by an overarching strategy to provide a coherent suite of policy objectives, aligned to the barriers to participation across the lifecycle.

Tailored programs to address intersectionality

The 9 initiatives have evolved over the course of their implementation, with an increasing focus on intersectionality and improving the participation of people from underrepresented cohorts. While this is a positive step, the 9 initiatives are generally designed from a mainstream perspective rather than targeting the nuanced barriers experienced by different cohorts.

Future directions should consider the specific experiences of underrepresented cohorts to determine which tailored programs are needed to provide effective support. Key to this will be considering the specific experiences of First Nations communities, migrant and refugee populations, non-binary participants and others in the broader LGBTQIA+ community.

Use of diversified government levers

The Australian Government has implemented programs to promote inclusion and diversity in STEM, which show some signs of immediate impact. Driving systemic change will require the consideration of broader policy measures to encourage industry engagement and ownership of the employment-related aspects of STEM participation.

The Australian Government should explore other levers to deliver on these policy objectives. This could include embedding gender equality measures in procurement arrangements, research funding opportunities and program-specific agreements.

Improved initiative design

The 9 initiatives currently use a variety of approaches to monitor performance, linked to their grant agreements and the level of maturity of the initiative. Few initiatives had clearly defined reach targets and requirements to report against the WiSTEM Framework or data sources to support the assessment of efficiency and effectiveness. This made it challenging to assess the effectiveness of government investment.

Future grant agreements should include defined requirements for reach and impact assessment, linked to the overarching evaluation framework to support consistency of approach across initiatives. Grant agreements should embed requirements for data collection and monitoring. Design and reporting requirements should also be aligned across related initiatives, including key metrics, to support aggregation and comparison of outcomes.

Strengthened data systems

Current systems, for both government and initiative delivery partners, lack the nuanced fields required to support a deeper understanding of what works for whom and in what context. This is particularly relevant when exploring gender, intersectionality and structural barriers.

Data systems should be strengthened by including the collection of demographic information, where possible, while managing privacy implications.

Greater outcomes measurement

The evaluation was limited in its ability to comment on the collective impact of the 9 initiatives due to data availability. There is a need to improve the measurement of outcomes, both in terms of the rigour of evidence collected and the tracking of participants over time.

One key change here would be a shift from reliance on self-reported perspectives to data on participant behaviour and actions. Opportunities to support longitudinal tracking should be explored to confirm whether motivation is actually translating into behavioural change and organisational change. This would require monitoring of individuals or cohorts who have participated in WiSTEM projects and could be progressed either through research projects or in data collection undertaken by delivery partners.

There are likely to be ongoing difficulties in demonstrating the contribution of the WiSTEM initiatives to broader social and cultural change. Developing a robust theory of change, using supporting lead indicators with longitudinal participant data collected against these would assist in demonstrating contribution. Other approaches could include conducting wider-scale attitudinal surveys that gather data across the initiatives over time to identify whether attitudes are shifting.

Appendices

A Evaluation framework

This appendix provides the evaluation framework that guided the evaluation.

Table A.1 Evaluation framework and data matrix

Evaluation questions	**Indicators** What are you going to track?	**Metrics** How are you going to track it? How the concept will be measured?	**Data sources** Who, where and how to source the qualitative or quantitative data?
1.0. Appropriateness: How appropriate was the design of the initiatives?			
1.1. What was the original rationale for the WiSTEM initiatives?	1.1.1. Nature and magnitude of the opportunity or problem each WiSTEM initiative was designed to address	Quantitative assessment of the change in girls' and women's participation in STEM studies and career at each life stage	Document review, including the original proposals[96]
1.2. Was Australian Government intervention appropriate?	1.2.1. Extent to which unequitable participation in STEM studies and careers required Australian Government intervention	Qualitative assessment of indicator	STEM Equity Monitor Document review, including original proposals
	1.2.2. Likelihood that without the WiSTEM initiatives, the problem or opportunity would have been addressed through other avenues	Qualitative assessment of indicator	High-level review of relevant program reports, policy frameworks, and data
1.3. How well was the WiSTEM initiatives designed?	1.3.1. Clarity and consistency of WiSTEM initiative objectives,	Qualitative assessment of indicator	Document review, including original proposals

[96] Noting that each initiative will have a slightly different rationale as they arose from different policies. The initiatives will be measured against the original rationales not against the later-released Advancing WiSTEM.

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
	across the suite of initiatives and for each initiative		
	1.3.2. Inclusion of appropriate representatives of underrepresented groups (e.g., First Nations peoples, people living with disability) in the design process	Qualitative assessment of indicator	Document review, including previous evaluations and the latest guidelines Interviews with delivery teams
	1.3.3. Diversity of governing body	Qualitative assessment of indicator	Document review, including previous evaluations and the latest guidelines
	1.3.4. Strength of links between inputs, activities and expected outcomes for each initiative	Qualitative assessment of indicator	Document review, including program logics and latest guidelines
	1.3.5. Quality of mechanisms in place to select projects or participants (only applicable to a subset of initiatives like WiSE and Elevate: Boosting Women in STEM)	Qualitative assessment of indicator	Document review, including the latest guidelines and evidence of how they are applied
	1.3.6. Quality of mechanisms in place to assess outcome achievement for each initiative	Qualitative assessment of indicator	Document review, including reporting templates and a sample of participant reports
	1.3.7. Adequacy of resourcing for each initiative	Number and types of activities undertaken Actual costs and timelines for initiative implementation Number and type of activities delivered in accordance with work plans	Document review, including previous evaluations Resource and role assessment Interviews with the 9 delivery teams

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
		Proportion of activities completed within targeted time	
	1.3.8. Alignment and interaction with other government programs and initiatives targeting similar objectives	Qualitative assessment of indicator, including an environmental scan of all relevant, active, large-scale initiatives	Interviews with industry and government stakeholders
1.4. What is the continuing rationale for the WiSTEM initiatives?	1.4.1. Level of continuing need for intervention	Qualitative assessment of indicator Change in participation of girls and women in STEM studies and careers Change in participation of underrepresented cohorts in STEM studies and careers	STEM Equity Monitor Document review, including the annual summary reports Interviews with industry and government stakeholders
	1.4.2. Extent to which stated policy rationale can be addressed through other mechanisms	Assessment of alternate delivery mechanisms	
2.0 Efficiency and effectiveness: Were the initiatives administered and delivered efficiently?			
2.1. How efficient was the WiSTEM initiatives' rollout?	2.1.1. Extent to which timeframes for each initiative rollout were met, and reasons for any delays	Actual timelines for initiative implementation	Document review, including original proposals Interviews with the 9 delivery teams
2.2. How effectively and efficiently were the WiSTEM initiatives scoped and delivered?	2.2.1. Extent to which initiatives were delivered efficiently?	Actual initiative spend divided by operational budget Administrative spend divided by total spend	Document review, including original proposals Cost assessment Survey of participants
	2.2.2. Extent to which initiatives were adequately scoped to meet needs of participants	Proportion of participants who deemed their needs are met for each initiative	

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
2.3. How effective and efficient were WiSTEM initiatives' reporting requirements?	2.3.1. Extent to which each initiative's reporting requirements help measure output and outcome without creating undue administrative cost	Qualitative assessment of indicator	Document review, including reporting templates
3.0 Outcomes and impact: Did the initiatives work?			
3.1. To what extent have the WiSTEM initiatives' intended short-term outcomes been achieved? Did this vary for different cohorts of girls and women?	3.1.1. Extent to which more girls and women are motivated and able to study STEM subjects and courses	Not assessed directly given challenges associated with surveying younger participants. Instead, this will be assessed indirectly through 3.1.3.	*See comment to the left*
	3.1.2. Extent to which more girls and women are motivated and able to pursue STEM careers	Not assessed directly given challenges associated with surveying younger participants. Instead, this will be assessed indirectly with 3.1.3.	*See comment to the left*
	3.1.3. Extent to which teachers and parents better support girls to pursue STEM studies and careers	Quantitative / qualitative assessment of the quality and usefulness of resources provided by relevant initiatives Quantitative / qualitative assessment of how teachers and parents used the resources (e.g., change in classroom practices) to support girls to pursue STEM studies and careers Quantitative assessment of teachers' and parent's change in attitude, for example: – Parents' and teachers' awareness of STEM importance*	Survey of teacher and parent participants Feedback analysis based on routine survey data from teachers and parents

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
		(e.g., “I believe STEM skills are important for getting a good job”) – Parents’ and teachers’ beliefs about their responsibility to be involved in girl’s career ambitions (e.g., “I believe it is my responsibility to help my child/student cultivate interest in STEM”) – Parents’ feelings of efficacy regarding their involvement in their children’s schooling (e.g., “I know how to help my child/student do well in STEM subjects”) *These questions should align with the YouthInsight’s survey administered by the Department	
	3.1.4. Extent to which government interventions are better informed by the evidence base and pilot results	Quantitative assessment of whether/how government considered and actioned on findings derived from the STEM Equity Monitor and WiSE	Document review, including original proposals Interviews with the relevant delivery teams, including the Women in STEM Ambassador
	3.1.5. Extent to which organisations are better positioned to employ, retain, and progress STEM-qualified women	Quantitative assessment of policies, procedures and gender equality metrics from organisations that participated in SAGE or Coalition of Change	Organisational performance based on STEM Equity Monitor and WGEA data Document review, including the list of participating organisations/institutes
3.2. To what extent have the WiSTEM initiatives’ intended medium-term outcomes been	3.2.1. Extent to which more girls and women choose to study STEM subjects or courses	Proportion of girls enrolled in STEM subjects in senior	STEM Equity Monitor

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
achieved? Did this vary for different cohorts of girls and women?		secondary school (years 9, 10, 11 and 12)	
	3.2.2. Extent to which more women choose to pursue STEM careers	Proportion of women enrolled in STEM disciplines in vocational education, undergraduate, and postgraduate degrees Proportion of women enrolled in STEM disciplines PhD	STEM Equity Monitor
	3.2.3. Extent to which more women continue and progress in STEM careers	Proportion of workers who are women in STEM industries and occupations, as a metric for retention Proportion of female managers and senior leaders in STEM organisations, as a metric for progression	STEM Equity Monitor
	3.2.4. Extent to which government interventions (i.e., WiSTEM initiatives) operate as a consistent, holistic suite with a proportionate focus on critical issues	Qualitative assessment of the suite of government interventions	Interviews with the relevant delivery teams, including the Women in STEM Ambassador
	3.2.5. Extent to which societal and organisational barriers to participation, retention, and progression are reduced in STEM careers	Quantitative assessment of policies, procedures and gender equality metrics of organisations and academic institutes that participated in SAGE or Coalition of Change.	Organisational performance based on STEM Equity Monitor and WGEA data Document review, including the list of participating organisations/institutes
3.3 To what extent have the WiSTEM initiatives' intended long-term outcomes been achieved?	3.3.1. Extent to which there are equal opportunity and improved participation, retention, and progression in STEM studies	Proportion of girls enrolled in STEM subjects in senior secondary school (years 9, 10, 11 and 12)	STEM Equity Monitor

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
Did this vary for different cohorts of girls and women?		Proportion of women enrolled in STEM disciplines in vocational education, undergraduate, and postgraduate degrees Proportion of women enrolled in STEM disciplines PhD	
	3.3.2. Extent to which there are equal opportunity and improved participation, retention, and progression in STEM careers	Proportion of workers who are women in STEM industries and occupations, as a metric for retention Proportion of female managers and senior leaders in STEM organisations, as a metric for progression Quantitative assessment of teachers' and parent's change in attitude	STEM Equity Monitor Feedback analysis based on routine survey data (Youth Insight) from teachers and parents
	3.3.3. Extent to which there are sustainable change in societal expectations in girls and women' STEM studies and careers	Quantitative assessment of policies, procedures, and gender equality metrics of organisations and academic institutes Qualitative assessment of the suite of government interventions	Interviews with the relevant delivery teams, including the Women in STEM Ambassador STEM Equity Monitor Document review, including the list of participating organisations/institutes
3.4. Who was affected by the initiative?	3.4.1. Extent that the WiSTEM initiatives reached participants	Number and type of participants who interacted with each initiative The unit of interaction would vary by initiative and some initiatives may have multiple ways of measuring interactions (e.g., number of event participants for	Cohort analysis based on each initiative's participant data

Evaluation questions	Indicators What are you going to track?	Metrics How are you going to track it? How the concept will be measured?	Data sources Who, where and how to source the qualitative or quantitative data?
		Superstars of STEM and number of unique website visitors for Girls in STEM toolkit) Participants should be further segmented by cohort, such as girls and women who identify as Aboriginal or Torres Strait Islander, culturally and linguistically diverse, and lesbian, gay, bisexual, transgender, queer or questioning, and intersex (LGBTQI), and those who have a disability	
	3.4.2. Extent and nature of value delivered to participants	Qualitative assessment of the indicator	Survey and interview with participants
3.5 Did the initiatives have any unintended consequences, either positive or negative?	3.5.1. Extent and nature of unintended consequences, including impact on Country (particularly environmental and on First Nations peoples and communities)	Qualitative assessment	Interviews with the 9 delivery teams Survey of participants
3.6. To what extent was each WiSTEM initiative 'evaluation ready'?	3.6.1. Extent to which each WiSTEM initiative is ready for evaluation of its activities, outputs, and outcomes	Metrics identified in initiative documentation and Evaluation Strategy Evidence of reporting data usage by initiative delivery/policy team	Interviews with the 9 delivery teams Document review

Source: Nous (2022). Evaluation and Monitoring Framework, Department of Industry, Science, Energy and Resources. Melbourne: Nous Group.

B Additional methodology and data sources

This appendix provides additional methodology and information on data sources.

B.1 Stakeholder consultation

A total of 46 stakeholders were consulted in 23 interviews. This breadth of stakeholders has been captured in Table B.1.

Notes were recorded during interviews to enable qualitative thematic analysis. Interviewees were provided with a discussion guide.

Table B.1 Stakeholders consulted

Stakeholder group	Number of stakeholders
Program delivery teams	9
CCC-STEM organisations – CSIRO – Geoscience Australia – MYOB	3
Government and peak body stakeholders – The department – National Indigenous Australians Agency – Office for Women, Department of the Prime Minister and Cabinet – Department of Education – Workplace Gender Equality Agency – CSIRO – Defence Science and Technology Group – Australian Academy of Science – Women in STEMM Australia – Engineers Australia – Women in Technology	11

Source: ACIL Allen

B.2 Survey administration and response rates

A survey was administered via Web Survey Creator to gather additional insights from the large number of initiative participants, teachers and parents that are not available from the initiative documentation. This provided a breadth of data collection that could not be obtained through consultation alone. The survey was tailored to address gaps identified in the desktop review for each initiative, in line with the initiative KEQs. Survey respondents were required to agree to the Privacy Collection Statement/Notice before completing the survey.

This survey received a total of 152 responses across the 6 initiatives surveyed. The number of responses and response rates for each initiative are detailed in Table B.2. This survey received 62 responses from participants in Superstars of STEM, 31 responses from participants in SAGE, 22 responses from participants in Elevate, 20 responses from participants in WiSE, 13 responses from participants in GiST and 4 responses from participants in CCC-STEM.

Table B.2 Number of responses and response rates for each initiative

Initiative	Number of potential respondents	Number of responses	Response rate
Elevate	50 inaugural scholars	22	44%
GiST	750 newsletter subscribers	13	2%
CCC-STEM	13 members	4	31%
SAGE	43 subscriber organisations	31	72%
Superstars of STEM	200 superstars	62	31%
WiSE	71 grantees	20	28%
Total	**1,127**	**152**	**13%**

Source: ACIL Allen

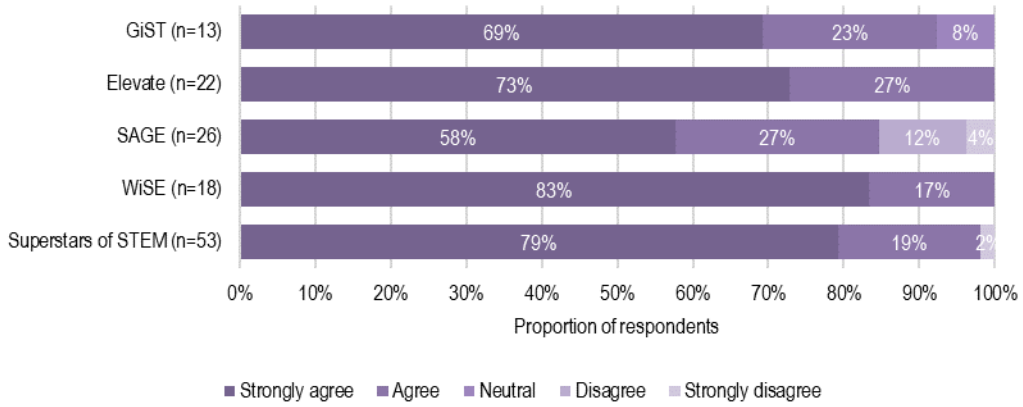
C Additional data and information

This appendix provides additional survey information referenced in the report.

C.1 ACIL Allen survey data

Figure C.1 shows the extent to which survey respondents agreed there is an ongoing need for their initiative, or similar, program/s.

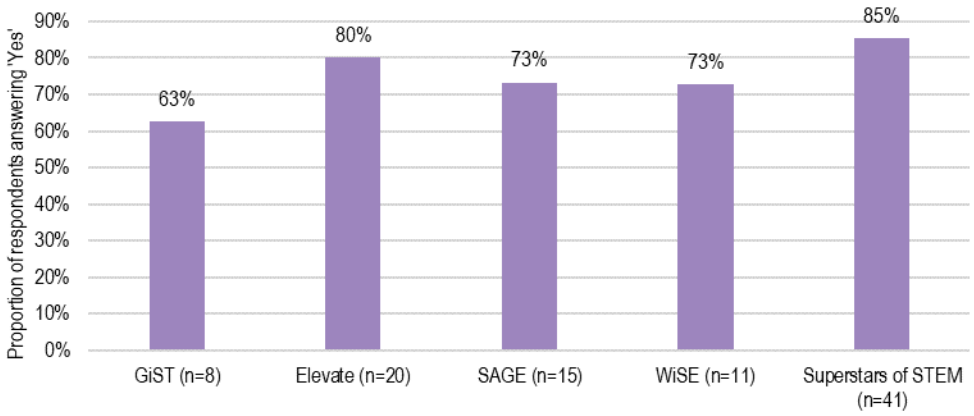
Figure C.1 To what extent do you agree that there is an ongoing need for this, or similar, program/s?



Source: ACIL Allen survey of WiSTEM initiative participants, 2023

Figure C.2 shows the extent to which survey respondents agreed the meaningful contribution made by initiatives to changing how society expects girls and women to engage in STEM (see Figure 5.20) is sustainable.

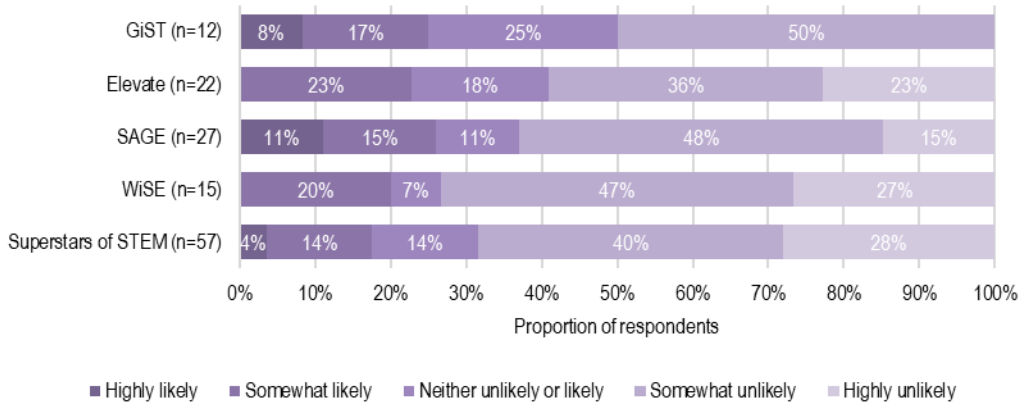
Figure C.2 Is this change sustainable?



Source: ACIL Allen survey of WiSTEM initiative participants, 2023

Figure C.3 shows respondents' perspectives on whether they would have received similar support from other sources or taken the actions they took if they were not involved in each initiative.

Figure C.3 If you were not involved in the initiative, how likely is it that you would have received similar support from other sources or taken the actions you took?

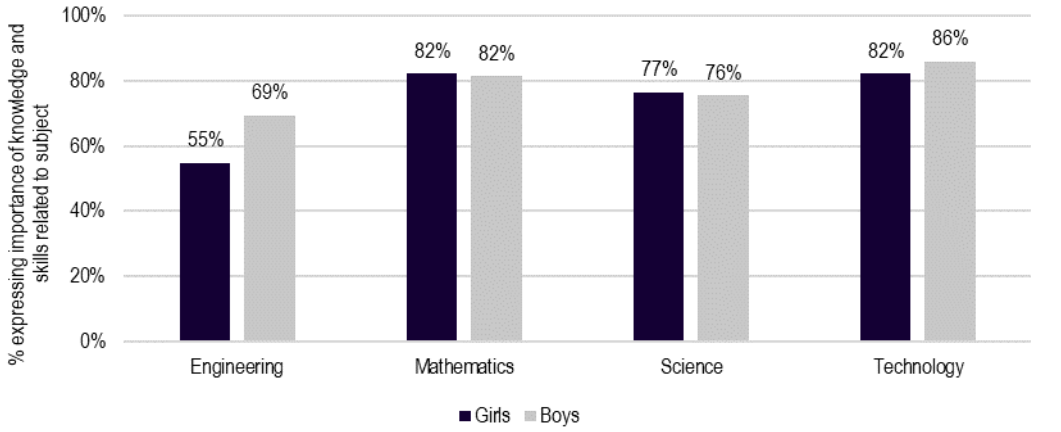


Source: ACIL Allen survey of WiSTEM initiative participants, 2023

C.2 Public data

Figure C.4 shows girls' and boys' responses to the question "How important do you believe it is to have knowledge and skills related to each of the subjects that make up STEM".

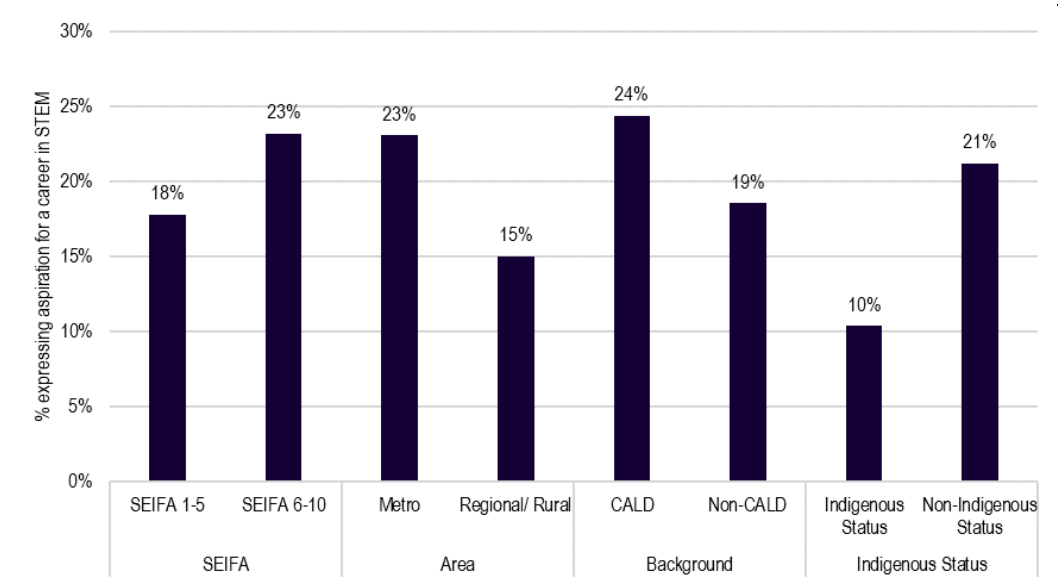
Figure C.4 How important do you believe it is to have knowledge and skills related to each of the subjects that make up STEM – Wave 3, ages 14-17



Source: YouthInsight

Figure C.5 shows the proportion of girls and women with STEM career aspirations – Wave 3, Ages 12-25.

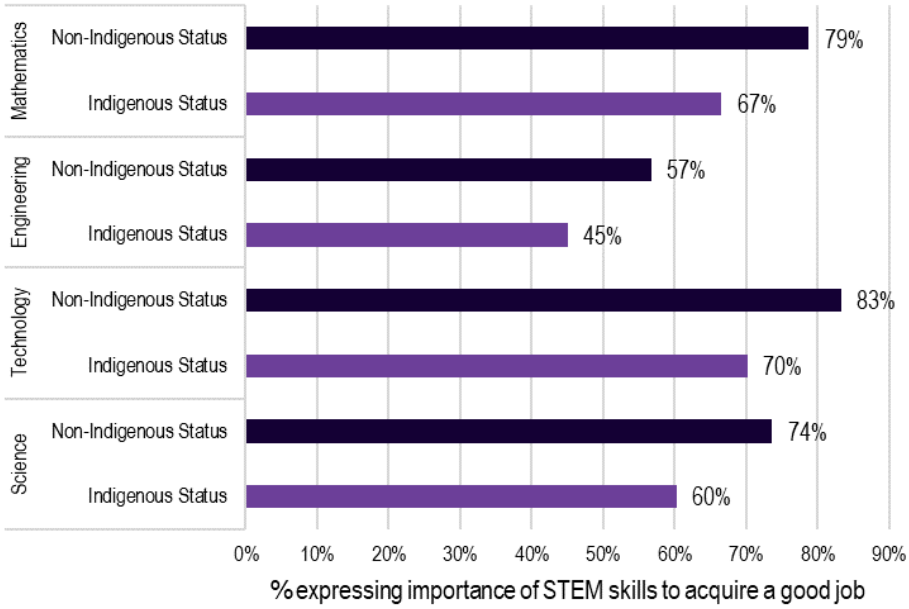
Figure C.5 Proportion of girls and women with STEM career aspirations – Wave 3, Ages 12-25. Refer to glossary for details on SEIFA cohorts.



Source: YouthInsight

Figure C.6 shows the proportion of girls and women expressing the importance of STEM skills to acquire a good job.

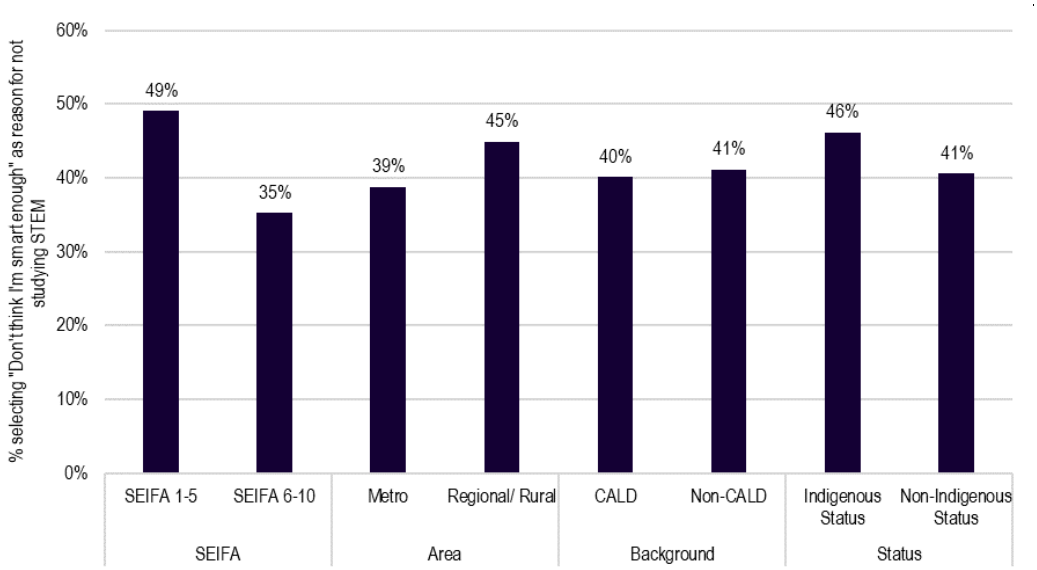
Figure C.6 Proportion of girls and women expressing the importance of STEM skills to acquire a good job – Wave 3, Ages 12-25



Source: YouthInsight

Figure C.7 shows the proportion of girls and women selecting “Don’t think I’m smart enough” as a reason for not studying STEM.

Figure C.7 Proportion of girls and women selecting “Don’t think I’m smart enough” as a reason for not studying STEM



Source: YouthInsight

D Women in STEM and Entrepreneurship grants

This appendix provides an assessment of the WiSE initiative.

D.1 Overview of WiSE

Table D.1 Women in STEM and Entrepreneurship grants

Lead Agency	Department
Related policy/strategy	NISA WiSTEM Strategy
Target audience	STEM sector organisations, girls and women in STEM and entrepreneurship education, activities and careers
Aims	– Increase awareness and participation of girls and women in STEM – Increase entrepreneurship education and careers – Increase participation of girls and women in other parts of the innovation ecosystem – Increase the number of women in senior leadership and decision-making positions in government, research organisations, industry and business.
Key activities	Funding is provided to successful applicants. Eligible activities for grantees include developing and delivering engagements (e.g., workshops, networking events), education and professional development activities, educational materials and tools, change management programs and activities to reduce cognitive biases in investment decision-making.

Source: ACIL Allen, 2023.

D.2 Data sources used for this assessment

Insight on reach and outcomes has been limited by the available data. WiSE shares similar objectives with other initiatives in the sector which makes it difficult to attribute impact. Data from ACIL Allen's evaluation survey is self-reported.

The assessment is informed by data from the internal evaluations of Rounds 1, 2 and start of Round 3 (2022), grant guidelines, progress reports, final reports, and consultation with the delivery partner, delivery partners of other relevant WiSTEM initiatives and government and peak body stakeholders.

D.3 Initiative design

D.3.1 Justification for the initiative

Women in STEM and Entrepreneurship (WiSE) is a competitive grants initiative that funds community-driven projects aiming to deliver lasting systemic change and support girls and women by eliminating barriers to participation in STEM education and careers, including entrepreneurship.

Evidence indicates the market does not provide sufficient funding to increase the participation of girls and women in STEM and entrepreneurship education, activities and careers.[97] There is a clear role for government in funding initiatives like WiSE as a public good, as similar initiatives are unlikely to be funded through other sources. This is supported by the ACIL Allen evaluation survey of WiSE recipients, which showed 74% of respondents reported being somewhat or highly unlikely to receive similar support from sources other than WiSE.

WiSE aligns with the government's strategic policy intention to increase gender equity in STEM education and careers, as outlined in the WiSTEM Strategy. The design of the initiative aligns with the 2020 Women's Economic Security Statement, as well as the policy directions of the 2020-21 and 2021-22 Budgets, which identify gender inequity as a key priority for government.[98] WiSE aligns with other WiSTEM initiatives, for example:

— *Women in STEM Ambassador*: the incumbent Ambassador chaired the WiSE Round 3 Grant Committee.

— *STEM Equity Monitor:* Monitor data provided evidence of areas of low female engagement in the STEM sector, which informed the focus areas for Round 3. Round 4 applicants were recommended to use Monitor data to support their applications.

— *Superstars of STEM:* was originally funded through a WiSE grant and has contributed significantly to raising awareness of women and girls in STEM. This initiative has since received regular funding from the Australian Government.

WiSE's engagement across other WiSTEM initiatives helps to fill gaps in the suite of interventions in this space by funding programs across the sector, as identified by the sector.

D.3.2 Design of the initiative

The aims of WiSE are clearly identified and link with the policy intent of the WiSTEM Strategy.

The 2022 evaluation indicates at least 6 different areas of the department were involved in the initial design and delivery of WiSE Round 1. Involvement by the National Indigenous Australians Agency was important in supporting a focus on intersectionality. However, First Nations peoples are not explicitly identified as a priority in the grant guidelines, despite being under-represented throughout the STEM pipeline.[99]

There is limited alignment between the inputs and objectives of the initiative. While WiSE is funded for 12 years, grant duration ranged from 24 months in Round 1 and 2, 15

[97] Nous Group (2022). Op. cit.

[98] Department of Industry, Science, Energy and Resources (2022). *Women in STEM and Entrepreneurship program monitoring evaluation*.

[99] Australian Academy of Science and Australian Academy of Technological Sciences and Engineering (2019). Op. cit.

months in Round 3 and 3 years in Round 4. This does not position the WiSE grantees to drive long-term systemic change in the STEM sector, nor enable grantees to become self-sustaining after the completion of the grant.[100] Funding provided for the first 3 rounds ($5,000 to $250,000) was insufficient to drive broad change.

Funding for Round 4 was increased ($0.5-1 million) to scale or extend existing projects with an ongoing or completed evaluation. Engagement with government and peak body stakeholders for ACIL Allen's evaluation highlighted the value of this scaling approach in building impact from the investment.

After Round 1, the department implemented processes to review the grant round and assess lessons learned. Time constraints in Round 2 limited the opportunity for review. Round 4 aligned with recommendations from the 2022 evaluation, which suggested the size of the funding envelopes offered in the first 3 rounds was too small to create lasting systemic change.[101]

> *"…it's already verging on a perception that it's lip service because it's not a huge pool…limited in terms of what meaningful change it can bring."*
>
> *External stakeholder*[102]

ACIL Allen's 2023 survey of grantees shows 75% of respondents considered WiSE funding to be highly useful and 83% agreed or strongly agreed the initiative met their needs. Further, the 2022 evaluation found the government's investment in WiSE is signalling the importance of the issue to the private and research sectors..[103] Together, this indicates the design is meeting participants' needs.

D.3.3 Links to the evidence base

Some elements of WiSE's design have clear links to evidence of effective practice.

The objectives of WiSE align with the evidence base. WiSE allows government to fund pilot initiatives that are community-identified and led.[104] This recognises addressing underrepresentation of girls and women in STEM is a collective challenge that involves broad engagement.

The selection process also aligns with the evidence base. The recommendation for applicants to use STEM Equity Monitor data as evidence in Rounds 3 and 4 enabled the Grant Committee to identify successful grants in line with areas of need. For example, Round 3 aimed to support projects to contribute to lasting systemic change by reducing barriers for girls and women in information technology (IT), engineering and entrepreneurship. Evidence suggests that women are particularly underrepresented in these areas.[105]

[100] Engagement with government and peak body stakeholders for ACIL Allen's evaluation.

[101] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[102] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[103] Department of Industry, Science, Energy and Resources (2021). *Grant Opportunity Guidelines. Women in STEM and Entrepreneurship: Round 4.* Canberra: Department of Industry, Science, Energy and Resources.

[104] Department of Industry, Innovation and Science (2019). Op. cit.

[105] Australian Academy of Science and Australian Academy of Technological Sciences and Engineering (2019). Op. cit.

D.4 Efficiency

D.4.1 Reach

WiSE has a positive reach across the primary target audience of STEM sector organisations but the initiative is significantly oversubscribed.

A total of 54 grants have been awarded over Rounds 1 to 3 to organisations including academic institutions, non-profits, businesses and community organisations. Rounds 1-3 were significantly oversubscribed, with 54 of 730 (7%) applicants successful. Over 90% of applicants met eligibility criteria, suggesting worthwhile projects may not have been funded.[106] This process could be improved to reduce oversubscription and minimise the associated burden on the sector, for example through more focused eligibility and assessment criteria or expressions of interest stages.

The 2022 evaluation found over 85% of both successful and unsuccessful applications came from organisations classified as an Australian Public Company, Australian Private Company or Other Incorporated Entity,[107] and from Education and Training, Professional, Scientific and Technical Services, or Other Services.[108] The 2022 evaluation found the grantees for Rounds 1-3 reflected the geographic distribution of Australia's population and education institutions, noting more focus could be given to regional areas. The focus of grantees on digital engagement in regional areas was seen to limit the ability to engage with regional girls and women who do not have access to a stable internet connection or devices. This concern was also raised during engagement with government and peak body stakeholders for ACIL Allen's evaluation.

No information is collected on the individuals involved in each activity delivered by grantees. However, ACIL Allen's evaluation survey of 20 grant recipients shows 60% of respondents reported using the funding to reduce intersectional or cultural barriers for girls and women participating in STEM (see Figure D.1).[109] Intersectionality is an explicit focus of Round 3 and 4.[110]

Grantees commonly report using WiSE funding to support STEM-skilled girls and women in education, careers or entrepreneurship (80%) and support women to gain STEM skills (65%).[111]

[106] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[107] Department of Industry, Science, Energy and Resources (2022). Op. cit.

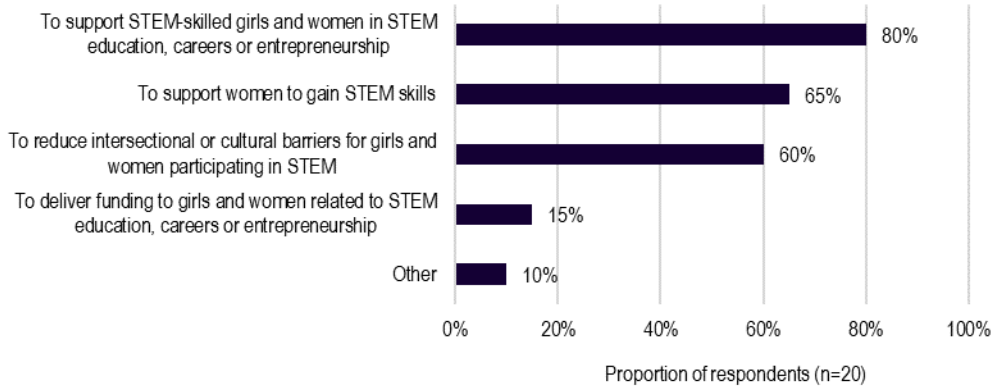
[108] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[109] ACIL Allen survey conducted in 2023.

[110] Department of Industry, Science, Energy and Resources (2021). Op. cit.

[111] ACIL Allen survey conducted in 2023.

Figure D.1 How did you use the funding provided by WISE?



Source: ACIL Allen survey, 2023

D.4.2 Timelines

WiSE reporting shows overall initiative timelines were not consistently met.

There were significant delays in the approval and announcement process for Round 3. These largely resulted from Ministerial changes. The 2022 evaluation reported applicants received limited communication on these delays and 43% of survey respondents were unsatisfied or very unsatisfied with the application process.[112]

Round 3 was also impacted by the COVID-19 pandemic as many projects required face-to-face interactions. Delays to funding approval and project timelines meant very few Round 3 recipients had completed their project and required evaluation in time to apply for Round 4 and, as such, were ineligible.

D.4.3 Funding

It is challenging to comment on the expenditure of WiSE due to limitations in available funding information.

The Australian Government allocated a total of $25,725,809 from 2016/17 to 2024/25. $7,967,886 was allocated to the initiative for the first 4 years, from 2016–17 to 2019–20. $1 million of funding was allocated in 2020-21 and $977,691 in 2021-22. $15,780,232 was allocated across 2022-23 to 2024-25.

There were limitations in terms of obtaining details of expenditure for Rounds 1 and 2. Overall expenditure for Rounds 3 and 4 between 2020-21 and 2021-22 was 10% less than budgeted.

Departmental spending on grant administration was not available, as once allocated to specific areas of the department (for administration as well as for strategic oversight from the policy team), it is not monitored at the initiative level.

WiSE recommends applicants make co-contributions, which leverage government funding to increase the potential impact of the projects.

[112] Department of Industry, Science, Energy and Resources (2022). Op. cit.

D.5 Outcomes and impacts

D.5.1 Evaluation readiness

WiSE has data collection and reporting processes in place to support the evaluation of activity and outputs on an individual grantee basis.

Self-evaluation processes were introduced in Rounds 3 and 4 to facilitate the collection of more granular short-term outcome data.[113] Outcome reporting in Rounds 3 and 4 were more comprehensive and accurate than in Rounds 1 and 2 (which focused on activities and outputs).

WiSE is delivered by the Portfolio Program Delivery Branch (Branch) in the Grants Delivery and Business Services Division (Division) of the Department, which reports on progress to the department's policy team. The Branch was previously in the AusIndustry Division and was moved into the Division in a 2022 restructure. The Division collects administrative data on applications (including demographics and requested funding amount) and requires grantees to submit progress reports, final reports and self-evaluations. These include information on progress toward agreed milestones, project expenditure and co-contributions.[114] Progress reports are assessed on a project-by-project basis and are not collated in any systematic manner to enable a collective view or evaluation of the grants. The WiSE evaluation found no evidence the cost of compliance was not commensurate with perceived benefits.[115] ACIL Allen did not consult with grantees and could not verify the impact of subsequent changes to outcomes reporting.

There is limited data available to inform an assessment of medium- to long-term outcomes or to determine which initiatives are most impactful.[116] Given there are numerous initiatives targeting similar objectives, it is also difficult to determine the extent to which short-, medium- and long-term outcomes can be attributed to WISE.

D.5.2 Short-term outcomes

There is evidence WiSE is achieving the measured short-term outcomes, including among under-represented groups.

Surveys and consultations conducted as part of the 2022 evaluation suggest the initiative is raising awareness and motivating girls and women to pursue STEM studies and careers. Examples of successful grant recipients include:

— Superstars of STEM has increased the awareness and motivation of participants to engage with STEM. Many Superstars attribute their career progression to their initial involvement with the initiative.[117] The Superstars of STEM initiative received subsequent government funding to continue.

— The University of Canberra's *Biomechanics Research and Innovation Challenge: 100 Girls, 100: Stories; 100 Days* (Round 3) demonstrated via pre- and post-initiative surveys participants were more aware of STEM studies and careers and more likely

[113] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[114] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[115] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[116] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[117] Department of Industry, Science, Energy and Resources (2022). Op. cit.

to view the fields of biomechanics and engineering as interesting and good career options.[118]

— Engineers Without Borders (Round 3) *Futur-neers* outreach program demonstrated via a pre- and post-workshop survey participants reported a statistically significant increase in both awareness of engineering as a career and interest in engineering as a potential career path.[119]

— Food Futures Company's (Round 3) *Indigenous Girls and Women in Native Ag+Food: Entrepreneurship Pathways*, engaged female First Nations students in schools, universities and TAFEs and generated a measurable increase in awareness of STEM and entrepreneurial career opportunities available for girls and women in the native food and agriculture sector.[120]

— CSIRO's (Round 3) *Empowering Indigenous women-led AI to manage health Country* led to improved digital skills employment opportunities of First Nations women who participated in the program.[121]

"I think there are increased mechanisms and platforms to support women to have a career in STEM [as a result of WiSE]."

Stakeholder interview[122]

D.5.3 Medium- to long-term outcomes

Medium- and long-term outcomes are difficult to measure due to limitations in the available data described under the evaluation readiness section.

However, the observed short-term outcomes are likely to be lead indicators for medium-term outcomes, with the contemporary evidence base suggesting that increased interest in STEM studies can lead to increased participation in STEM studies and careers.

Respondents to ACIL Allen's 2023 survey reported WiSE supported their organisation to employ and retain STEM-qualified women (28% of 18 respondents) and progress STEM-qualified women (39%).[123] 63% of respondents believe WISE is contributing to meaningful change in how society expects girls and women to engage in STEM.[124] This lower response rate may reflect the diversity and scope of projects funded under WiSE and the longer timeframes required for these outcomes to emerge.

D.5.4 Unintended consequences

Competitive grant initiatives with low success rates, like WISE, can cause a high burden on applicants and assessors.[125] This is inefficient and has the potential to damage the reputation of WiSE, as potential applicants may not apply due to perceptions of limited success. This may be more likely to impact organisations most in need of funding that have limited resources to apply.

[118] The University of Canberra (2022). End of project report:

[119] Engineers Without Borders (2022) End of project report:

[120] Food Futures Company (2022) End of project report:

[121] CSIRO (2022) End of project report.

[122] Department of Industry, Science, Energy and Resources (2022). Op. cit.

[123] ACIL Allen evaluation survey 2023.

[124] ACIL Allen evaluation survey 2023.

[125] Department of Industry, Science, Energy and Resources (2022). Op. cit.

The size of the Grant Committee increased from 4 in Round 2 to 25 in Round 3 to distribute the workload and diversify the views of the assessors. However, a 2022 evaluation indicated this negatively impacted the efficiency of the assessment, creating administrative complications and consistency issues.[126] The Grant Committee was reduced to 11 in Round 4, which reflected the recommendation of the 2022 evaluation.

D.6 Key insights

- The funding model is insufficient to create the desired systemic change in the sector. WiSE is reaching only a small proportion of the organisations that could potentially benefit from funding. The short length of funding terms is also a factor limiting systemic change.
- Oversubscription creates a high administrative burden and could negatively impact the reputation of the initiative. Refining the Round objectives or eligibility criteria or creating a 2-step application process could reduce this burden.
- Administrative complications and the COVID-19 pandemic hindered WiSE delivery. Better timeline management and communication of delays would improve engagement with and outcomes for applicants and recipients. Better communication between the administration and policy teams could also support more effective grant management.
- Better ongoing collation of progress report data would enable a collective view of the WiSE grants and improve WiSE's evaluation readiness. This could be achieved through the adoption of an online reporting system that collates information across WiSE grants into a dataset to monitor activities, outputs and outcomes collectively.
- Insight on reach and outcomes has been limited by the available data. Additional data collection and better tracking of end-users would support future evaluation and opportunities for improvement. This includes better understanding of the extent to which the initiative is meeting the needs of diverse cohorts.

[126] Department of Industry, Science, Energy and Resources (2021). Op. cit.

E Champions of Change Coalition STEM Group

This appendix provides an assessment of the CCC-STEM initiative.

E.1 Overview of CCC-STEM

Table E.1 Champions of Change Coalition STEM Group – Quick Reference

Lead Agency	Champions of Change Coalition, formerly Male Champions of Change
Related policy/strategy	NISA
Target audience	STEM leaders forming the CCC-STEM, participating member organisations, broader STEM sector
Aims	To address the lower participation, retention and slower progression rate of women in STEM workplaces
Key activities	CCC-STEM conducts regular meetings among participating leaders to drive organisational change through practical action including developing action plans, engaging with stakeholders, partnering with other organisations (e.g., SAGE and Engineers Australia), identifying and sharing best practice, key learnings and contributing to the evidence base.

Source: ACIL Allen, 2023.

E.2 Data sources used for this assessment

The assessment is informed by impact reporting, consultation with CCC-STEM, delivery partners of other relevant WiSTEM initiatives, government and current or former members of the CCC-STEM.

The sample of organisations participating in CCC-STEM is relatively small and there is no available comparison group; this limits the extent to which conclusions can be drawn from the data.

E.3 Initiative design

E.3.1 Justification for the initiative

CCC-STEM is an organisational capability-building initiative, designed to recruit established industry leaders in the STEM sector to drive the cultural change required to improve the participation of women in STEM.

Initiatives like CCC-STEM are necessary to address the inequity present in STEM careers, as evidenced by reduced rates of participation, retention and progression of women in the STEM sector. This links to the evidence base that women:

— are more likely to consider leaving STEM careers

— are less likely to see earning potential and benefits in STEM careers

— have less opportunity for promotion and leadership, a lack of visible role models in leadership and a lack of diversity in senior leadership.

While there is a role for government in supporting initiatives like CCC-STEM, there is a clear rationale for industry to invest in driving cultural change and organisational behaviour. As such, the initiative became self-sustaining through member funding in 2019 after completing 3 government-funded phases. Consulted member organisations noted the most valuable role for government was in the education sector, driving change in the volume of STEM-educated and qualified girls and women, while industry should take greater leadership in organisational change.

CCC-STEM was implemented in 2016 under the NISA and aligns with the government's strategic policy intentions to enable improved gender equity in STEM careers. CCC-STEM has had direct interaction with other WiSTEM initiatives such as:

— *Science in Australia Gender Equality (SAGE)*: an organisational culture change and capability-building initiative that intends to address the underrepresentation of women in STEM-based careers in academia and research. Several CCC-STEM members represent organisations that are SAGE subscribers which creates synergies and complementary activities that occur within an organisation participating in both initiatives, accelerating action.

— *Women in STEM Ambassador (WiSA)*: an awareness-raising initiative that seeks to address drivers of underrepresentation of girls and women in STEM. The WiSA has been represented at CCC-STEM meetings and had influence in member organisations.

E.3.2 Design of the initiative

The aims of CCC-STEM are clearly identified and linked with the initiative design which requires participation and action from members at the CEO level, where members have the largest influence to affect change. The initiative is designed to leverage the influence of members directly within their organisations and externally.

The CCC-STEM group has a dedicated convenor. The convenor's role is to guide members in their activities. The Champions of Change Coalition is governed by a Board of 6 members representing a variety of sectors internationally, with 14 convenors and an institute team, including Program Directors and Managers.

Government inputs to, and activities of, the CCC-STEM align with the aims of addressing lower participation, retention and slower progression rates by driving organisational change from the CEO level. This fills a gap in support needed for the sector by supporting broad organisational change. While government inputs were relatively modest for the

initiative aims, transitioning to a self-sustaining model allows the initiative to leverage additional investment in line with its aims.

Intersectionality was not a specific focus of the initiative design. However, activities and aims that focus on creating flexible and inclusive employment experiences may consider broader diversity.

The focus on leaders, initially male but since shifted to include all leaders as part of the evolution of the organisation, at the CEO level, taking practical action to accelerate progress on gender equality, is unique. It asks leaders to personally influence system-wide action by creating organisational accountability for change, changing institutional norms and providing guides to assist STEM employers beyond the CCC-STEM Group to improve their workforce gender equality.[127] It is considered disruptive, experimental and agile.[128]

E.3.3 Links to the evidence base

CCC-STEM's design is linked to the evidence base on effective practice.

The focus of CCC-STEM on engaging leaders aligns with good practice research on organisational change towards gender equity in similar fields, which indicates:

— inclusive leadership is increasingly needed to effect organisational change and is recognised as an essential aspect of effective leadership in business

— it is important the burden of organisational culture shift does not fall on women or, in the case of intersectionality, other under-represented groups.[129]

E.4 Efficiency

E.4.1 Reach

Nationally, over 1.6 million people worked in STEM occupations.[130] At present, members are reported to represent organisations with workforces totalling approximately 27,000 staff, indicating the potential reach of these organisations represents approximately 2% of the STEM workforce. Additionally, stakeholders noted their reach extended beyond their organisations through social media, networking and other channels; however, this was not quantified.

This initiative has no defined targeted reach, beyond the number of members in the group. CCC-STEM has had 8 to 17 members since 2016. An overview of the reach of CCC-STEM, as per their direct sphere of influence, is provided below.

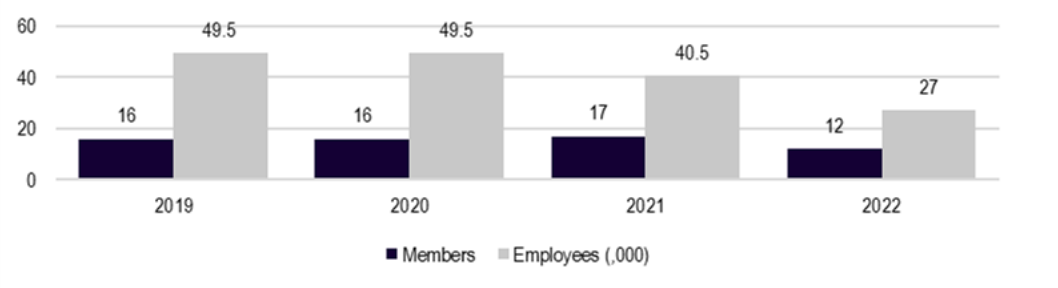
[127] Kang, S.K. and Kaplan, S. (2019). Working toward gender diversity and inclusion in medicine: myths and solutions. *The Lancet*, 393(10171), pp.579-586.

[128] Latimer, J., Cerise, S., Ovseiko, P.V., Rathborne, J.M., Billiards, S.S. and El-Adhami, W. (2019). Australia's strategy to achieve gender equality in STEM. *The Lancet*, 393(10171), pp.524-526.

[129] Coe, I.R., Wiley, R. and Bekker, L.G., 2019. Organisational best practices towards gender equality in science and medicine. *The Lancet*, 393(10171), pp.587-593.

[130] Department of Industry, Science and Resources (2023). *STEM-qualified occupations*. Accessed at: https://www.industry.gov.au/publications/stem-equity-monitor/workforce-data/stem-qualified-occupations.

Figure E.1 CCC-STEM Group reach



Source: Data sourced from MCC Impact Reports, 2019-2022, analysis by ACIL Allen, 2023.

Notably, the measurement of reach by the metrics of employees and jurisdictions is highly dependent on individual member participation on a yearly basis. There is insufficient data to identify reach beyond the member organisations.

E.4.2 Timelines

CCC-STEM grant agreement timelines for Phase 3 were met. A report setting out the achievements and outcomes of Phases 1-2 demonstrated the intended objectives of the project were met. Phase 2 was intended to be completed by the end of September 2017 but was extended to the end of March 2018.

Government grant funding ceased in 2019. At this time, the initiative became self-sustaining, achieved through member contributions. The initiative has continued since with regular meetings and reporting by members.

E.4.3 Funding

Funding for CCC-STEM has been appropriate and was considered effective in accelerating the initiative.

CCC-STEM received $2.095 million in government funding across 2 grants: $1.125 million for Phases 1 and 2 and $0.97 million for Phase 3. Funding is attributed to administrative expenses (e.g., human resources, legal and audit fees, travel, events and meeting expenses), publications (e.g., publicly available resources and guides) and consulting fees.

The costs to deliver the initiative were 4% and 7% more than the original budgets, respectively. All additional costs were paid for by the Champions of Change Institute.

In Phase 3, the greatest discrepancy between the budget and actual spending is seen in additional human resources, at 23% ($106,439) higher than the budget spend on the second grant. This expense, paid for by the Champions of Change Institute, supported landmark STEM industry events, including the CCC Future of Work. All other operating costs related to the second grant were under or on budget.

A contribution of $195,000 from the first grant and $200,000 from the second grant was made to the CCC institute for central governance and administration. CCC-STEM received $628,541 in member contributions during Phase 3 which intentionally provided budget flexibility to cover expenses.

Phase 3 grant funding expired in 2019 and the initiative transitioned to a completely self-sustaining fee-based model. The first year of the initiative did not have member fees, with fees increasing from 2017 to the full rate in 2019 as grant funding concluded.

E.5 Outcomes and impacts

E.5.1 Evaluation readiness

Under the grant agreement, CCC-STEM had sufficient data collection and reporting processes in place to assess activities, outputs and short-term outcomes. The reporting processes are straightforward and have not caused unreasonable administrative burdens.

Since completing the grant, CCC-STEM collects and reports on outcome data at an aggregated, organisational level, relating to recruitment, retention, progression and representation across the organisation, as well as staff perspectives on policies, including flexible work arrangements, parental leave and respect and safety policy. These are used in annual impact reporting to track the progress of each member organisation, totalled across the STEM group.

Individual actions taken by members do not appear to be formally evaluated, and the specific inputs, activities, outputs and expected outcomes are not made publicly available. Case studies of activities may be provided in annual reporting.

E.5.2 Short-term outcomes

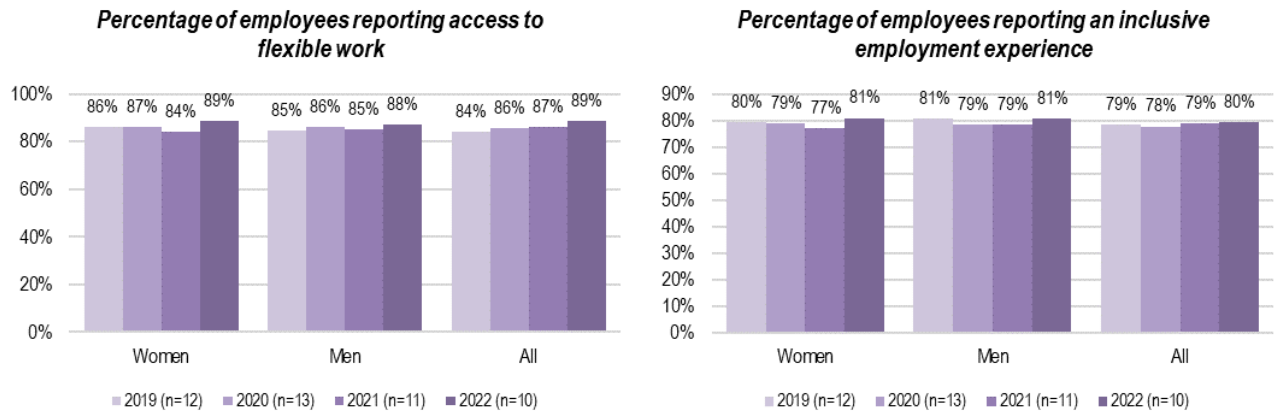
There is some evidence CCC-STEM is achieving short-term outcomes in organisational capacity to employ, retain and progress women. However, there is no evidence indicating women are more motivated to pursue STEM careers.

Stakeholders largely found the CCC-STEM supports their organisation to reduce barriers within their organisations and enable their organisations to employ, retain and progress women in STEM careers. In particular, members felt their organisations were better positioned to support the equal opportunity, retention and progression of women in STEM careers. The focus on this improvement included policy change addressing such areas as pay disparity, parental leave and family violence.

> *"We shifted the gender diversity, the pay gap, enabled conversations to take place in the organisation that hadn't previously happened. [We became] outcome oriented rather than input oriented, we changed company policy." (Former CCC-STEM member, ACIL Allen Evaluation)*

Member organisation surveys, reported annually, indicate an improvement over time in the ability of all employees to access flexible working arrangements, whilst employee perceptions of inclusive employment practices remain stable with some small increases over time.

Figure E.2 Change in flexible work and inclusive workplace



Source: Data sourced from MCC Impact Reports, 2019-2022, analysis by ACIL Allen, 2023. Data includes those CCC-STEM groups that are reporting. These reporting organisations change over time as membership changes.

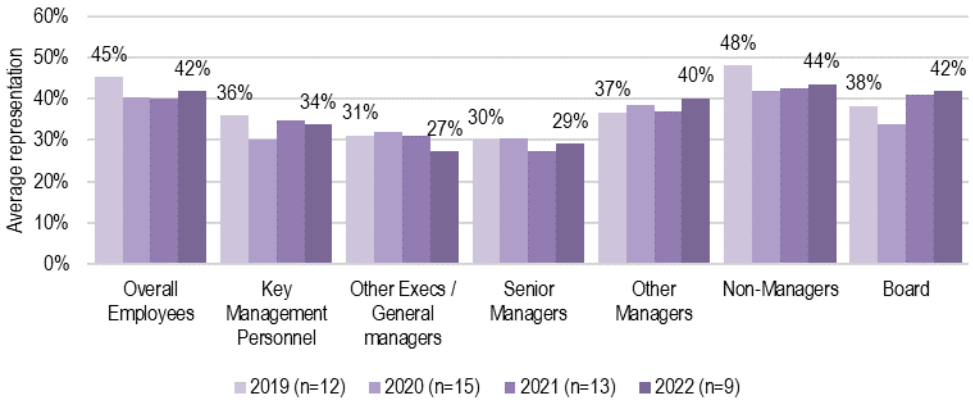
This evidence is confined only to member organisations that report on these metrics. There is no evidence of the broader influence of the CCC-STEM outside of its members.

E.5.3 Medium- and long-term outcomes

There is some evidence of members demonstrating medium-term outcomes of improved retention and progression of women in STEM careers and reduced organisational barriers to participation.

Key outcomes include progress towards gender equity in positions of leadership and representation among reporting members, including in the categories of Other Managers, Non-Managers and Board Members. As such, considerable variation exists that may not reflect the progress being made in certain organisations. Further, the data below is aggregated and does not reflect the impact of incoming members with lower baseline figures.

Figure E.3 Women's representation in different management levels in member organisations

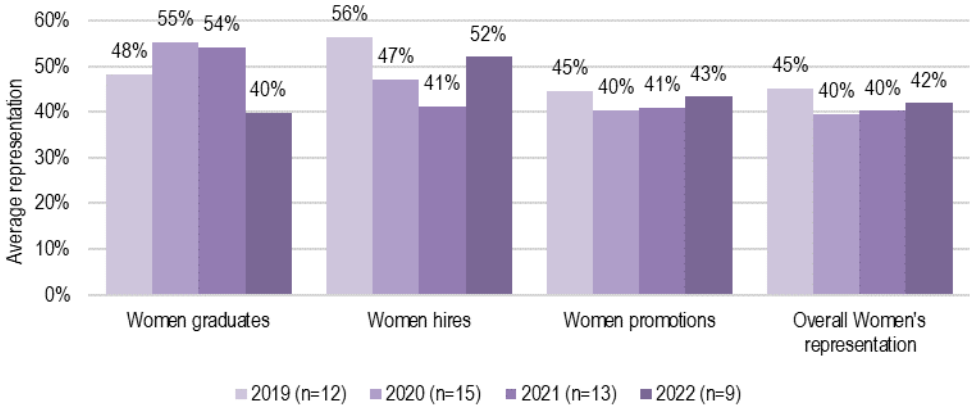


Source: Data sourced from MCC Impact Reports, 2019-2022, analysis by ACIL Allen, 2023. Data includes those CCC-STEM groups that are reporting. These reporting organisations change over time as membership changes. Aggregate results do not reflect the impact on aggregated results of incoming members with lower baseline figures.

Another key measure of outcome was the rates of recruitment and promotion. Graduate recruitment and hires of women fluctuated over time but remained approximately around the 40-60% gender equity target. Women's promotions and overall representation, while

increasing over time, remained at the lower end of the gender equity middle band for reporting organisations.

Figure E.4 Women's recruitment and retention in member organisations



Source: Data sourced from MCC Impact Reports, 2019-2022, analysis by ACIL Allen, 2023. Data includes those CCC-STEM members that are reporting. These reporting organisations change over time as membership changes. Aggregate results do not reflect the impact on aggregated results of incoming members with lower baseline figures.

There is insufficient evidence to measure whether the CCC-STEM group is achieving long-term outcomes for the wider STEM sector. However, stakeholders indicated the momentum and change achieved in their organisations did result in broader change achieved through networking and competitive branding and recruitment.

> *"The flow on effects are always rippling out. I had multiple team members, both men and women, but particularly women, talk with pride about what we were doing. People promoted it, spoke at conferences, social media. That becomes a part of your value proposition and brand. As that happens, the flow on effects are many." (Former CCC-STEM member, ACIL Allen Evaluation)*

Stakeholders noted a key barrier to achieving longer-term outcomes in improving participation of women in STEM careers is the limited supply of STEM-qualified women. At both the graduate and post-graduate levels, women's representation remains low, impacting the ability of organisations to recruit women to STEM roles at a rate that would impact overall participation.

E.5.4 Unintended consequences

The grant agreement required CCC-STEM to partner with SAGE. However, the collaboration was more successful than expected and organisations engaged across both initiatives accelerated their progress toward gender equality outcomes. The CCC-STEM and SAGE were seen to complement each other effectively, with CCC-STEM demonstrating the importance of leadership and SAGE the importance of rigour, analysis and process-driven change. The commitment of CCC-STEM enabled the SAGE activities to be accelerated and resourced at a higher level than among SAGE organisations that were not involved in the CCC-STEM Group.

Members also highly valued the opportunity to share experiences and practice with their peers during the COVID-19 pandemic. This enabled the members to continue to drive organisational responses and coordinate responses and actions with emerging issues; issues such as effective workplace flexibility in response to carer needs in lockdowns were raised as a key example.

“You suffer setbacks; you think something will impact but it doesn’t. What was valuable was not just learning from your mistakes and successes but from others. Each year, 3-4 people broke up and trialled things in groups. You would do one trial and learn from 4 different trials.” (Former CCC-STEM member, ACIL Allen Evaluation)

E.6 Key insights

- The initiative experienced some positive outcomes in transitioning to virtual meetings. These were considered an efficient and effective mode of continuing the discourse while enabling members to participate. This led to increased engagement during the COVID-19 pandemic.
- The initiative holds considerable key-person risk in being structured around individual leaders within organisations. This raised challenges when CEOs exited the group or their role. Replacement leaders could come with reduced levels of interest or understanding, requiring upskilling to realign all members and ensure a consistent interpretation of the action plans and strategies already developed.
- Navigating the dynamics between members of the group caused some delay in agreeing to and implementing actions. Each CEO represents a different workplace, with varying levels of resourcing, culture, structure, geography and progress in gender equity, diversity and inclusion. This creates nuanced and variable pressures on each CEO, which may or may not be adequately captured in a unified action plan or strategy. This diversity has further implications for implementing action, thereby relying on the commitment of the individual leaders.
- Whilst stakeholders noted their involvement in the initiative generated positive impacts, a considerable challenge to further progress was the limited size of the pool of STEM-qualified women. Recruitment and retention across STEM industries hence becomes a competitive process between these larger organisations, limiting the capacity of organisations to achieve greater change in gender equity.
- Future efforts could strengthen reporting on long-term outcome metrics, understanding whether the CCC is influencing non-member organisations and building membership across currently unrepresented sectors. Additionally, expanding or turning over the membership base regularly would allow for a greater degree of participation from a broader sample of organisations, whilst generating continuous change.

F Science in Australia Gender Equity

This appendix provides an assessment of the SAGE initiative.

F.1 Overview of SAGE

Table F.1 Science in Australia Gender Equity – Quick Reference

Lead Agency	Australian Academy of Science (AAS) 2016-19 SAGE 2019-present
Related policy/strategy	NISA
Target audience	Higher Education and Research (HER) sector, including tertiary institutions, Medical Research Institutions (MRIs) and Publicly Funded Research Agencies (PFRA)
Aims	– To address the lower participation rate of women in STEM academia as PhD students and professors, the lower retention rate and the slower progression of women in STEM academia – To reduce barriers to women's participation, retention and progression in STEM academia
Key activities	Development and maintenance of a fit-for-purpose accreditation framework, based on the UK Athena SWAN Charter; recruitment of institutions, where participating institutions conduct and submit annual standard gender equity assessments; support for organisations to develop and implement action plans in accordance with the accreditation framework.

Source: ACIL Allen, 2023.

F.2 Data sources used for this assessment

Data was sourced from an external evaluation of the SAGE Pilot (2017), the SAGE Peer Review and Accreditation Process (2020) and the SAGE Impact Evaluation (2022). Outcomes assessment is achieved using WGEA data with comparisons between SAGE and non-SAGE subscribers and may be considered narrow in scope. Sample sizes for non-SAGE Subscribers are quite small which limits the conclusions that can be drawn from the data.

F.3 Initiative design

F.3.1 Justification for the initiative

SAGE is an organisational culture change and capability-building initiative that intends to address the underrepresentation of women in STEM-based careers in academia and research by driving cultural change.

Initiatives like SAGE are necessary to drive the organisational change needed to address the barriers to inequity in STEM careers, including organisational culture, as evidenced by reduced rates of participation, retention, and progression of women in the STEM sector.

While there is a role for government in supporting initiatives like SAGE, there is a clear rationale for industry to invest in driving cultural change and organisational behaviour. As such, the initiative is in the process of moving to a self-sustaining, cost-recovery model, achievable through its subscription base and other revenue streams.

SAGE is currently the only accreditation initiative that encourages and fosters gender equity in the academic and research sectors. It was introduced in 2016 under the NISA and aligns with government's strategic policy intentions to enable improved gender equity in STEM careers.

SAGE aligns with other WiSTEM initiatives such as:

— *Champions of Change Coalition STEM Group*: which shares the same aim of developing organisational capacity to ensure the participation, retention and progression of women in STEM careers. Members of the CCC-STEM Group lead organisations that are involved in SAGE, creating synergies and complementary activities that occur within an organisation participating in both initiatives, accelerating action.

— *Women in STEM and Entrepreneurship (WiSE):* where SAGE subscribers have received WiSE grants and use their experience with SAGE to inform their grant applications.

F.3.2 Design of the initiative

The aims of SAGE are clearly identified and link closely with the new SAGE Framework, which is designed to allow a place-based, individualised institutional action on gender equity, diversity and inclusion.

There is some alignment between the inputs and objectives of the initiative, noting it is challenging to achieve sector-wide change with the resourcing and timeframes provided.

SAGE is governed by a three-member board, the chair of which is independent, with the remaining two members serving as representatives of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering.

The Framework intends to allow organisations to flexibly develop key priority areas and submit reports at any time, to reduce the burden of action timelines and applications, while maintaining rigour. Participating subscribers are charged fees based on the size of their organisation providing access to the resources and supports available. The Framework has 4 steps (see Box F.1) underpinned by activities at each level that align with the objectives of achieving organisational change.

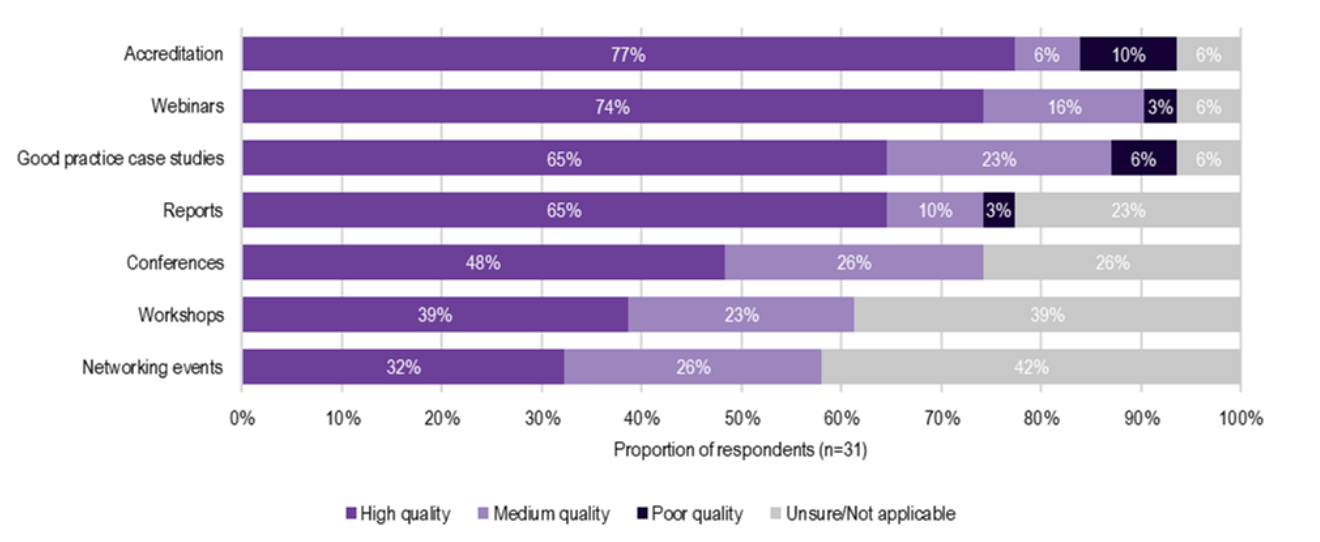
Box F.1 SAGE Framework steps

1. **Joining SAGE:** An institution's senior leaders commit to actions on gender equity, diversity and inclusion, and have 2 years to apply for the Athena SWAN Bronze Award.
2. **Athena SWAN Bronze Award**: Institutions self-assess their gender equity, diversity and inclusion, understand the structural, systemic and cultural barriers that contribute to inequity, and create an Action Plan to remove or reduce 5 key barriers. This Award is valid for 7 years.
3. **SAGE Cygnet Awards**: After implementing the Action Plan, subscribers can apply for Cygnet Awards for each barrier. Subscribers report on progress, impact, learnings and further actions.
4. **Athena SWAN Silver Award**: Institutions may apply after achieving 5 Cygnet Awards. This requires a review of the current gender equity, diversity and inclusion, ongoing barriers and a new Action Plan to remove or reduce the 5 barriers, focusing on sustainable change.

Source: The SAGE accreditation pathway, SAGE, 2022. Accessed at: https://sciencegenderequity.org.au/sage-accreditation-and-awards/sage-pathway-to-athena-swan/

To support the implementation of the Framework, SAGE provides subscribers with a series of resources to facilitate and support their progression. SAGE subscribers largely considered the initiative resources to be useful and of high quality. Surveyed representatives of SAGE subscribers indicated the quality of SAGE resources was high. Respondents particularly found the webinars (90%), good practice case studies (88%), accreditation (83%) and reports (75%) to be of high or medium quality. The quality of conferences, workshops and networking events was not ranked as highly. However, these were heavily impacted by COVID-19 restrictions which may be reflected by higher rates of unsure/not applicable responses.

Figure F.1 Quality of SAGE resources



Source: Survey of Initiative participants, 2023. Analysis by ACIL Allen, 2023.

F.3.3 Links to the evidence base

SAGE's design has clear links to the evidence base of the Athena Scientific Women's Academic Network (SWAN) Charter.

Athena SWAN is considered a successful enabling mechanism that provides organisations with a framework to plan and undertake actions to create structural and

cultural change for gender equity. Studies into the effectiveness of Athena SWAN in the UK and United States are associated with:

— increased awareness of gender inequity and broader diversity issues
— challenges to discrimination and bias
— improvements in the visibility of women and in self-confidence and leadership skills
— an enhanced work environment and institutional support for women's careers
— new mentoring and professional development mechanisms and opportunities for all staff
— an increased understanding and appreciation of work-life balance and caring responsibilities.[131]

However, evidence indicates the Athena SWAN model was commonly associated with a high administrative burden that is disproportionally borne by women.[132]

When adapting the UK Athena SWAN model for the Australian context, more diverse cohorts were included in the project objectives. This included adjusting the language of the initiative to include diversity in addition to gender equity and other diverse groups in addition to women.

> *"We decided that to take an intersectional view we needed it to be a bit broader and so we ask organisations to look at the intersections of gender and disability, gender and race, gender and Aboriginal and Torres Strait Islanders status, rather than subsuming that within race, and also, to the extent they can, gender and sexuality. We also put in a much clearer focus on other genders."*
>
> *SAGE representative, ACIL Allen Evaluation*

F.4 Efficiency

F.4.1 Reach

SAGE has had positive but not universal reach across the target audience. In 2022, SAGE had:[133]

— 43 subscribing institutions representing approximately 50% of Australia's HER sector, an increase of one institution from 2020
— 30 universities (72% of all universities), 6 MRIs (14% of all MRIs), and 6 PFRA (50% of such agencies).

In addition, SAGE activities had reached 527 new followers on Twitter and LinkedIn (total of 7,985 Twitter and 998 LinkedIn followers), 136 Newsletter subscribers, 1,129 social media and 92 online news mentions. SAGE has also undertaken collaborations with agencies including the Workplace Gender Equality Agency (WGEA), the Sex Discrimination Commissioner and the Champions of Change Coalition.

Surveyed SAGE subscriber representatives indicated the reach of the initiative within their organisations was difficult to describe, considering many organisations are large with staffing cohorts that vary in their institutional or administrative involvement. They

[131] Kalpazidou Schmidt, E., Ovseiko, P.V., Henderson, L.R. and Kiparoglou, V. (2020). Understanding the Athena SWAN award scheme for gender equality as a complex social intervention in a complex system: analysis of Silver award action plans in a comparative European perspective. *Health Research Policy and Systems*, 18(1), pp.1-21.

[132] Kalpazidou Schmidt, E., Ovseiko, P.V., Henderson, L.R. and Kiparoglou, V. (2020). Op. cit.

[133] Science in Australia Gender Equity (2022). *SAGE Impact Statement 2022*. ACT: SAGE.

noted in many cases, all members of their organisation would have been affected by the initiative to varying extents, but there were challenges in quantifying its true reach.

COVID-19 has impacted the reach of SAGE. The HER sector was significantly impacted by the pandemic, with the post-pandemic recovery period expected to extend to at least 2024-25. Hence, SAGE will operate in a financially restrained market, which presents considerable risk of subscribing institutions failing to progress their action plans, and to continue to subscribe. In 2023, SAGE is developing a program tailored to the changing needs of current subscribers, with a focus on recruiting new staff and subscribers in the HER sector and VET sector, which faces similar inequities.

F.4.2 Timelines

The SAGE grant agreement timelines have largely been met, with SAGE implementing all 14 agreed milestones by the conclusion of its 2019 funding agreement (covering 2020 to 2022) in late 2022.

However, the COVID-19 pandemic severely slowed SAGE's implementation, outputs and outcomes. Cost recovery and expansion have been slow to occur. SAGE was on a trajectory to achieving complete cost recovery by 2023 through increased membership by the remaining 50% of institutions in the HER sector and expansion to the VET sector. This is now considered infeasible until 2026, due to the significant impact of COVID-19 on the HER sector.

F.4.3 Funding

Funding for SAGE had to be revised due to the impacts of COVID-19 on initiative delivery, which necessitated the provision of additional funds from the department.

The AAS was granted $2 million over 2016-17 to 2019-20 to support the expansion of SAGE and determine a sustainable business model for SAGE, including transferring ownership of the initiative to SAGE. Throughout the original grant, the initiative operated over budget from 2016-17 to 2018-19, noting the additional income from subscription fees allowed SAGE to break even.

SAGE was granted $1.8 million in 2020 to the end of June 2022, to support SAGE to become a fully operational and independent not-for-profit company, expand subscribers, and transition subscribers to Silver Athena SWAN Award level. In August 2020, SAGE relied on urgent funding via re-phased milestone payments from this grant, in order to manage cash flow issues attributed to delayed subscription fees. This was accompanied by several cost-saving measures taken to mitigate the risks of COVID-19. Spending from the final grant extends into 2022-23, beyond the grant end date, at the end of 2021-22.

Overall expenditure for SAGE to June 2022 is under budget (33%), noting the initiative is ongoing. These reserves were made across labour and labour on costs, domestic travel, and events, attributed to the impact of COVID-19, where events and travel were cancelled. These are scheduled for future expenditure. For example, SAGE has re-commenced face-to-face engagement with stakeholders and has planned investment in events, such as the Gender Conference 2024.

As noted above, SAGE is now expected to transition to a self-sustaining model by 2026. While organisations are back on track, further government funding may be required to supplement SAGE's revenue while the higher education and research sectors recover from the COVID-19 pandemic. With reduced revenue, SAGE may have to reduce operations.

F.5 Outcomes and impacts

F.5.1 Evaluation readiness

SAGE has appropriate data collection, monitoring and evaluation infrastructure in place to support the evaluation of outputs and short-term outcomes. This is incorporated into the design, where institutions must self-assess, develop and undertake monitoring.

SAGE provides progress reports in line with the timeframes in the grant agreement. These include progress against agreed project milestones and eligible expenditure. However, key representatives, leaders and professionals report the administrative processes for subscribing to SAGE are labour-intensive, burdensome, and not an appropriate investment.

Impact is measured using surveys of SAGE subscribers, 2022 comparison of WGEA data between subscribing organisations and non-subscribing comparator organisations, and case studies of actions and initiatives made by subscribing organisations.

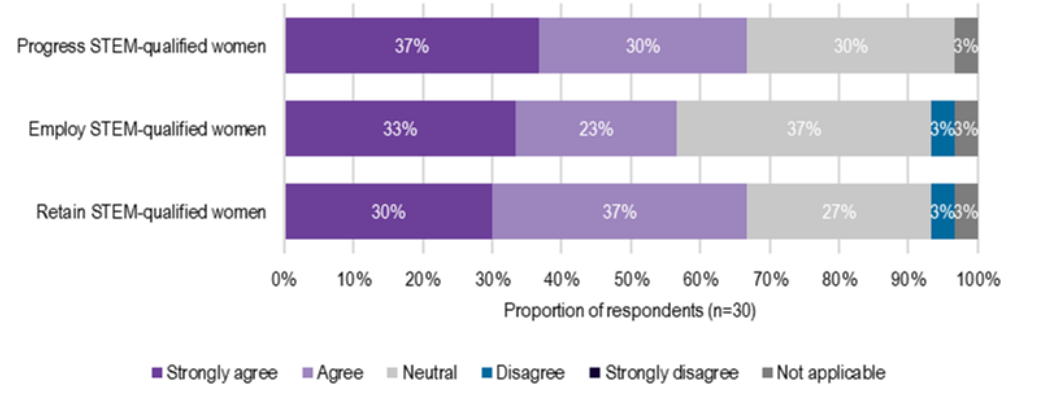
F.5.2 Short-term outcomes

There is strong evidence SAGE subscribers are achieving the measured short-term outcomes, including implementing key policies and structures to support gender equity, diversity and inclusion, and reducing or removing institutional barriers. As a result, subscribers have been better positioned to employ, retain and progress STEM-qualified women.

> *"The organisation is much more aware of gender equity issues and proactive in understanding barriers and taking remedial action. The SAGE accreditation program has pushed the organisation to introduce initiatives and programs. These programs are supporting women and other marginalised cohorts."*
>
> *SAGE Survey respondent, ACIL Allen Evaluation*

When surveyed, the majority of representatives of SAGE members found SAGE had supported them to progress (67%), retain (67%) and employ (56%) STEM-qualified women.

Figure F.2 Extent to which SAGE had supported institutions to…



Source: Survey of Initiative participants, 2023. Analysis by ACIL Allen, 2023.

Across SAGE subscribers, key short-term outcomes include:

— 100% conducted a remuneration gender pay gap analysis and acted on this, 62% higher than non-subscribers

— 93% have a formal policy on remuneration (43% higher than non-subscribers) and 86% have specific gender pay equity objectives as part of their formal policy (61% higher than non-subscribers)

— 83% have KPIs for managers relating to gender equality, 43% higher than non-subscribers.

— 100% had a recruitment gender equality policy or strategy, an overall gender equality policy or strategy, a retention gender equality policy or strategy and an employee consultation on gender equality

— 97% have a flexible working arrangements policy or strategy, 22% higher than non-subscribers

— 100% offer formal carer's leave, 12% higher than non-subscribers

— 93% provide paid primary carer's leave to men and women, 5% higher than non-subscribers.

The initiative may be used by institutions as a 'tick box' exercise to achieve accreditation, particularly when key leadership members are not invested in the initiative or outcomes. Initial activities such as policy development can be quickly actioned but may not impact embedded cultural issues or achieve institutional change. Assessing the extent to which these observations are accurate would require additional data collection, for example, through a monitoring or audit approach.

F.5.3 Medium- to long-term outcomes

There is some evidence SAGE is achieving medium-term outcomes, with indications women are better able to progress in STEM careers in academia and organisational barriers to women's participation, retention and progression in STEM are being reduced.

Key outcomes for SAGE subscribers from 2017-22 include:

— 3% increase in the proportion of women promoted and 7% increase in the proportion of women in management

— higher proportion of women across their governing bodies (including chairs and directors) and in key senior management positions (CEOs and key management personnel) than non-subscribers

— 4% increase in female staff at senior academic level

— 5% increase in female staff at above senior academic level.

> *"The direct impacts (addressing the barriers to participation, progression and retention) of our involvement in the SAGE Athena SWAN program have been extensive and are on-going, including: a major campaign to remove barriers to the recruitment of women and gender-diverse people into academic STEMM positions, which has resulted in a 19% increase in applications from women to STEMM roles and a 60% increase in the number of women appointed to senior-level STEMM roles since 2019; and a 10% increase in the success rate for women in Academic Promotions to 85% including high success rates for applicants with caring responsibilities and/or dependent children, to name a few."*[134]
>
> *SAGE survey respondent, ACIL Allen Evaluation*

[134] Figures expressed in this survey response represent Science, Technology, Engineering, Mathematics and Medicine (STEMM). These figures may not accurately represent those pertaining to STEM.

There is limited evidence SAGE is supporting women to pursue STEM careers in academia, or that STEM careers in academia offer equal opportunity and improved participation. The interface between organisational change and the pathway of STEM-qualified women is dependent on factors outside of institutional policy change. Stakeholders also noted the program was targeted very specifically in the academic space and may not have broader societal impacts.

F.5.4 Unintended consequences

Increased recognition in the HER sector that inequity exists in gender, diversity and inclusion among institutions is considered a key outcome. At an individual level, institutions conducted specialised training and implemented new hiring policies and recruitment processes.

> *"The organisation is much more aware of gender equity issues and proactive in understanding barriers and taking remedial action. The SAGE accreditation program has pushed the organisation to introduce initiatives and programs. These programs are supporting women and other marginalised cohorts."*
>
> *SAGE Survey respondent, ACIL Allen Evaluation*

SAGE's implementation has attracted attention internationally as a reference for effective practice in increasing gender equity. The adaptation of the Athena SWAN model to the Australian context was noted in other countries including Canada, the US, India and South Korea, including international collaborations with Dimensions (Canada), among others.

Two government and peak body stakeholders highlighted the significant role SAGE has played in influencing the sector, referencing action by the National Health and Medical Research Council in setting targets to award equal numbers of Investigator Grants to women and men.[135]

[135] Butler, M. (2022). *Working towards gender equity in health and medical research*. Accessed May 2023: https://www.health.gov.au/ministers/the-hon-mark-butler-mp/media/working-towards-gender-equity-in-health-and-medical-research.

F.6 Key insights

- The fit-for-purpose design has enabled the initiative's success by incorporating individualised and place-based actions for SAGE subscribers to conduct activities and achieve outcomes, with a self-developed initiative.
- SAGE modified the Athena SWAN model to use Cygnet Awards, rather than Departmental Awards, which were more suited to large universities. This allowed for better engagement by smaller institutions, as the action plan model is scalable and could be adapted to their context more appropriately.
- Outputs and outcomes, including the expansion of the initiative and the progression of SAGE members, have been heavily influenced by external factors, such as COVID-19. This creates a high level of risk as the initiative's success depends on institutions' commitment.
- The initiative may be used by institutions as a 'tick box' exercise to achieve accreditation. Assessing the extent to which these observations are accurate would require additional data collection, for example, through a monitoring or audit approach.
- The current subscription model requires a significant investment, with annual fees varying according to revenue, starting at approximately $18,000. This hinders engagement by smaller organisations.
- As SAGE expands its subscriber base and moves towards a full cost recovery model, the role of the government in sustaining SAGE operations should diminish. Further government funding may be required to support SAGE while the higher education and research sectors recover from the COVID-19 pandemic or should any other unexpected adverse events occur.

G Superstars of STEM

This appendix provides an assessment of the Superstars of STEM initiative.

G.1 Overview of Superstars of STEM

Table G.1 Superstars of STEM – Quick Reference

Lead Agency	Science & Technology Australia (STA)
Related policy/strategy	NISA Towards 2025: A strategy to boost Australian women's workforce participation
Target audience	Diverse women in STEM, school students and general public audiences for consumers of both traditional and social media, including key careers influencers such as parents
Aims	– Recruit and provide leadership training across the country for women and non-binary STEM professionals – Increase the public visibility of women as STEM role models and promote equal representation in the media of women working in all fields of STEM – Encourage girls' and young women's interest in STEM careers through increased visibility of diverse role models
Key activities	Superstars of STEM provides women and non-binary STEM professionals with training, a high-profile mentor and opportunities to raise their public profile via TV, print, social media appearances and school visits. The initiative also builds a strong peer network of mutual support to propel participant success.

Source: ACIL Allen, 2023.

G.2 Data sources used for this assessment

The assessment is informed by previous evaluations collected internally every 6 months, the internal final report on the pilot (2021), consultation with the delivery partner, delivery partners of other relevant WiSTEM initiatives, and government and peak body stakeholders.

It draws on previous evaluation data based on respondents' perceived impact of the Superstars of STEM initiative, supplemented by additional data collection through the ACIL Allen survey.

G.3 Initiative design

G.3.1 Justification for the initiative

Superstars of STEM is a mentorship and media training initiative that seeks to address the underrepresentation of women STEM experts in the Australian media by building a critical mass of high-profile women and non-binary role models in STEM and giving them communications training and media opportunities.

Initiatives like the Superstars of STEM initiative are necessary to increase the number of women represented in the media as experts in STEM to create more diverse and visible role models and raise awareness of career opportunities in STEM.

There is a clear role for the Australian Government in supporting initiatives like Superstars of STEM, as they are unlikely to be fully funded through industry-led approaches or solely by individual employers. There is an opportunity for industry to provide financial contributions for such initiatives, as has occurred for Superstars of STEM. However, for Superstars of STEM, financial contributions have been modest and insufficient to fund the full delivery of the initiative without government funding.

> *"Government has the resourcing and capability to deliver interventions like Superstars of STEM… if employer organisations were capable of doing it without government, they would have found a way to resource it and do it by now"*
>
> *STA staff member, ACIL Allen Evaluation*

Superstars of STEM aligns with the government's strategic policy intentions to increase gender equity in STEM education and careers and expand opportunities for women in STEM and entrepreneurship, as outlined in the National Innovation and Science Agenda (NISA) and Towards 2025: A strategy to boost Australian women's workforce participation.

Superstars of STEM is aligned with other WiSTEM initiatives that aim to increase the visibility and skills of women in STEM careers, including:

— *Future You*: which promotes STEM study and careers for primary school children, and has provided suggestions for current Future You characters.

— *Girls in STEM Toolkit (GiST):* which provides online resources to inspire and encourage girls to study and work in STEM, through the promotion of diverse women in STEM careers.

— *Champions of Change Coalition STEM Group*: which engages and activates senior leaders in organisations to accelerate progress in gender equality. Some participants in Superstars of STEM are employed by these organisations and may support discussion about gender equality in their workplace.

Superstars of STEM operates as a resource for other initiatives and the sector more broadly, providing visibility of and access to well-trained and articulate public figures in STEM careers.

G.3.2 Design of the initiative

The aims of the Superstars initiative are clearly identified and linked closely with the initiative activities and milestones outlined in the 2022 Grant Agreement between the department and STA. The inputs and activities are broadly in line with the aims of the initiative.

The success of the pilot (2017-18) cohort of 30 women led to an extension of funding and expansion of the initiative which now recruits and trains 60 women and non-binary people every 2 years.136 The pilot collected evaluation data to inform the scale-up and design of the current initiative.

A design strength of the initiative is it targets multiple areas (education, visibility and employment) and life stages (for STEM professionals and, indirectly, secondary school students). The initiative has a strong focus on diversity and inclusion.137 Each cohort seeks to include diverse ages, career stages, cultures, disabilities, ethnicities, First Nations peoples, LBGTQIA+, languages, and locations.138 First Nations peoples are encouraged to apply, as are candidates from STEM disciplines in which women are acutely under-represented (e.g. Information Technology and Engineering).139 The initiative facilitates the participation of people with caring responsibilities, including support with care costs during training. During the COVID-19 pandemic and beyond, components of the initiative have been delivered online to ensure accessibility and participation.140

> *"[STA takes] a very rigorous approach to data collection, …. measuring and thinking deeply about innovation."*
>
> *STA staff member, ACIL Allen Evaluation*

The design has been effective in supporting participants, with 68% reporting it is unlikely they would have received similar career support from another source in the absence of Superstars of STEM.[141]

G.3.3 Links to the evidence base

The Superstars of STEM initiative is well connected to the evidence base.

Superstars of STEM directly aligns with the evidence women are significantly underrepresented in news stories as news protagonists and experts.[142] Evidence shows increasing women's presence on radio, television and in print is likely to provide positive role models for women and girls,[143] increased confidence among women to act as experts and interviewees and attract a greater female audience.[144]

[136] Science and Technology Australia (2018). *Women in STEM and Entrepreneurship – final report: Superstars of STEM 2017-2018*. Canberra: STA.

[137] Science and Technology Australia (2022a). *Superstars EDM*. Canberra: STA.

[138] Science and Technology Australia (2022b). *The Superstars of STEM 2017/22 Program Impact report*. Canberra: STA.

[139] Department of Industry, Innovation and Science (2018). *Commonwealth Grant Agreement between the Commonwealth represented by Department of Industry, Innovation and Science and The Federation of Australian Scientific and Technological Societies Incorporated*. Canberra: Department of Industry, Innovation and Science.

[140] Science and Technology Australia (2016). *Women in STEM and Entrepreneurship Program Application Form: Superstars of STEM*. Canberra: STA.

[141] ACIL Allen evaluation survey 2023.

[142] Kassova, L (2020). Op. cit.

[143] Shin JEL, Levy SR, London B. (2016). Op. cit.

Drury BJ, Siy JO, Cheryan S. (2011). Op. cit.

[144] Kangas, A., Haider, H., & Fraser, E. (2014). Op. cit.

G.4 Efficiency

G.4.1 Reach

Superstars of STEM has reached the target audiences of women and non-binary people in STEM (as participants), school children in years 8 to 10, and consumers of Australian media (as end beneficiaries).

The initiative receives approximately 6 times more applications than the number of available spaces.

A total of 210 participants have participated in the initiative, including 30 participants from the 2017-18 pilot and 60 participants every 2 years since then. From 2017-22, 63% of participants have been from the academic sector, 20% public, 12% private and 5% not-for-profit. The participants represent diversity across age, career stage, culture, language, disability, ethnicity, geography (regional and rural), LGBTQIA+ and First Nations peoples.[145]

Media monitoring showed participants' stories about STEM reached approximately 83 million people through traditional media from July 2020- June 2021.[146] The initiative also reached over 64,000 Australian school children between 2017-22 through school visits.[147]

G.4.2 Timelines

Superstars of STEM reporting shows overall timelines have been met. The COVID-19 pandemic impacted one cohort of 60 participants who received a 6-month extension to complete the school visits and public speaking component of the initiative. The extension was absorbed by the existing budget.

G.4.3 Funding

Overall, Superstars of STEM has delivered its first 2 grants on budget. The third grant funding period is ongoing and budget information not yet available will be available in the first reporting cycle due later in 2023. Total funding for Superstars of STEM from 2017-26 is $3.2785 million. The initiative received 3 grants:

— The first grant of $178,500 was awarded in 2016 under WiSE. STA also made an in-kind contribution of $94,000. This grant was delivered on budget (minor overspend of 1.4%).

— The Department invested a further $1.3 million following the successful pilot for STA to deliver the initiative for an additional 2 cohorts of 60 participants each between 2018 and 2022. This second grant was varied to reflect the impact of the COVID-19 pandemic and an extended milestone to accommodate delayed school visits. Financial re-profiling occurred across the years to reflect less travel (as there were no in-person training sessions from 2022 to mid-2021) and increased staff time to support initiative redesign, delivery of online networking and training, and additional one-on-one support. The delivery of the final report was also brought forward from August to April 2023. Expenditure for the final financial year for this grant is not available. This grant was delivered on budget.

[145] Science and Technology Australia (2022b). Op. cit.

[146] Science and Technology Australia (2021). Op. cit.

[147] Science and Technology Australia (2022b). Op. cit.

— Following a favourable evaluation in 2021, the Department funded the initiative for a further 4 years, with $1.8 million for 2 more cohorts of 60 participants each from 2022 to 2026. The first report on expenditure is due in late 2023.

The Superstars of STEM initiative is run with base funding provided by government. This provides the majority of resourcing for the initiative. A modest co-contribution for each Superstar is made by employers and/or participants. This demonstrates the value of the initiative to employers and ensures industry is supporting change in the STEM sector and employers are aware of the initiative's objectives. In its current delivery model, government funding remains critical to the initiative's operation in the long term. The initiative is not yet sustainable and the removal of government funding would likely lead to a reduction or conclusion of activity.

Self-sustainability was not part of the original funding arrangements and was only introduced in the most recent (2022) grant agreement. The grant scope involves developing a self-sustaining business model by exploring the potential global licensing of the initiative to provide a revenue stream to support the Australian initiative. However, staffing constraints have impeded this ambition to date. Further, the lead time for establishing a global model and designing and implementing other initiatives is likely to be long.

> *"The reality is if we [did not] have government funding into the future, it would become really hard to … sustain an initiative like this… [Employers] have skin in the game [through their co-contribution] but there's a long-term role for government to deliver baseline funding for initiatives like this."*
>
> *STA staff member, ACIL Allen Evaluation*

G.5 Outcomes and impacts

G.5.1 Evaluation readiness

Superstars of STEM has sufficient data collection and reporting processes in place to support the evaluation of short-term and some medium-term outcomes.

Superstars of STEM provides progress reports in line with its grant agreements. These include progress towards completion of agreed project milestones and eligible expenditure. Overall grant agreement reporting requirements have been met through media and social media monitoring and the collection of feedback through regular surveys of participants and beneficiaries such as employers and teachers. These data collection practices informed the 2021 Evaluation and other impact reports.[148] The reporting processes are straightforward and have not caused unreasonable administrative burdens. STA has exceeded the reporting requirements by committing to collecting and publishing evaluation and impact data. However, they recognise the burden on participants and are seeking to reduce this by streamlining opportunities to provide details on progress and feedback.

It is more challenging to evaluate long-term outcomes as the initiative has only been running for 5 years. These outcomes are also difficult to attribute specifically to Superstars of STEM (compared to other initiatives) and may occur many years after a woman's involvement with the initiative.

[148] Science and Technology Australia (2022b). Op. cit.

G.5.2 Short-term outcomes

There is strong evidence Superstars of STEM is achieving the measured short-term outcomes of motivating girls and women to study STEM subjects and to pursue STEM careers.

A 2021 evaluation of a cohort of 60 superstars from 2019-2021 found:[149]

- 84% of superstars grew their reach and profile (including 4,286 media mentions, a 300% growth in Twitter followers and a 250% growth in LinkedIn connections)
- 94% of teachers felt the superstar's visit influenced their students' choice of subjects
- 63% of superstars felt more supported by their employer since participating in the initiative
- 93% of superstars said the connections they made with other superstars helped their careers
- 72% of superstars said the initiative had generated more career-enhancing opportunities.

The responses to the 2023 ACIL Allen Survey[150] support these findings with the majority of participants in the Superstars of STEM initiative agreeing the initiative:

- created an equal opportunity for them to pursue a career in a STEM industry or occupation (58%)
- made them more aware of (67%), increased their interest in (78%) and created an equal opportunity for them to (50%) pursue a leadership position in a STEM organisation
- enabled them to motivate other girls and women to choose to Study STEM subjects or courses (90%), pursue STEM careers (86%) and progress in STEM careers (72%).

However, it is too early to tell whether these changes were sustained in the longer term for all respondents as the initiative has been running for 5 years and some have only recently completed or are part way through the initiative.

> *"All the presenters were really engaging! Students stayed behind to ask questions. Really positive role models, especially for the girls to influence them to pursue STEM careers."*
>
> *Teacher, Roma Mitchell Secondary College*[151]

G.5.3 Medium- to long-term outcomes

Medium-term outcomes around choosing to study STEM subjects, pursue, continue and progress in STEM careers, and reduced barriers to participation, retention and progression, are more difficult to measure.

Most Superstars believe the initiative has helped their careers[152] and most employers agree.[153] The 2021 Evaluation shows early evidence Superstars of STEM is reducing

[149] Science and Technology Australia (2021). Op. cit.

[150] Sixty Superstars responded to the survey.

[151] Science and Technology Australia (2021). Op. cit.

[152] Science and Technology Australia (2022b). Op. cit.

[153] Science and Technology Australia (2021). Op. cit.

barriers to participation, retention, and progression of women's careers in STEM with 1 in 5 Superstars being promoted during the initiative.

> *Awards were the most commonly reported career advancement followed by promotions. Other advancement opportunities include securing new funding, being invited to sit on committees and boards, invitations to speak at scientific conferences, and being a finalist for an award.*
>
> *Respondents to the 2021 Evaluation*[154]

Participants are more likely to experience greater success in the initiative when employers commit to supporting them through additional funding and time allocated for participants to focus on the initiative.

72% of Superstars also agree the initiative contributed to meaningful change in how society expects girls and women to engage in STEM.[155] 98% of participants also agree there is an ongoing need for the initiative.[156]

There is limited evidence Superstars of STEM is achieving the measured long-term outcomes of equal opportunity and improved participation, retention and progression in STEM studies and careers, and sustainable change in societal expectations in girls' and women's STEM studies and careers, due to limitations in the available data described under the evaluation readiness section. However, early data on acceleration in career progression and promotion for the participants attributed to the initiative in 6-monthly evaluation data is promising.

G.5.4 Unintended consequences

Enhanced professional networks, a public profile and engagement in social media have assisted participants' career progression.

> *"When you raise the profile and public visibility of people as experts, their own employers suddenly see them as much more valuable and promotable."*
>
> *STA staff member, ACIL Allen Evaluation*

However, program participants were subjected to online harassment by people outside of the initiative as a result of their participation. Mindful of the broader trend of growing online harassment of high-profile people on social media platforms, Superstars of STEM initiated the delivery of 'social media self-defence' as a core component of its social media skills training for participants.

The initiative also positions women as the key change agent and supports women in building capacity and capability to excel in STEM. While this is positive, it also places the burden to create change on women, rather than on addressing broader cultural, organisational and societal systems/barriers.

[154] Science and Technology Australia (2021). Op. cit.

[155] ACIL Allen evaluation survey 2023.

[156] ACIL Allen evaluation survey 2023.

G.6 Key insights

- A design strength of the initiative is it targets multiple areas (education, visibility, and employment) and life stages (secondary school students and STEM professionals at all career stages).
- The initiative receives significantly more applications than the number of available spaces. Scaling up the initiative would require expanded resources and staffing and would need to be supported by the provision of longer-term funding. The delivery organisation is mindful care needs to be taken not to dilute the reputation of excellence generated by the initiative.
- Anecdotally, it is understood participants experience greater success in the initiative when employers commit to supporting them by giving participants time and support to focus on the initiative and make the most of the opportunity.
- Superstars of STEM is established and delivering value to participants and end beneficiaries. Increasing the visibility of women in STEM professions and engaging with school children requires sustained support to contribute lasting impact.

H Girls in STEM Toolkit

This appendix provides an assessment of the GiST initiative.

H.1 Overview of GiST

Table H.1 Girls in STEM Toolkit

Lead Agency	Education Services Australia (ESA)
Related policy/strategy	WiSTEM Strategy
Target audience	High school girls (years 7 to 12), their teachers and families
Aims	2018-2022 – assist girls to understand the diverse types of STEM careers including non-technical and non-traditional roles, match their interests to STEM careers, understand study pathways to work towards STEM careers – assist parents, teachers, career counsellors and other influencers to effectively explain opportunities and careers in STEM 2021-2024: – assist girls, their families and teachers, particularly those with intersectional identities who may face additional barriers, to envision themselves, participate and engage in STEM.
Key activities	GiST is a web-based platform, which includes activities and events pages, profiles of women in STEM, DIY home activities, a list of A-Z of STEM careers, lesson plans and the STEM Career Quiz. GiST is being expanded to include an online image bank, a webinar series, the development of additional lesson plans and other learning materials and resources.

Source: ACIL Allen, 2023.

H.2 Data sources used for this assessment

The data sources used to conduct this initiative assessment includes the Grant Agreements, progress reports to the department, Google analytics reports, project plans, an evaluation report (internal evaluation as part of second grant agreement in August 2021) and the ACIL Allen survey. It is difficult to measure long-term outcomes since the behaviour of site visitors is not tracked after their exposure to GiST.

H.3 Initiative design

H.3.1 Justification for the initiative

The Girls in STEM Toolkit (GiST) is an educational initiative delivered via an online website that provides girls with tools for understanding how their existing skills and interests can link to STEM careers and study pathways.

The purpose of the GiST is to address the underrepresentation of girls and women in STEM at school, university and in the workplace (see chapter 3). It is important to improve visibility of STEM pathways at an early age to raise awareness, expand opportunities and overcome negative stereotypes of STEM careers (see chapter 3). There is a role for government in funding initiatives like GiST as a public good, as similar initiatives are unlikely to be funded through other sources such as industry or academia.

GiST is part of the Australian Government's commitment to Advancing Women in STEM[157] and contributes to achieving the *Investing in Science, Technology and Commercialisation program* and supports the implementation of Australia's international obligations under the *Convention of All Forms of Discrimination against Women.*

The ESA team previously held meetings with the Future You team for approximately a year. Future You is a web-based platform for children aged 8-12 and their teachers, parents and carers. The 2 delivery partners have communicated to align the initiatives so they complement rather than duplicate each other. However, government and peak body stakeholders engaged for the evaluation considered Future You now duplicate elements of GiST due to an overlap of end users (GiST is used by some primary school audiences).

H.3.2 Design of the initiative

The aims of GiST are clearly identified and link closely with the objectives of the initiative.

ESA consulted closely with a range of stakeholders in the development, evaluation and expansion of the GiST. The development of the GiST was informed by real-world experiences of women in STEM, education experts and Australian Government careers data and resources. User-based and educational content stakeholders were consulted early in the discovery stage and during the production of the GiST to ensure the toolkit would be relevant and useful. The Department was also consulted regularly and provided feedback on the content and the website throughout development and before release.

H.3.3 Links to the evidence base

GiST's design is clearly connected to the evidence base on effective practice.

GiST aligns with the academic evidence which addresses the need for young girls to be exposed to STEM curriculum in the early years as means of positively influencing girls' perception of and interest in STEM.[158] Evidence shows increasing exposure to positive role models can increase interest in, and attraction to, STEM while improving self-efficacy. [159]

GiST's inclusion of content for underrepresented groups is also likely to have a significant benefit for girls with diverse backgrounds, with the literature highlighting the acknowledgement and promotion of girls/women's cultural heritage and racial and ethnic

[157] Department of Industry, Innovation and Science (2019). Op. cit.

[158] United Nations Educational, Scientific and Cultural Organisation (2017). Op. cit.

[159]Shin JEL, Levy SR, London B. (2016). Op. cit.

identity are crucial to the emotional well-being and academic success of students from historically marginalised groups.[160]

GiST's focus on other change agents, including teachers, schools and parents/carers, aligns with the literature that highlights the importance of gender-inclusive learning environments at school and at home to promote STEM participation.[161]

H.4 Efficiency

H.4.1 Reach

GiST has had positive reach, though it is challenging to determine true reach given data limitations.

GiST has had over 80,755162 site visits since its launch in 2019. There was a significant level of time spent on the site by visitors (an average of about 300 seconds, or 5 minutes, per page across those 10 most popular pages), indicating they are engaging with the site content.

The GiST Twitter account has 1,200 followers, the Facebook page has 1,052 followers and the Instagram account has 964 followers. According to social media analytics, the total engagements across the 3 social media channels has been 21,607 since launch.163 The GiST has 737 newsletter subscribers.

Education stakeholders noted the GiST has "good visual posters that I can print out and promote in the classroom", was "easy to recommend", and a teacher thanked the GiST team "for allowing teachers to use these resources for free - it makes a difference!". One teacher noted the resources did not fit the NSW curriculum, and also noted the GiST could have more Australian women visuals, for example in the form of 'A day in the work of...' videos.

ACIL Allen conducted a survey of GiST stakeholders between 5 April 2023 and 21 April 2023. At least 85% of respondents noted the online STEM toolkit, student resources, and school resources were useful and of medium or high quality. For family resources, 46% responded the resources were useful and of medium or high quality, with one respondent stating the family resources were of low quality (the remaining stakeholders were neutral).

Most respondents (69%) noted the GiST met their needs (the remaining 31% were neutral), and 50% of respondents believed it was somewhat unlikely they would have received similar support from another source (25% responded it was likely or highly likely they would have received similar support, with the remaining 25% responding neutral). When asked if there was an ongoing need for GiST or similar initiatives, 69% highly agreed, 23% agreed and the remaining 8% responded neutral.

[160]Hung Yee, Kam (2015). Op. cit.

[161] United Nations Educational, Scientific and Cultural Organisation (2017). Op. cit.

[162] According to the latest GiST analytics report, which captured data from launch to March 31 2023.

[163] Total engagement refers to the sum of all interactions (shares, comments, reactions, etc.). To give an idea of the current levels of engagement, the total engagement across the 3 channels was 1,095 between 1 January 2023 and 31 March 2023, which was an increase of 18% from the previous quarter.

H.4.2 Timelines

The GiST grant agreement timelines have been met overall, though some delays have been experienced.

Timelines were broadly adhered to with any delays flagged with the department. For example, the Discovery and Establishment milestone experienced ongoing system issues and ESA were in constant contact with the Department at this time. The longest delay between an agreed end date and delivery was 17 days.

H.4.3 Funding

GiST has been delivered slightly under budget, noting the initiative has not yet concluded.

The total grant funding allocated to the ESA is $1,493,801. The first grant was for $579,970 and covered 5 Sept 2018 to 30 June 2022. The total expenditure during the grant period was $579,935, resulting in an underspend of $35. The second grant was for $913,831, covering the period from April 2021 to April 2024. So far $394,028 has been spent between April 2021 and April 2023.

— The GiST has been under budget for financial years 2020-21 by $29,608 (74% of the 2020-21 budget) and 2021-22 by $38,059 (15% of the 2021-22 budget).

— As of April 2023, the 2022-23 budget was under budget by $140,859 (45% of the 2022-23 budget).

H.5 Outcomes and impacts

H.5.1 Evaluation readiness

GiST has sufficient data collection and reporting processes in place to support the evaluation of outputs and short-term outcomes.

ESA conducted an internal evaluation of the GiST as part of the grant agreement released in 2021.[164] The evaluation plan was informed by the Australian Government Women in STEM Ambassador's National Evaluation Guide. ESA also uses website data analytics and social media engagement to track outputs and progress towards outcomes. ESA deliver a report on site analytics to the DISR team monthly.

Some data limitations inhibit the evaluation of medium- to long-term outcomes, including challenges with routinely gathering data on impact. The collection of key data analytics is the only data collection specified in the grant agreements.

H.5.2 Short-term outcomes

There is some evidence GiST is achieving the measured short-term outcomes of increasing girls' interest in STEM subjects, activities and careers, as well as increasing teachers' and schools' awareness around inequalities in STEM.

The internal evaluation of GiST identified:

— GiST inspires girls in lower years to consider STEM and reassures those who have chosen to pursue STEM, providing participants with confidence and empowering them to re-evaluate negative perceptions of what it means to be a woman working in STEM.

[164] Note that 'evaluation of the programme' was specifically excluded from the scope according to the 2018 project plan.

— GiST provides evidence-based principles and example practises that give teachers authority to run STEM initiatives with gender-inclusive goals.

Free text responses to the ACIL Allen evaluation survey identified impacts including the GiST “created conversation and inquiry”, and “increased confidence and competence in teaching and supporting students in a meaningful way”.

The survey responses appear to demonstrate in general, the GiST is supporting its short-term outcomes by providing teachers with the tools needed to increase girls’ interest in STEM in the classroom.

H.5.3 Medium- to long-term outcomes

There is limited evidence GiST is achieving the measured medium-term outcomes of more girls choosing STEM study pathways and reduced societal barriers to participation in STEM studies. This is due to the lack of available data described under the evaluation readiness section, with no tracking of the behaviour of participants following their interaction with GiST to see if it translates into improved participation. For the same reasons, there is limited evidence GiST is achieving its measured long-term outcomes of equal opportunity and improved participation, retention and progression in STEM studies.

However, the observed short-term outcomes are likely to be lead indicators for medium-term outcomes, with the contemporary evidence base suggesting that increased visibility and awareness can lead to motivation for and participation in STEM studies.

The ACIL Allen survey also suggests tracking outcomes may be a challenging task. When asked whether, to the respondents’ knowledge, any children/students who engaged with GiST later studied STEM subjects in secondary school, where they may not have done so without GiST, 2 stakeholders (15%) responded yes, one (8%) responded no and the remaining were unsure (54%), or the question was not applicable (23%). When asked the same question in relation to tertiary education, one stakeholder (8%) responded yes and another (8%) no, with the remaining 85% either unsure (69%) or the question was not applicable (15%). Although the sample size was limited (13), it shows there is limited visibility of the medium- to long-term impacts.

However, the survey did indicate GiST appears to be contributing to change. When asked to what extent stakeholders agreed the GiST has contributed meaningful change in how society expects girls and women to engage in STEM, 10 stakeholders (77%) agreed or strongly agreed. The remaining 3 stakeholders were split between neutral (8%), disagree (8%) and strongly disagree (8%).

The passive nature of the GiST (and websites in general) may put the initiative at risk of not being able to achieve measured medium and long-term outcomes as additional support or engagement may be required to transition short-term impacts into longer-term behavioural change.

H.5.4 Unintended consequences

No unintended consequences were identified.

H.6 Key insights

- ESA consulted closely with a range of stakeholders when designing the GiST. The development of the GiST was informed by real-world experiences of women in STEM, education experts and Australian Government careers data and resources.
- Concern regarding potential overlap between GiST and Future You should be explored to ensure the initiatives are taking a strategic approach and that government funding is used efficiently. Stakeholder perceptions around the unique value added by each initiative should also be strengthened to ensure they are used as intended.
- The ESA team are not currently connected to other WiSTEM initiatives (although previously held meetings with the Future You team for approximately a year) but believe it would be beneficial for the department to facilitate a process where organisations can share knowledge and learnings.
- GiST activities have clear links to existing evidence on improving equality in STEM. Numerous studies suggest the objectives and activities of the GiST will result in greater participation of girls in STEM subjects, through motivating girls to pursue STEM and raising awareness with teachers, schools and parents/carers.
- The GiST appears to be operating efficiently. GiST has had over 80,755 site visits since its launch in 2019. Timelines have been broadly adhered to and the project has been operating within the budget provided.
- In 2021, ESA conducted an internal evaluation of the GiST. Overall, the evaluation found students, teachers and parents find the site useful, informative and inspiring. The ACIL Allen survey indicated the GiST is generally considered useful and high quality, with a number of teachers noting it supports meaningful change in schools.
- ESA have acknowledged medium- and long-term outcomes will be difficult to measure. Ongoing data collection by ESA involves the collection of site analytics. The collection of data in relation to medium- and long-term outcomes is not a requirement under the grant agreements. These agreements only outline the collection of key web analytics and an option to include data on outcomes.

I Women in STEM Ambassador

This appendix provides an assessment of the WiSA initiative.

I.1 Overview of WiSA

Table I.1 Women in STEM Ambassador – Quick Reference

Lead Agency	University of New South Wales (UNSW)
Related policy/strategy	WiSTEM Strategy
Target audience	Government, industry, universities and STEM research organisations; STEM professionals; Primary and high school students, schoolteachers and other educators
Aims	To advocate for gender equity and increase the visibility and participation of girls and women in STEM education and careers.
Key activities	WiSA conducts and applies research; develops gender equity initiatives and tools; delivers conference talks and presentations; provides research-backed advice to government and industry; and develops reports.

Source: ACIL Allen, 2023.

I.2 Data sources used for this assessment

The assessment is informed by a 2022 internal evaluation of 2018-20 activities, a 2023 external evaluation (including an external survey) of 2021-22 activities and consultation with the delivery partner, delivery partners of other relevant WiSTEM initiatives, government and peak body stakeholders. The assessment draws on previous survey respondents' perceived impact of WiSA, which has not been verified through additional data collection. This analysis did not include a control group, making it difficult to understand the counterfactual and attribute impact. Perceptions of impact may be influenced by the respondent's occupation, e.g., advisers may be more likely to see advisory activities as having a greater impact.

I.3 Initiative design

I.3.1 Justification for the initiative

Women in STEM Ambassador (WiSA) is an awareness-raising initiative that seeks to address drivers of underrepresentation of girls and women in STEM, including limited role models and visibility, poor workplace attitudes and the limited evidence base, best-practice tools and expert advice.

Initiatives like WiSA are necessary to increase visibility and participation as there is still gender inequity within STEM professions despite women's participation increasing. There is a clear role for government in funding WiSA as a public good as similar initiatives are unlikely to be funded through other sources. Further, government funding for WiSA provides credibility for the initiative among stakeholders consulted for the evaluation and supports closer engagement with key stakeholders within government.

WiSA aligns with the government's strategic policy intention to increase gender equity in STEM education and careers. WiSA supports the implementation of the Advancing Women in STEM strategy, 2020 Action Plan and the Women in STEM Decadal Plan. WiSA was tasked with promoting action among existing WiSTEM initiatives[165] and activities across Australia and aligns with other WiSTEM initiatives, for example:

— *Future You* which promotes STEM study and careers for primary school children and is delivered by WiSA.

— *Elevate – Boosting Women in STEM*: which supports women to gain, extend, or build on STEM education and qualifications. The incumbent WiSA has been involved on the advisory committee.

— *Women in STEM and Entrepreneurship (WiSE)*: which provides grants to organisations to support women in STEM and eliminate barriers to participation in STEM education and careers, including entrepreneurship. The Ambassador Chaired the Grant Committee for Round 3.

— *Champions of Change Coalition STEM Group*: which engages and activates senior leaders in organisations to accelerate progress in gender equality. WiSA provides evidence and tools, for example, showcasing the evaluation portal and advising on the evaluation of equity initiatives.

WiSA's engagement across other WiSTEM initiatives and its role in developing tools and resources for use by the sector broadly helps create cohesion in the suite of initiatives in this space.

I.3.2 Design of the initiative

The aims of WiSA are clearly identified and link closely with priority areas of activity for the initiative and the actions, as outlined in Table I.2.

[165] Department of Industry, Innovation and Science (2018). *Commonwealth Grant Agreement between the Commonwealth represented by Department of Industry, Innovation and Science and University of New South Wales*. Canberra: Department of Industry, Innovation and Science.

Table I.2 Priority focus areas for The Australian Government Women in STEM Ambassador

Priority area	Description
1. Visible role models	The Ambassador is a visible role model and raises the visibility of diverse women in STEM. This is achieved by giving presentations in schools and through public engagements, supported by marketing and communications.
2. STEM education	The Ambassador encourages and inspires girls to pursue STEM studies and careers. This is achieved by providing educators with gender equity research information and tools to create gender-equitable classrooms, e.g., Future You.
3. Advocate for gender equity in STEM	The Ambassador advocates for girls and women in STEM. This is achieved by mobilising, engaging and advising leaders, sector stakeholders and policymakers on issues affecting women and girls in STEM.
4. STEM careers	The Ambassador works towards attracting and retaining girls and women to STEM careers. This is achieved by communicating key messages on gender equity through advocacy, evaluation work, policy advice and engagement with sector leaders and the media.

Source: Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Evaluation of 'The Australian Government Women in STEM Ambassador' initiative: 2021-2022. Sydney: Centre for Social Impact, University of New South Wales.

Stakeholders perceive that WiSA is connected to both the government (through funding) and university (through the host organisation) sectors which has positioned WiSA for effective influence. The host, UNSW, supports the academic rigour of the advice provided, increasing the legitimacy of the significant research activities undertaken by WiSA (e.g. including supporting the Diversity in STEM Review, analysis of 20 years of research grants awarded by the Australian Research Council and the National Health and Medical Research Council), providing access to academics who lead evidence-based research programs on gender equity programs and supporting access to current research evidence to prepare content for conferences, talks and reports. However, engagement with government and peak body stakeholders for ACIL Allen's evaluation highlighted the focus on academic outputs limits their accessibility by non-academic sectors.

There is limited alignment between the inputs and objectives of the initiative. For example, the current funding is short-term in nature, while WiSA aims to drive long-term social and attitudinal change. Changing entrenched social attitudes typically requires sustained investment and activity over an extended period of time. The current structure of WiSA, with the Ambassador as the public figure and 5 full-time support staff and additional contract staff (as needed), creates key person risks, which may limit the level of activity and impact of WiSA. Engagement with government and peak body stakeholders for ACIL Allen's evaluation also highlighted a single Ambassador could not represent the diversity of women and career pathways, which limits impact.

WiSA has had an increasing focus on diversity to address the impact of intersectionality. This is reflected in the resources produced by the initiative such as the *Workplace Gender Equity Implementation Guide* and the characters in Future You. However, there is limited data and reporting on whether WiSA is reaching diverse audiences.

I.3.3 Links to the evidence base

Some elements of WiSA's design have clear links to evidence of effective practice.

WiSA's focus on visible role modelling and delivery of Future You align with evidence girls' perception of, and interest in, STEM can be positively influenced by role models, teachers, parents and carers,[166] and engaging girls early in their schooling.[167]

While the evidence base for the value of information provision, communication and advocacy is less established, there is research that indicates advocacy improves access to evidence and information to improve decision-making.[168]

I.4 Efficiency

I.4.1 Reach

WiSA has had a positive reach across the target audiences of government, industry, STEM professionals and organisations, universities, students, and educators. From 2021-22, WiSA reached 131,034 people across 550 hours of engagement. A national online event in 2021 that reached 68,909 primary school students was largely responsible for this large audience size. The next largest cohort reached was STEM professionals (5,203 in 2021-22), government (1,806) and high school students (1,734).[169]

Meetings with government officials, industry leaders and STEM professionals more than doubled from 2021 to 2022, with 103 meetings compared to 46. This is in line with WiSA's Strategic Plan for 2022, which prioritises these stakeholders and reflects a shift from school-based engagement to targeting change agents across government and industry.[170] The 2023 evaluation also highlighted WiSA's engagement with education stakeholders, industry, peak bodies and policymakers would be most likely to promote social and cultural change. WiSA has also shifted toward engaging more with industry as change agents that may assist in addressing systemic barriers. However, this has reduced engagement with the public.

> *"[WiSA's] role has changed from an awareness raising role to mobilising other people such as government, industry, and business leaders to create change in their sectors. [WiSA] also has a big advisory role, a role in producing resources and conducting research."*
>
> *Member of the Office of the Women in STEM Ambassador, ACIL Allen evaluation*

The evaluation of WiSA's second term[171] showed WiSA participants valued its reach across Australia and ability to drive change in systems, structures and policies.

> *"The STEM Ambassador has] developed programs that have national scale and reach."*

[166] United Nations Educational, Scientific and Cultural Organisation (2017). Op. cit.
Google Inc. & Gallup Inc. (2017). Op. cit.
The Invergowrie Foundation (2017). Op. cit.
Shin JEL, Levy SR, London B. (2016). Op. cit.
Drury BJ, Siy JO, Cheryan S. (2011). Op. cit.

[167] Sullivan, A. & Bers, M. U. (2018). Op. cit.

[168] Pretorius, D (2018). *STEM Advocacy: Lessons from the USA*. Canberra: Science and Technology Australia.

[169] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Op. cit.

[170] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Op. cit.

[171] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Op. cit.

"The Ambassador… has had extensive reach in Australia and innovative programs like 'Future You' are influencing young people to join STEM fields."

Respondents to the 2023 Evaluation[172]

I.4.2 Timelines

WiSA reporting shows overall timelines have been met, noting these have been revised through grant variations.

The short timeframes of the grant agreement and 2 variations (described in funding below) have created challenges with delivering activities on time. This has created employment uncertainty and increased staff turnover and affected the types of research opportunities and partnerships that could be explored. This led to the need for the most recent variation (November 2022) to extend the delivery of some milestones.

"Funding cycles mean we can only plan for a year in advance, we find out really close to the end of agreement whether, when and how long we will continue for and how much funding we will have. This limits our planning and… ability to be efficient and commit to projects."

Member of the Office of the Women in STEM Ambassador, ACIL Allen evaluation

Hosting WiSA at a university has created grant management challenges for the department due to the interface of government and academic bureaucracy. However, it also provided continued funding for staff salaries to manage gaps between grants.

The timelines have also been affected by academic publishing processes, which is not unique to WiSA. This has slowed the distribution of research findings and the potential for these findings to contribute to the evidence base and influence decisions. WiSA has shared information through informal channels to support faster uptake.

I.4.3 Funding

WiSA has been delivered on budget, noting variations have been made to original funds.

WiSA received 2 grants, one from 2018-19 to 2019-20 for $1.5 million, and the second from 2020-21 to 2022-23, originally for $1.5 million. The second grant was varied twice to a total of $3.145 million. The first variation was to support the continued establishment of a consistent national profile for WiSA, communicate key messages to drive systemic change and provide further funding to develop and deliver the Evaluation Portal. The second was to allow for the completion of the 2022 annual review, continued implementation of stakeholder engagement, development of research to support the Diversity in STEM Review and delivery of an evaluation report in 2023. It is set to end in November 2023.

The first grant was on budget, noting labour costs were higher than budgeted (due to initial under-resourcing of staff) and all other expenses were lower than budgeted. The second grant has been delivered on budget to 2021-22, with all categorised expenses equal to their budget amounts. The current financial year is on track to continue this trend.

Additional resourcing has enabled WiSA to target its efforts more effectively toward harder-to-reach stakeholders and shift focus from school engagement to mobilising, engaging and advising leaders, sector stakeholders and policymakers. WiSA has grown from a team of 2 (the Ambassador and a Project Officer) to a team of 6 with the addition

[172] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Op. cit.

of a Chief Investigator (UNSW funded in-kind), Senior Research Associate, Research Associate, Operations Manager and Digital Content Officer. Casual Research Assistants and administrative staff are employed when needed.

I.5 Outcomes and impacts

I.5.1 Evaluation readiness

WiSA has sufficient data collection and reporting processes in place to support the evaluation of outputs and short-term outcomes.

WiSA provides regular progress reports in line with the grant agreement, reporting on achievements, milestones, engagement activities, outcomes to date and expenditure. The grant agreements also detail timing expectations for reporting, the need for an independent audit report on completion of the grant activity and opportunities to collect data from stakeholder engagement activities, including delivering a WiSA impact survey. Overall grant agreement reporting requirements have been met and they have not caused unreasonable administrative burden. However, the time taken for UNSW to prepare financial statements (1 month), was challenging for AusIndustry to accommodate. Initial progress reporting was more frequent and at varied intervals which was somewhat challenging to schedule. Reporting has become less frequent over time, in line with the initiative's development.

WiSA's evaluation readiness focuses on understanding and continually improving the WiSA activities, as well as guiding the sector through the *National Evaluation Guide for STEM gender equity programs* and *STEM Equity Evaluation Guide and Portal*.

It is more challenging to evaluate longer-term outcomes as these are difficult to attribute to specific initiatives and may occur many years after the intervention begins.

I.5.2 Short-term outcomes

There is evidence to suggest WiSA is delivering on the short-term outcomes.

The evaluation of WiSA's second term used a mixed-methods approach to examine WiSA's impact. The evaluation showed:

— WiSA has been an effective advocate and role model for girls and women in STEM and in STEM careers, with 80% reporting WiSA significantly shifted their own perceptions regarding young people and careers in STEM.

— Respondents appreciated WiSA's leadership skills, visibility and ability to promote excitement among young people for STEM.

— WiSA has created cultural and social change to support improved gender equity in STEM, with 60% reporting WiSA had a moderate-very high impact on the STEM sector.

I.5.3 Medium- to long-term outcomes

Medium-term outcomes are more difficult to measure. However, the 2023 Evaluation shows early evidence of WiSA influencing more women to study STEM courses.

> *The number of young women taking up undergraduate STEM has increased.*
>
> *The work and advice of the STEM ambassador [sic] (and team) have significantly contributed to the conversation and understanding of issues of gender equity in the*

health and medical research sector, the end result of which was a significant change in funding policy.

Respondents to the 2023 Evaluation[173]

There is limited evidence WiSA is achieving the measured long-term outcomes due to limitations as described in the data section of this appendix.

I.5.4 Unintended consequences

In addition to the direct outcomes collected through the evaluation survey, there are other short-term outcomes identified including:

- WiSA's research projects (including a longitudinal, 20-year study on grant outcomes) have directly influenced decisions affecting women and non-binary people, for example, by influencing a funding agency to allocate half of Investigator grant funding to women and non-binary people.
- WiSA's approach to speaking engagements has increased diversity on panels and improved awareness of stakeholders of the need to represent a range of voices.

I.6 Key insights

- Government funding for WiSA and embedding WiSA in a university increases the rigour and legitimacy of the initiative.
- WiSA has engaged more with industry in 2022 which may have increased its impact as it is likely targeting change agents that will assist in addressing systemic barriers.
- Timelines and impact have been affected by academic publishing processes. This highlights the tension between legitimacy provided through peer-reviewed journals and the need to get findings into the public sphere to inform contemporary discussions. These issues have been overcome through informal information-sharing but could be improved in the future.
- Need for funding certainty. Funding uncertainty has had an impact on staff retention and the efficiency of initiative delivery.
- There is key person risk and capacity constraints from structuring WiSA around a single Ambassador. This will limit scalability but is a common risk to similar initiative models. Alternate structures (e.g., a national network) and additional support arrangements could be considered, such as stronger engagement with other organisations that have similar objectives.
- Significant work remains to address gender inequity in STEM. The Ambassador role is established and highly valued, many relationships and projects are in progress and WiSA would be best suited to continue this work.
- There is value in more formally considering intersectionality and including other equity groups in planning for future work and ongoing public engagement activities.

[173] Varadharajan, M., Calyx, C., Barnes., E., & Noone, J. (2023). Op. cit.

J STEM Equity Monitor

This appendix provides an assessment of the STEM Equity Monitor initiative.

J.1 Overview of STEM Equity Monitor

Table J.1 STEM Equity Monitor – Quick Reference

Lead Agency	Department
Related policy/strategy	WiSTEM Strategy 2020 WiSTEM Strategy Action Plan
Target audience	Government, policymakers, the STEM sector, data custodians, media, social science researchers, educators and STEM workforce employers
Aims	– To collate data from organisations that collect data relating to girls and women in STEM and commission further data collection to address gaps in the available data.[174] – To publish and promote an annual data resource that presents the current state and trends in gender equity in STEM, creating a standardised data and evidence base, which serves as a single-source-of-truth.[175]
Key activities	The STEM Equity Monitor (the monitor) provides publicly available data through a web-based portal and reports. Data is updated annually and provides insight into the participation of girls and women in STEM, from high school to postgraduate education and the labour force, and attitudes towards STEM.[176]

Source: ACIL Allen, 2023.

J.2 Data sources used for this assessment

The assessment draws on previous evaluation data based on survey respondents' perceived impact of the monitor, which has not been verified through additional data collection. It is not known whether the survey sample is representative. Data is gathered from a 2022 internal evaluation of 2020 and 2021 monitor releases and a 2022 external market research report.

There are also limitations in terms of determining whether the monitor is reaching its intended end users.

[174] Nous Group (2022). Op. cit.

[175] Nous Group (2022). Op. cit.

[176] Department of Industry, Science, Energy and Resources (2022) *STEM Equity Monitor Post-implementation evaluation report.* Canberra: Department of Industry, Science, Energy and Resources.

J.3 Initiative design

J.3.1 Justification for the initiative

The STEM Equity Monitor (the monitor) is a national data resource on girls and women in STEM that seeks to address gaps in the availability of a centralised and consistent evidence base to inform decision-making. The monitor reports the current state of STEM gender equity in Australia and measures changes over time,[177] aiming to address data gaps and inconsistencies that led to poor evidence on the stages at which girls and women were leaving STEM. This in turn hinders the accuracy of policy advice.[178]

There is a role for government in funding initiatives like the monitor as a public good, as similar initiatives are unlikely to be funded through other sources such as industry or academia. Initiatives like the monitor are central to understanding the challenge and informing decision-making around girls and women in STEM. By more accurately measuring the current state of equality, participation and engagement, decision-makers can better design initiatives to address gaps.

The monitor aligns with the government's strategic policy intentions for increasing gender equity in STEM education and careers.[179] The monitor aligns with other WiSTEM initiatives such as:

— *Women in STEM and Entrepreneurship Grants*: provided evidence of areas of low female engagement in the STEM sector. This information informed WISE Round 3.

— *Elevate: Boosting Women in STEM*: data from the monitor showed 40% of women in the 2011 university graduate cohort took at least one career break between 2012 and 2016.[180] This data led Elevate to include a focus on those returning to the workforce.

J.3.2 Design of the initiative

The aims of the monitor are clearly identified and link with the policy intent of the WiSTEM Strategy. The activities of collecting and collating data and making this publicly available align with the aim of building the evidence base to serve as a single-source-of-truth.

The activities of the monitor align with the aims of addressing data gaps and creating an evidence base that serves as a single-source-of-truth. However, more granular data on demographics is required to create a comprehensive evidence base for the sector.

The design process for the monitor included consultation with data custodians, including the Workplace Gender Equality Agency (WGEA), the Australian Research Council (ARC) and the Department of Education. These consultations informed the types of data collected and available for use in the monitor. These consultations also informed the decision to develop an interactive resource using Power BI for data analytics, in addition to a static PDF data report for a high-level overview.

The monitor incorporates data from 22 different sources, ranging from publicly available data to unpublished data and commissioned data.[181] Department staff work with data

[177] Department of Industry, Science, Energy and Resources (2022). *STEM Equity Monitor*. Accessed 13 April 2023: https://www.industry.gov.au/publications/stem-equity-monitor.

[178] Nous Group (2022). Op. cit.

[179] Department of Industry, Innovation and Science (2019). Op. cit.

[180] Department of Industry, Science, Energy and Resources (2022). Op cit.

[181] Department of Industry, Science, Energy and Resources (2022). Op cit.

custodians to refine the data collected and new data sources are added to each release as they become available. Case studies were introduced in 2022 to share the experiences of girls, women and non-binary people in STEM.[182] The monitor provides data on most key indicators identified in policy documents and additional indicators, as intended.[183]

J.3.3 Links to the evidence base

The design of the monitor aligns with the evidence base on the importance of data-driven decision-making by government.

Funding decisions rely on population data showing attitudes, participation, retention and progression of people across their lives. By understanding differences in key metrics across diverse groups and life stages, decision-makers can understand where the biggest challenges lie and where the largest impacts could be delivered. Further, most WiSTEM initiatives lack evaluation data, which hinders informed decisions about the best way to target priorities and achieve positive change.[184]

> *Action requires measurement. Evidence-based policy making requires the systematic collection of data, aimed at identifying priorities, and defining and monitoring key lines of actions. Fostering the addition of gender-related dimensions in official statistics is important in this respect.*[185]

J.4 Efficiency

J.4.1 Reach

The monitor has had some reach across the target audiences of government and policymakers.

Website analytics show 3,470 unique users have accessed the website since 15 September 2022 (the release date of the 2022 issue of the monitor), with an average of 16 users per day (see Figure J.1). The most-accessed resources were workforce data and primary and secondary school data.

The monitor website does not track the demographics or occupations of individual users. However, market research conducted in 2022 showed that of a sample of 161 current users, users were most commonly employed in the STEM field (20%), students interested in a career in STEM (17%) and teachers of STEM subjects (14%).[186]

[182] Department of Industry, Science, Energy and Resources (2022). Op cit.

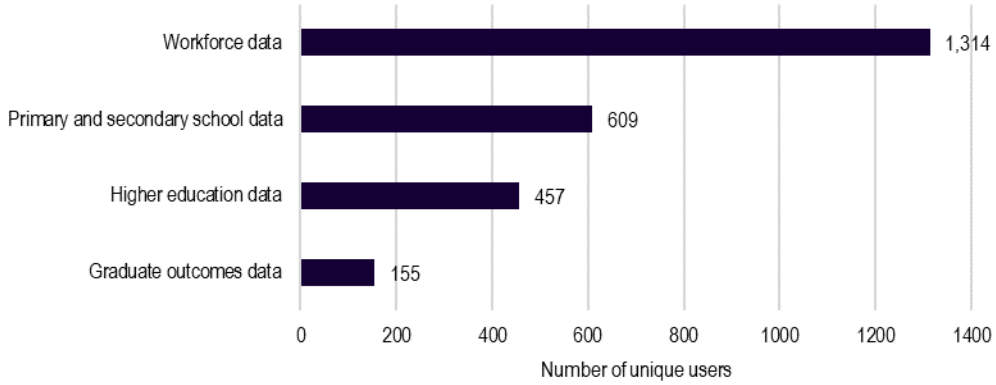
[183] Department of Industry, Science, Energy and Resources (2022) *STEM Equity Monitor Post-implementation evaluation report.* Canberra: Department of Industry, Science, Energy and Resources.

[184] Australian Academy of Science and Australian Academy of Technological Sciences and Engineering (2019). Op. cit.

[185] Organisation for Economic Co-operation and Development (2018). *Bridging the digital gender divide include, upskill, innovate*. Report for the Australian Government. Paris: OECD.

[186] Instinct and Reason (2022) *STEM Equity Monitor User Research Preliminary report*. Report for the Department of Industry, Science, Energy and Resources. Sydney: Instinct and Reason.

Figure J.1 Total unique monitor users, by data category (15/9/22 – 22/4/23)



Source: Department of Industry, Science and Resources, 2023

J.4.2 Timelines

Overall timelines for the monitor have been met.

However, delivery has been impacted by internal and external staffing shortages and staff turnover. Upskilling of new team members entering the monitor team and staff shortages experienced by some data custodians impacted their ability to deliver data in time for the monitor.

It has also been challenging to align the different timeframes for each data custodian's data collection with the monitor release. A 2022 evaluation recommended the monitor release date be changed to July or August, to align with the start of the financial year and release of custodian datasets.[187] While the 2022 release of the monitor was delayed until September, future releases will adopt the recommendation of a July-August release.

Given the public-facing nature of the monitor, several internal clearance processes must be completed. This has been a resource-intensive process, causing significant time pressures on staff for the 2020 release.[188] A new clearance process was established in 2022, where content is cleared in tranches based on release dates of data custodians to reduce the workloads for teams.[189] Stakeholder engagement suggests this process has been working well, with clearance processes now better distributed in accordance with the release dates of custodian datasets.[190]

J.4.3 Funding

The monitor has not been delivered within the allocated budget.

The total budget for the monitor is $2.7 million over 10 years from 2020. Funding data from 2019/20 to 2022/23 shows the monitor has consistently operated over budget, with a total overspend of 57% ($604,133) over this period. This is due to labour costs (of 2.45 FTE) consistently exceeding the budgeted amount (1 FTE). Allocation for other cost categories (e.g., paid data services, website development, data access and integration) was generally on target.

[187] Department of Industry, Science, Energy and Resources (2022). Op cit.

[188] Department of Industry, Science, Energy and Resources (2022). Op cit.

[189] Department of Industry, Science, Energy and Resources (2022). Op cit.

[190] Department of Industry, Science, Energy and Resources (2022). Op cit

J.5 Outcomes and impacts

J.5.1 Evaluation readiness

The monitor collects output and usage data to support evaluation. Information on short-term outcomes is not routinely collected and has been obtained through ad hoc evaluation and market research.

The monitor reports internally to the department's policy team. Reporting requirements include project planning (including data collection plan), progress, risks, financials and timelines. Reporting is undertaken internally on a weekly basis in line with the project plans. Liaison with external data custodians, the department's finance business partner, the procurement team, Senior Executive Service and the Minister's Office occurs ad hoc and more frequently near publications. Reporting is not overly burdensome.

The monitor is not continually collecting data to assess the full reach of the outputs and the extent to which these are used to deliver short-term outcomes. The market research survey focused on understanding current and potential users, the importance of the information provided, how the information is used, how it can be improved and other sources of STEM equity information.

The monitor does not directly aim to deliver the measured medium- or long-term outcomes but rather to provide the evidence base for government, industry and research sector to make decisions and deliver policies and initiatives that will enable the medium- or long-term outcomes. As such, there is poor visibility of whether the monitor is supporting its end users to achieve medium- or long-term outcomes.

The monitor has additional longer-term outcomes not captured in the measured outcomes. These include providing increased awareness of other diversity indicators in the STEM sector and for STEM-aligned businesses to develop measures to assist women in staying within the industry.

The monitor also intends to support policy development to deliver outcomes including increased retention of girls and women in STEM education and careers, and more girls and women being attracted to pursue STEM education and STEM-skilled careers.

J.5.2 Short-term outcomes

There is some evidence the monitor is achieving the measured short-term outcome that government, industry and research sector interventions are better informed by the evidence base and more effective in achieving their goals. This is limited by available data on initiative reach.

The 2022 evaluation found the monitor:[191]

- informed policymakers in Round 3 of the WISE grants by identifying target areas of low engagement by girls and women
- informed Elevate inclusion of a focus on those returning to the workforce after career breaks by showing 40% of women in the 2011 university graduate cohort took at least one career break between 2012-2016
- informed responses for the Rapid Research Information (RRI) Forum. Workplace data from the monitor informed *The impact of COVID-19 on women in the STEM workforce*, an RRI report which highlighted the importance of tracking the gender impact of STEM employers' decisions.

[191] Department of Industry, Science, Energy and Resources (2022). Op cit.

— is used in internal briefings, which raises the profile of the monitor, noting the monitor is not always referenced.

The monitor has been used by media outlets reporting on STEM equity, including direct references by the ABC in an article on how the Department of Education-funded Curious Minds program could increase girls' participation in STEM.[192] An article by The Conversation referenced the monitor when identifying why girls are less likely to choose careers in STEM.[193] Use of the monitor by researchers is unclear, as citation data in academic literature are not collected.

It is difficult to determine whether the delivery of the monitor meets the needs of its target audience. However, a 2022 sample of 161 users of the monitor indicated an average satisfaction rating of 8 out of 10.[194]

J.5.3 Medium- to long-term outcomes

There is limited evidence the monitor is achieving the measured medium- and long-term outcomes due to the data constraints described under the evaluation readiness section.

The 2022 market research provides some insight into these outcomes, showing 31% of survey respondents use the monitor to highlight inequity in STEM, 30% to develop programs around STEM inequity, and 27% to inform policy on STEM inequity.[195] However, it is unclear how well the surveyed sample represents the population.

Further, given the range of information sources available and influences on end users, long-term outcomes could not be reasonably attributed to the monitor.

J.5.4 Unintended consequences

The monitor has created a platform to engage with data providers on data quality and representativeness. This has prompted discussions with data custodians on how they can improve the way they collect data. For example, consultation with the delivery team highlighted engagement with data custodians to raise awareness of the value of disaggregated gender data in enabling insight into diverse cohorts and improved evidence to support policies and programs. This resulted in non-binary data being reported separately (rather than aggregated with women).

[192] ABC (2021). *Curious Minds program encourages girls to pursue careers in STEM.* Accessed May 2023: https://www.abc.net.au/news/2021-07-16/the-students-in-stem-hoping-to-reverse-the-gender-gap/100296594.

[193] The Conversation (2021). *It's not lack of confidence that's holding back women in STEM.* Accessed May 2023: https://theconversation.com/its-not-lack-of-confidence-thats-holding-back-women-in-stem-155216.

[194] Instinct and Reason (2022). Op. cit.

[195] Instinct and Reason (2022). Op. cit.

J.6 Key insights

- The monitor's flexibility in refining and incorporating new datasets, amending timeframes and building on the outputs via case studies has broadened its offering.
- Insight into reach and outcomes has been limited by the available evaluation data. Additional data collection and better tracking of users would strengthen insights into the full cohort of users (including more data on industry users), support future evaluation and support the improvement of the monitor. This could include tracking how users apply the data accessed through the monitor and gathering qualitative insights into linkages with longer-term outcomes.

The monitor has been delivered over budget and delivery of the monitor has been hindered by resourcing constraints and lack of staff. Better resourcing and staffing could support improvement in data collation and the outputs provided and help reduce staff turnover.

K Future You

This appendix provides an assessment of the Future You initiative.

K.1 Overview of Future You

Table K.1 Future you – Quick Reference

Lead Agency	Office of the Australian Government's Women in STEM Ambassador (UNSW)
Related policy/strategy	WiSTEM Strategy
Target audience	Children aged 8-12 and their teachers, parents and carers
Aims	– Raise the awareness of children aged 8 to 12 and their teachers, parents and carers, of the diverse range of STEM careers Increase the visibility of girls and women in STEM education and professions – Address public perception of what a career in STEM involves by reducing stereotypes and gender bias.
Key activities	Future You is funded as a national awareness-raising initiative (initially a pilot campaign, now an ongoing initiative with a continuous communications plan). Future You is a web-based platform. The Pilot delivered 12 Future You STEM characters, a hero video animation, campaign song, games and a career quiz. The current initiative delivers the Pathfinders series, Imagining The Future short story program, quizzes, games, posters, stories, competitions and songs. Future You conducts research on priorities and current initiatives, conducts evaluation and partners with the sector to expand the reach of the initiative.

Source: ACIL Allen, 2023.

K.2 Data sources used for the assessment

The assessment is informed by an internal evaluation of the Future You pilot (2020) and the available survey data from 308 child-parent pairs pre- and post-engagement with Future You to inform the 2023 evaluation (internal evaluation set to be completed in 2023), consultation with the delivery partner, delivery partners of other relevant WiSTEM initiatives, government and peak body stakeholders.

K.3 Initiative design

K.3.1 Justification for the initiative

Future You is funded by the Women in STEM National Awareness Raising Initiative (NARI) grant and is an early intervention initiative that seeks to address drivers of underrepresentation of girls and women in STEM by improving awareness and visibility of diverse female role models.

Initiatives like Future You are necessary to increase girls' visibility of diverse role models, as women remain underrepresented in STEM professions (see chapter 3). It is important to improve visibility of role models at an early age to overcome negative stereotypes, biases and poor visibility of STEM careers (see chapter 3). There is a role for government in funding initiatives like Future You as a public good, as similar initiatives are unlikely to be funded through other sources such as industry or the research sector.

Future You aligns with the government's strategic policy intentions to increase gender equity in STEM education and careers. Future You aligns with other WiSTEM initiatives such as:

— *Superstars of STEM*: which promotes STEM careers and has provided suggestions for upcoming Future You characters

— *Girls in STEM Toolkit (GiST)*: which is aimed at high school students and provides a new platform for children when they outgrow the Future You platform; the delivery partners also communicate to ensure the initiatives complement rather than duplicate each other

— *The Women in STEM Ambassador (WiSA)*: who hosts and promotes Future You and has led its development and delivery.

K.3.2 Design of the initiative

The aims of Future You are clearly identified and link closely with the actions in the 2020-22 and 2022+ Future You Strategies. The Future You activities (i.e., creating and promoting child, teacher and carer resources) align with the aim to deliver improved visibility. These activities link with the aims of the initiative and are supported by the Women in STEM Ambassador who promotes Future You.

There is a clear understanding of the objectives among initiative delivery staff. However, there is recognition that the activities and approach to reaching target stakeholders will continue to evolve to ensure appropriate and adequate reach.

The Future You pilot was a national campaign focused on 8-12-year-olds. This was extended through a second grant to evaluate the reach and impact of the pilot and transition to an ongoing initiative supported by continuous communications. The design of the ongoing initiative shifted to focus on parents/carers and teachers, including engagement with schools. This shift has not been well documented in the grant agreements. Stakeholders engaged for ACIL Allen's evaluation expressed concern Future You now duplicates elements of GiST due to an overlap of end users (GiST is used by some primary school audiences) and a shift toward using Future You in schools. However, Future You includes parents and carers as a central focus, unlike GiST. The risks here are relatively small as there is no conflict in intent and overlap in each initiative's reach. Outcomes may be strengthened by providing multiple engagement points with girls and underrepresented groups. However, this approach should be clarified and discussed at a strategic and practical level.

While the pilot was not developed in consultation with the sector, sector experts are being consulted on future developments to better meet the needs of industry and the future workforce.

Future You originally contracted external providers to supply content, graphic design and web development services. After initially driving high engagement through the pilot, Future You shifted focus to deeper audience engagement and began designing resources internally, working with a larger number of smaller creative providers as needed. A Producer was also employed to manage content development. This enabled more control over the delivery of Future You.

Future You provides diverse role models through its characters, a commitment to reflect Australia's diversity through Future You and its resources and facilitate connection with diverse audiences. Characters include representation of First Nations Peoples, Women of Colour, non-binary gender identity and differently-abled people.

> *"Underrepresented groups are a really strong focus of the program."*
>
> *Future You staff member, ACIL Allen evaluation*

K.3.3 Links to the evidence base

Future You's design is clearly connected to the evidence base on effective practice.

Future You aligns with the academic evidence which addresses the need for young girls to be exposed to diverse STEM role models as means of positively influencing girls' perception of and interest in STEM.[196] Evidence shows focusing on girls at the primary school level can increase girls' self-efficacy and interest in STEM and may influence their future study and career choices.[197]

Some resources are designed to be used by teachers and carers to facilitate conversations about STEM skills, study and careers, which is based on evidence these role models reinforce or challenge stereotypes,[198] and influence children's perceptions of and interest in STEM.[199]

> *"Research shows the earlier we can dispel gender myths the better. The data is clear - by the end of primary we've already lost girls."*
>
> *Future You staff member, ACIL Allen evaluation*

K.4 Efficiency

K.4.1 Reach

Future You has had positive reach across the target audiences of primary children and their parents and carers. The initiative's reach across teachers is unclear due to data limitations.

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[196] Shin JEL, Levy SR, London B. (2016). Op. cit.
Drury BJ, Siy JO, Cheryan S. (2011). Op. cit.

[197] Sullivan, A. & Bers, M. U. (2018). Op. cit.

[198] van Tuijl C, van der Molen JHW (2016). Op. cit.
Archer L, DeWitt J, Wong B. (2014). Op. cit.

[199] Google Inc. and Gallup Inc. (2016). Op. cit.
United Nations Educational, Scientific and Cultural Organisation (2017). Op. cit.
Google Inc. & Gallup Inc. (2017). Op cit.
The Invergowrie Foundation (2017). Op. cit.

Collaboration with sector partners has supported the promotion of Future You and is a key feature of the 2022+ Future You Strategic Plan.[200]

The evaluation of the pilot (October-December 2020) showed Future You reached an audience of 3.1 million, with 190,000 page views and 153,000 unique visitors.[201] Digital advertising surpassed industry media benchmarks for various metrics, such as video completion rates, cost per completed view, click-through rates and engagement rates.[202] The site also surpassed industry benchmarks for time spent on a microsite, with an average time of 3:57 minutes compared to the typical 1–2-minute benchmark.[203]

Future You has experienced challenges in engaging the school sector as a pathway to better reach the primary-aged target audience for the ongoing initiative. Barriers include the nature of the Australian Curriculum which allows schools to develop career education in diverse ways,[204] the pressures on schools in terms of available time and the already full curriculum.

K.4.2 Timelines

The NARI grant agreement timelines have been met.

There were some delays in delivering Future You when switching from external to internal content production, as the external providers failed to deliver in line with the anticipated schedule. While the funds provided to the external providers were recovered, this led to inefficiencies and necessitated longer delivery timelines.

Delivery has also been impacted by internal staffing issues. Future You experienced a high turnover of staff between 2021-22, which impacted available resourcing and initiative delivery. There were 3 different people in the role in a 2-year period, with the role also vacant during periods of recruitment to replace which impacted available resourcing and initiative delivery. The initiative manager role was filled in 2023 and is expected to improve planning and targeting of future activities.

K.4.3 Funding

Future You has been delivered slightly above budget, noting the initiative has not yet concluded.

The Future You pilot received a $500,000 NARI grant that commenced in August 2019. The pilot was provided with in-kind promotional support from the Ambassador. Expenditure was on budget (less than 1% over budget). Spending on 'digital media' was $69,664 higher than budgeted and lower than budgeted for contract, market research, staff training and domestic travel.

The second $1 million NARI grant commenced in December 2020. A $500,000 variation to the 2020-22 grant extended the initiative to November 2023 to a total value of $1.5 million. This grant is set to conclude in November 2023. Expenditure in 2020-21 was on budget, followed by an 18% ($98,351) overspend in 2021-22 due to contract expenses,

[200] Office of the Women in STEM Ambassador (2022). *Future You 2022+ Strategic Plan*. Sydney: UNSW.

[201] Office of the Women in STEM Ambassador (2022). Op. cit.

[202] Office of the Women in STEM Ambassador (2020). Op. cit.

[203] Office of the Women in STEM Ambassador (2020). Op. cit.

[204] Australian Curriculum, Assessment and Reporting Authority (2023). *General capabilities and career education*. Accessed April 2023: https://www.australiancurriculum.edu.au/resources/general-capabilities-and-career-education/.

materials development and labour/labour oncosts. Overall, Future You is 9% over budget for 2019-20 to 2021-22.

The short timeframes of the 2 grant agreements and one variation have impacted initiative delivery. A gap between the grant agreements caused funding uncertainty, higher-than-expected staff turnover in the Program Coordinator role, decreased productivity and impacts on project timelines. To address the funding gap, UNSW funded the continuation of staff salaries and salary adjustments were made across end-of-year periods in the budget. UNSW was repaid for some salaries and absorbed these costs in other cases.

Funding also did not align with school timelines, which meant the launch of resources targeting teachers and schools was misaligned with optimum windows for reaching these audiences.

> *"It is difficult to deliver on clear objectives… to plan, implement and evaluate in one-year funding cycles".*
>
> *Future You staff member, ACIL Allen evaluation*

K.5 Outcomes and impacts

K.5.1 Evaluation readiness

Future You has sufficient data collection and reporting processes in place to support the evaluation of the initiative's outputs and short-term outcomes affecting primary-aged children and their parents and carers. No data was available on teachers' use of Future You.

Grant agreements detail expectations of ongoing initiative evaluation to determine the initiative's effectiveness and monitor engagement and changes in the target audience's attitudes and behaviour. Evaluation is a core philosophy of WiSA and Future You and prompted the pilot and the current 2023 evaluations. Lessons from the pilot evaluation informed the scale-up and delivery of the initiative.

Future You provides progress reports in line with the timeframes in the grant agreement. These include progress against agreed project milestones and eligible expenditure. The reporting processes are straightforward and have not caused unreasonable administrative burdens.

Some data limitations inhibit the evaluation of medium- to long-term outcomes, including challenges with routinely gathering data on participant impact: Future You does not have access to details of platform users (users are not required to register), as collecting these details may hinder engagement. Further, the recent 2023 impact survey of child-parent pairs analysed attitudes before and after engaging with a Pathfinders video. While large enough to deliver statistically significant results, the analysis does not collect information on whether the changes are sustained over time or lead to changes in behaviour. It also does not collect teacher perspectives on the resources.

K.5.2 Short-term outcomes

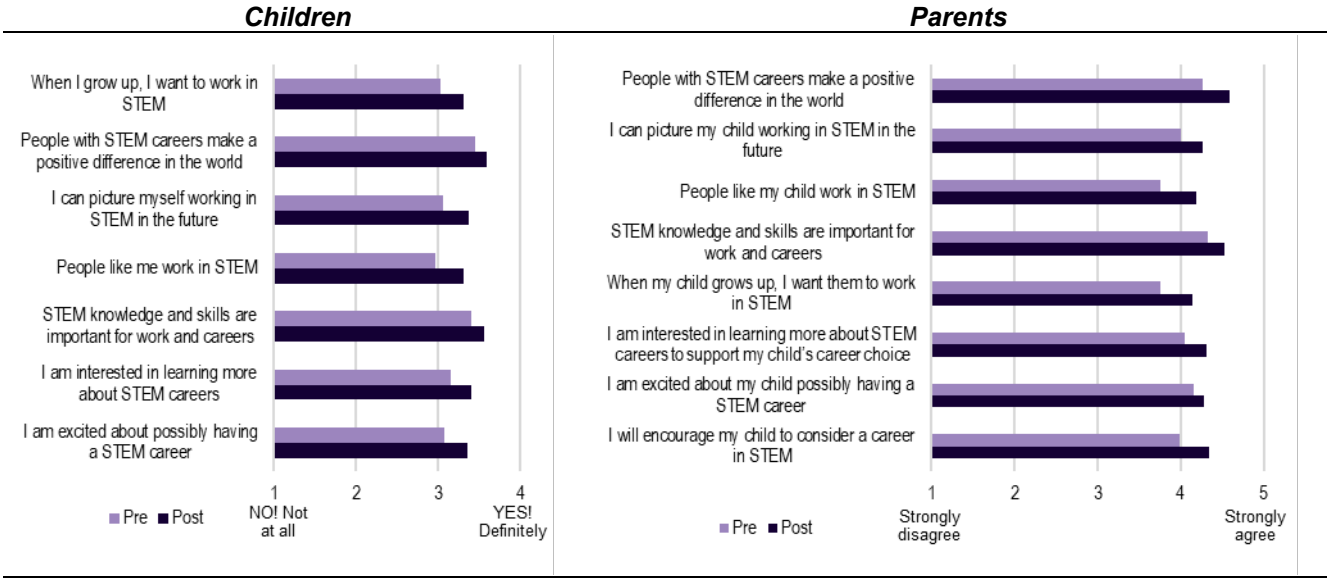
There is strong evidence Future You is achieving the measured short-term outcomes that more girls are motivated to study STEM subjects in secondary school and more girls are motivated to pursue STEM careers.

Evaluation of the pilot (which does not directly relate to the current version of Future You) showed using an online survey before and after the one-month campaign showed Future You increased:[205]

- children's awareness of what STEM is/stands for
- children's interest in STEM work and study from 74% to 92% and increased girls 'strong interest' in STEM jobs and subjects by 48%
- the proportion of mothers perceiving their child's STEM skills to be 'very important' in securing a good job in the future by 19%
- girls' awareness of STEM jobs (particularly food technologists) by 13%
- boys' perception of STEM jobs as being for women and men equally by 11%.

The 2023 survey showed statistically significant increases across all metrics of children and parents' perceptions of, excitement about and desire to study (or support their child's study) in STEM. The largest changes can be seen in children responding to "People like me work in STEM" and for parents "When my child grows up, they want to work in STEM". However, the effect sizes were modest and only explored attitudes immediately following the completion of the video.

Figure K.1 Future You outcomes for children and parents



Source: Future You Impact survey: Stem Career Questions Summary Statistics 2023.

K.5.3 Medium- to long-term outcomes

There is limited evidence Future You is achieving the measured medium-term outcome that more girls choose to study STEM subjects (and extra-curricular activities) in secondary school, nor the long-term outcome of equal opportunity and improved participation, retention and progression in STEM studies. This is due to the lack of available data described in the evaluation readiness section.

However, the observed short-term outcomes are likely to be lead indicators for medium-term outcomes, with the contemporary evidence base suggesting increased awareness can lead to increased participation in STEM studies.

[205] Office of the Women in STEM Ambassador (2020). Op. cit.

K.5.4 Unintended consequences

No unintended consequences were identified.

K.6 Key insights

- A design strength has been the diversity of characters and, as a result, the potential to connect with diverse audiences.
- Collaboration with sector partners has supported the promotion of Future You and will ensure any future developments better meet the needs of industry and the future workforce.
- There is an opportunity to work more closely with and better understand the needs and attitudes of schools and teachers to engage them in influencing the target audience.[206]

  "Partnerships will be important [to effectively reaching schools]. For example, partnerships with home schooling organisations and the Department of Education."

  Future You staff member, ACIL Allen evaluation

- There is a need for funding certainty. Short-term funding cycles and notice periods for confirming the availability of grant funding has impacted staff retention and the efficiency of initiative delivery.
- The level of overlap between Future You and GiST should be explored to ensure the initiatives are taking a strategic approach and government funding is used efficiently. Stakeholders recognised that each provided unique value and these strengths should be emphasised in the design to maximise impact.
- There is a role for government in providing sustained support to engage girls in STEM to achieve lasting impact. Future You is established and motivating users. This is a reasonable level of achievement given the relatively small funding envelope. However, it is not clear whether the increased awareness and motivation are sustained or are leading to behavioural change.

[206] Office of the Women in STEM Ambassador (2020). Op. cit.

L Elevate: Boosting Women in STEM

This appendix provides an assessment of the Elevate initiative.

L.1 Overview of Elevate

Table L.1 Elevate: Boosting Women in STEM – Quick Reference

Lead Agency	The Australian Academy of Technological Sciences and Engineering (ATSE)
Related policy/strategy	WiSTEM Decadal Plan
Target audience	Domestic students in Australia who identify as a woman or as non-binary and are planning to undertake an undergraduate or postgraduate STEM degree or a higher degree to build business acumen, e.g., Master of Business Administration
Aims	– Increase participation of women and non-binary people in STEM tertiary education (including re-training and seeking higher qualifications) – Support women to build multi-disciplinary skillsets sought by industry to foster the next wave of role models and support re-entry into the workforce – Supporting leadership development at every career stage and increasing women in senior leadership and decision-making roles
Key activities	Elevate delivers 500 higher education scholarships to women who are starting an undergraduate degree, re-training, seeking higher qualifications or undertaking study after a break from study/work at an Australian university.

Source: ACIL Allen, 2023.

L.2 Data sources used for this assessment

The data sources used to conduct this initiative assessment include the Grant Agreement, progress reports to the department, design documentation (including project, risk and communications plans, monitoring and evaluation plans), scholarship applications and the ACIL Allen survey conducted in April and May of 2023. The initiative is still in the early stages of implementation and outcome data is limited. There have been no evaluations to date.

L.3 Initiative design

L.3.1 Justification for the initiative

Elevate is an education initiative that awards undergraduate and postgraduate scholarships to women in STEM and provides them with additional mentoring, networking, internship and research opportunities.

Employers recognised diverse, inclusive and equitable teams and workplaces are the most productive, innovative and effective. Women represent an under-accessed resource, however, there remain structural, cultural and socioeconomic barriers that prevent many women from accessing opportunities to undertake higher education in STEM, pursue STEM careers and become leaders within the STEM ecosystem.

There is a need for government funding to address these barriers as industry and the research sector are unlikely to fund similar initiatives. Government intervention leverages the policy instruments and mechanisms that are not available to other stakeholders in the STEM sector.

> *The only thing that's going to make a difference is significant investment, bold moves, regulatory change and the use of those levers and that leadership that government can bring, and only government can bring.*
>
> *ATSE staff member, ACIL Allen evaluation*

When asked if respondents would have received similar support in the absence of Elevate, 59% responded somewhat unlikely or highly unlikely. 100% of respondents strongly agreed or agreed Elevate met their needs and there is an ongoing need for the program.

Elevate aligns with the department's strategic policy objectives to increase diversity in STEM studies and workplaces. Elevate interacts with other WiSTEM initiatives such as:

- *SAGE* – ATSE co-established the Science in Australia Gender Equity (SAGE) initiative and is involved in monthly meetings with the delivery team. ATSE has a member on the SAGE board.
- *WiSA* – the Women in STEM Ambassador (WiSA) is on the Elevate steering group.
- *Superstars of STEM* – The CEO, Kylie Walker, founded Superstars of STEM when she was CEO of Science Technology Australia. Several ATSE staff are now mentors for this initiative.
- *Champions of Change Coalition* – ATSE is involved in monthly meetings with the delivery team

In addition, ATSE was the delivery partner for the Decadal Plan for Women in STEM alongside the Australian Academy of Science. ATSE is also the inaugural co-chair of the Diversity and Inclusion (D&I) Committee of the international Council of the Academies of Engineering and Technological Sciences (CAETS). Other Elevate partners with a focus on supporting women in STEM include WILD Women and Women in STEMM Australia.

L.3.2 Design of the initiative

The aims of Elevate are clearly identified and link closely with the strategic objectives outlined in Elevate's Grant Agreements and Planning documentation.

The design of Elevate was informed by significant public consultation with key stakeholders across and outside the STEM ecosystem. Elevate was co-designed in

consultation with experts (including ATSE Fellows), stakeholders in industry, the research sector and government and individuals with lived experience.

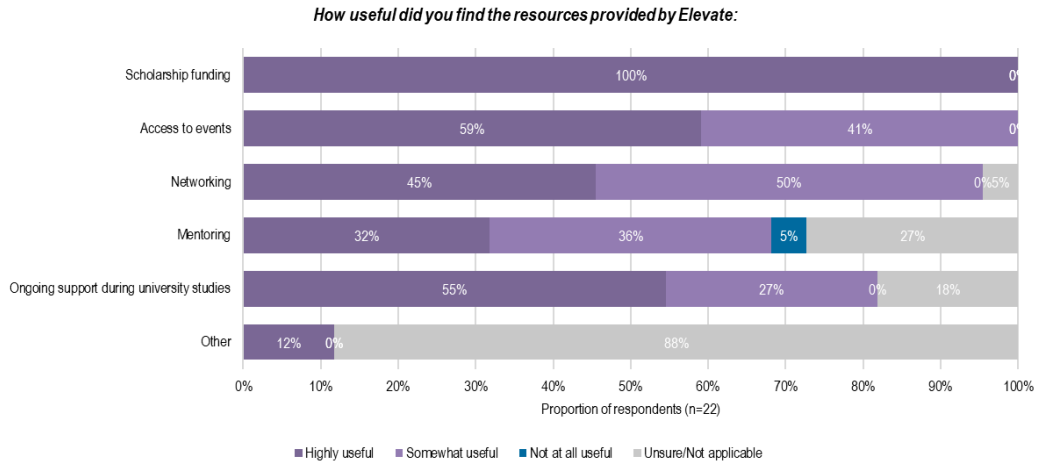
ATSE continues to consult with stakeholders through an Elevate Advisory Group (EAG) to ensure the initiative remains fit for purpose. ATSE have a strong focus on ensuring the application, assessment and selection processes for scholarships are underpinned by inclusivity, accessibility and radical empathy. ATSE has strategies in place to record, collate, analyse and share ongoing advice, recommendations and feedback with the Department and other key stakeholders.

When designing the application process, ATSE had a strong focus on diversity and inclusion. During consultation, ATSE staff noted part of this was to onboard assessors who are inclusive and are part of these underrepresented communities. This commitment is reflected in the Elevate Monitoring, Evaluation and Learning (MEL) plan, which aims to have representation from at least: 5% First Nations, 5% regional/rural, 5% low SES, 5% scholars identifying with a disability, and 5% LGBTQI+ scholars.

The input of $41.2 million over 7 years (2021/22 to 2027/28) for ATSE to deliver 500 Elevate scholarships appears to be appropriate for the aims of the initiative, with $36.4 million of this funding going directly to scholarships and $4.8 million going towards administrative costs (discussed further under the funding section).

In terms of scholarship design and supporting components, participants universally reported that the funding itself was useful. The inclusion of other elements into the design, including access to events and ongoing support, was also valued.

Figure L.1 How useful did you find the resources provided by Elevate



Source: ACIL Allen survey of Elevate stakeholders, 2023

L.3.3 Links to the evidence base

Elevate's design is clearly connected to the evidence of effective practice.

Contemporary literature provides evidence scholarships can greatly benefit university students including women, especially those with diverse and disadvantaged backgrounds.[207] [208] [209] This research highlights that in addition to enabling women to advance professionally, scholarships helped women develop the personal attributes,

[207] Department of Foreign Affairs and Trade (2015). Op. cit.

[208] Tsui, L. (2007). Op. cit.

[209] Washburn, K., & Bragg, D. D. (2022). Op. cit.

vision and broad range of skills needed for leadership. By catalysing the development of attributes including independence, confidence, self-belief, self-efficacy and open-mindedness, women scholarship recipients were able to see themselves as leaders — a critical prerequisite for leadership. Increasing opportunities for women in leadership roles is a key objective of Elevate and the evidence base suggests scholarships for women can support this objective.

L.4 Efficiency

L.4.1 Reach

It is challenging to measure reach as Elevate does not articulate an anticipated number of applications and scholars; however, the program received a significant number of applications during its first scholarship round.

There were 1,025 applications submitted for Elevate Scholarships commencing in 2023 and 935 were deemed eligible, progressing these applications through the assessment and selection stages. In 2022, ATSE announced the first cohort of 50 Elevate scholars, the majority of whom have since commenced study in 2023. Elevate's short, simplified application process via a user-friendly platform was very well received by assessors, as exemplified by the quotations below.

> *"[The process] was seamless, all the information was there, it loaded fast, and I could easily go to the next application when done with one (and it autosaved in between)."*
>
> *"Well done to the staff for running this process. As I work for a business that runs many scholarship rounds annually, I was incredibly impressed with how this was run."*
>
> *Elevate Assessors, 2022, Case study: Diversifying our STEM future for impact*

ATSE's commitment to diversity and inclusion was reflected in the diversity of the first cohort of scholars which included those who identify as First Nations; LGBTQIA+, from culturally and linguistically diverse backgrounds, from regional or rural areas, with low socio-economic status and/or living with a disability.

The application process is supported by a robust communications plan with clearly outlined communication objectives, key messages, target audiences, budgets, timelines and monitoring and evaluation approach. Communication channels include traditional media (e.g., media releases), social media, the ATSE website and newsletters. The total social media impressions achieved for Elevate's 2022 media campaigns was over 275,000.[210]

L.4.2 Timelines

The timelines for the implementation of Elevate have been delayed.

The first progress report submitted by ATSE for Elevate shows awarding the scholarships for the 2023 cohort was delayed by just under 2 months. This was due to delays associated with executing the agreement and the subsequent first payment. Consequently, the consultation and co-design process, which was scheduled to end at the start of March 2022, was completed at the start of May 2022. During consultations,

[210] Australian Academy of Technological Sciences and Engineering (2022). *Australian Academy of Technological Sciences and Engineering Annual Review 2021-2022*. Canberra: Australian Academy of Technological Sciences and Engineering.

ATSE staff noted timelines were adjusted in agreement with the department early in the initiative to accommodate for this. When asked about the timelines, ATSE staff noted the timelines were short, and this could have put the initiative quality at risk:

> *"We only had a couple of months to design a program that will last for at least 7 years […] to put all of that together within 6 or 8 weeks is an enormous ask. I think that's the biggest potential risk for any new program."*
>
> *ATSE staff member, ACIL Allen evaluation*

ATSE noted they did not compromise on the consultation and co-design nor the final deadline, despite the adjustment of timelines, however, this meant significant extra working hours for the ATSE team in the leadup to the initiative's launch.

L.4.3 Funding

Elevate has only recently commenced implementation but delivery is currently tracking under budget.

The Department has funded ATSE to deliver Elevate over 7 years, from 2021/22 to 2027/28, with a budget of $41.2 million. Most of these funds ($36.4 million or 88%) are in scholarships, with the remaining funds ($4.8 million or 12%) in contract costs, wages, marketing and communications, staff training, travel, audit costs and others. To the end of 2021/22, Elevate delivered 14% under budget, largely due to lower uncategorised other costs. Expenditure is expected to increase from 2022/23 onwards due to the allocation of scholarship funds.

The value of the scholarships awarded under Elevate are $30,000 for undergraduate scholars (3 years), $82,000 for postgraduate scholars (3 years) and $70,000 for leadership scholars (2 years).[211]

L.5 Outcomes and impacts

L.5.1 Evaluation readiness

Although Elevate is in the early stages of delivery, it is equipped with a number of robust process documents to ensure it is evaluation-ready. The documents prepared by the Elevate team include a *Monitoring, Evaluation and Learning (MEL) plan* and a *Risk Matrix and Mitigation Strategy*. The development of the MEL framework was informed by the Women in STEM Ambassador Evaluation Guide and evaluation portal. The framework will monitor progress on key milestones and targets through both quantitative and qualitative methods.

The Elevate MEL details 4 high-level outcomes,[212] with each having a number of specific outputs assigned to them. Indicators, disaggregation of data, baseline data, target/evidence of achievement and sources of data and methods are described for each outcome and output where the information is available.

The Risk Matrix and Mitigation Strategy describes mitigation actions for 26 identified program risks, across 10 risk categories. The purpose of the document is to ensure the

[211] Australian Academy of Technological Sciences and Engineering (2022). *Elevate project plan*. Canberra: Australian Academy of Technological Sciences and Engineering.

[212] The 4 outcomes are: 1. Women scholars have increased leadership skills and capability to influence and make change; 2. More women and girls who are from diverse gender and social backgrounds access STEM study, careers and leadership opportunities; 3. Industry-academia collaborations in applied research and business established and accessible to all scholarship recipients; and 4. The Elevate program achieves high quality and impact.

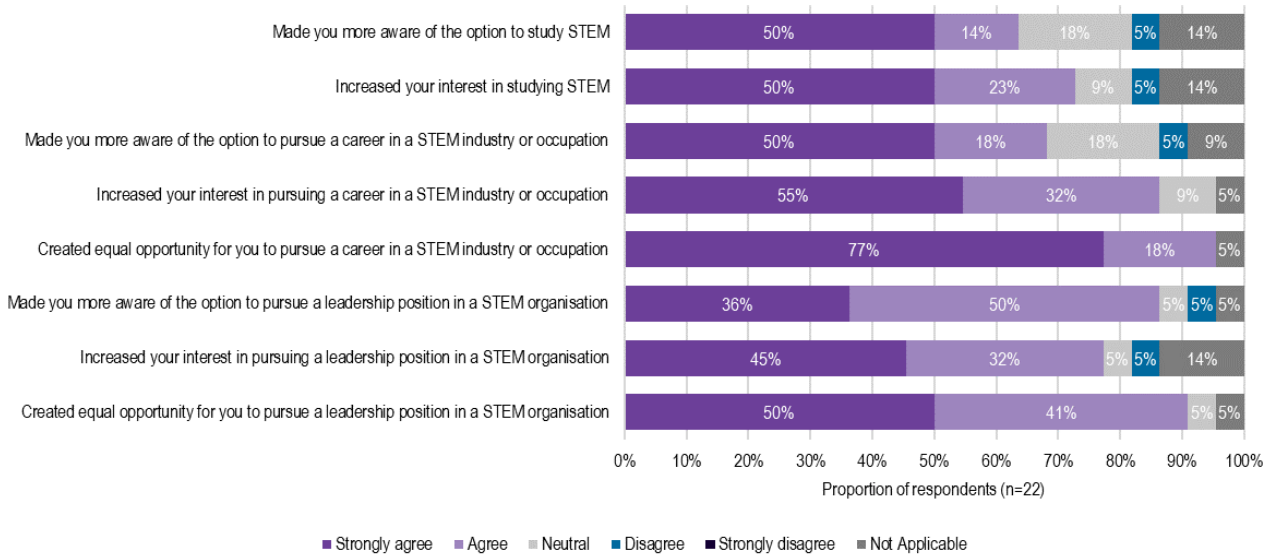
Elevate team is in a position to effectively address any risks that could arise during the delivery of the initiative.[213]

L.5.2 Short-term outcomes

Despite the first cohort of Elevate scholars only commencing their study at the beginning of 2023, there is evidence the initiative is achieving its short-term measured outcomes of increasing the motivation and ability of women to study STEM at university.

ACIL Allen conducted a survey of Elevate stakeholders between 5 April 2023 and 21 April 2023. The survey received 22 responses, 8 from undergraduate scholars, 11 from postgraduate scholars, 2 from PhD candidates and one from an industry employee. A high proportion of respondents also agreed or strongly agreed Elevate made respondents more aware of the option to study STEM, increased respondent's interest in studying STEM, made respondents more aware of the option to pursue a career in a STEM industry or occupation and pursue a leadership position in a STEM organisation (see Figure L.2).

Figure L.2 To what extent do you agree that Elevate:



Source: ACIL Allen survey of Elevate stakeholders, 2023

L.5.3 Medium- to long-term outcomes

Data on the first cohort of scholars suggest the initiative is achieving its measured medium-term outcome of more women choosing to study STEM courses in university. When asked whether the respondents chose to pursue STEM subjects or courses because of the support offered through Elevate, 41% responded yes and 32% responded no (the remaining respondents were unsure or responded the question was not applicable). This suggests a third of scholars were interested in pursuing STEM prior to involvement in Elevate.

However, there is limited evidence of the measured medium-term outcomes of women choosing to pursue STEM careers and being retained and progressing in the industry, as it is too early in the initiative. This is the same reason there is limited evidence for

[213] The 10 risk categories were: Health, safety and environmental risk; Values, Ethics and reputational risk; Business continuity risk; Compliance and Regulatory risk; Competition risk; Stakeholder/ Customer risk; Financial risk; Building/site risk; Strategic risk; and Operational risk.

measured long-term outcomes of equal opportunity and improved participation, retention and progression in STEM studies and careers.

91% of respondents believe Elevate is contributing meaningful change in how society expects girls and women to engage in STEM.

L.5.4 Unintended consequences

The free text responses to the survey further demonstrated the impacts of Elevate on students so far. Numerous scholars talked about the financial stress Elevate alleviated and, in some cases, that the initiative was the only reason they could afford to stop working and to study. One student noted it allowed them to move to another city to seek a degree at a higher-quality institution. When asked how Elevate could be improved, 2 scholars noted Elevate participants could be involved in school visits to spread awareness of STEM roles and inspire more girls and women to pursue careers in STEM.

Elevate also has a focus on encouraging Elevate scholars to connect and share learnings through the initiative, which is likely to improve their experience at university and create long-lasting connections. In response to the ACIL Allen survey, one Elevate scholar noted:

> *"I am part of a cohort of like-minded women, who not only want to be excellent at a particular STEM subfield, but also want to advocate for others. This just feels really powerful to me and I cannot imagine a world in which it doesn't have outsized flow-on effects over the course of my career."*
>
> *Elevate scholar, ACIL Allen evaluation*

L.6 Key insights

- The design of Elevate was informed by significant consultation with key stakeholders including with those in industry, the research sector and government, and individuals with lived experience. ATSE also continue to consult with stakeholders through the Elevate Advisory Group.
- Elevate has clear links to evidence, provided both in Elevate documentation and in academic literature and online publications. The linkage to the evidence base provides support for the theory of change Elevate will support women to graduate and pursue positions of leadership in the STEM field.
- Elevate is operating efficiently, having successfully awarded 50 scholarships to a diverse group of scholars in its first scholarship round (2023). Timelines were delayed by approximately 2 months due to departmental delays in agreement execution and subsequent first payment, however, this was communicated to the department early in the initiative. The Elevate team noted timelines expected from the department were incredibly limited. However, scholars were still selected in 2022, enabling them to commence their studies in 2022.
- Although it is still early in the initiative's implementation, Elevate appears to be evaluation-ready with a robust Monitoring, Evaluation and Learning framework in place. Elevate has already achieved its targets with regard to diversity and inclusion for the inaugural cohort and has received positive feedback from assessors and scholars on the application process. The ACIL Allen survey showed scholars believe Elevate has been useful and informative and there is an ongoing need for the initiative.

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