

Written Evidence Submitted by Equality, Diversity and Inclusion in Science and Health (EDIS) (DIV0094)

1. About us

- 1.1. Equality, Diversity and Inclusion in Science and Health ([EDIS](#)) is a coalition of organisations working within the science and health research sector committed to improving equality, diversity and inclusion. Our vision is for everyone to have equal opportunities and access to a successful career within science and health, its research and its outcomes. Our mission is to build a powerful, connected and coordinated movement to advance equality, diversity and inclusion in science and health research.
- 1.2. EDIS is in a unique position, having been founded by a publicly funded research institute (The Francis Crick Institute), an independent funding charity (Wellcome) and a commercial partner (GlaxoSmithKline). Now, with an increasingly [wide-ranging membership](#), EDIS continues to draw together organisations from across science and health research to develop a coalition with power to influence, learn and drive evidence-based change.

2. Executive Summary

This submission focuses on question 5 of the ToR – the areas for action for the sector.

2.1. Context

- 2.1.1. A lack of diversity in STEM reflects a wider social context of unequal and inequitable opportunities and systems. The balance of power in society – including systems, structures, access to and distribution of resources, history and culture - all contribute to persistent inequalities and underrepresentation. These factors also impact on who is included in research and innovation as subjects, participants or end users. It is important to recognise this wider sociocultural reality when discussing and addressing diversity in STEM.
- 2.1.2. Underrepresentation of women, ethnic minorities, disabled people and people with long-term health conditions, and those from disadvantaged socioeconomic backgrounds persists in STEM in both academia and industry. Intersectionality compounds underrepresentation as members of the research eco-system experience multiple layers of disadvantage. Data on this underrepresentation throughout STEM is well-evidenced and confirms systemic bias at a structural level that must be addressed. This is especially shown in academic awarding gaps, research funding success rates and representation at different career levels across the UK.
- 2.1.3. Lack of diversity in STEM impacts on the design, delivery and communication of research and innovation. Research and innovation are less likely to be designed with all members of the UK population in mind. In turn, poor diversity further compounds and entrenches disadvantage, and undermines trust in STEM as well as work to level up and improvements to social mobility. A well-known example is absence of adequate health research that addresses already underserved groups, for instance women or members of ethnic minority groups. These research gaps are related to the same wider social context that shapes STEM as a career, an activity and a system. This places the UK research system at global disadvantage.
- 2.1.4. There is growing evidence that the COVID-19 pandemic has exacerbated existing inequalities economically (including social mobility¹), for the workforce and in health,² and has

introduced 'long COVID'³ and new health inequalities⁴. The pandemic's effect on health and working conditions has disproportionately affected underrepresented groups in STEM as well as in the wider UK workforce. This impact may compound existing job precarity and inequalities produced by frameworks that assess productivity and excellence in STEM through narrow parameters. However, we have learnt that adaptation to different working conditions is possible (e.g. remote working) and should better support disabled employees who have asked for such adaptations prior to the pandemic. There is scope now to consider the evidence for greater flexibility in workplace arrangements generally, alongside more equitable assessments of research outcomes and careers.

- 2.2. We note that many previous reports have explored evidence and the reasons for the challenge of underrepresentation in STEM for women, ethnic minorities, disabled people and people with long-term health conditions, and those from disadvantaged socioeconomic backgrounds - and have made recommendations to address them. Therefore, in our response we have chosen not to duplicate this work. Instead, we have reviewed and refer to a set of influential reports and recommendations (Appendix). We have drawn out key points and themes to highlight areas for action and given examples of specific actions where possible.

2.3. Recommendations

- 2.3.1. We have used evidence from selected reports to develop six priority areas. We recommend that these areas should drive focused actions that address disadvantage in ways that account for intersectionality and power imbalances that have persisted over many years. The priority areas and the key structural or system-level recommendations are:

1. Invest in inclusive STEM education, with a focus on building science capital at all stages
2. Take proactive steps to remove bias and commit to ensuring equal outcomes
3. Support organisations to create change and embed good practice
4. Update legal frameworks and ensure dissemination and uptake of guidance
5. Invest in positive culture and incentives that reflect diverse contributions
6. Improve consistency in the design, implementation and monitoring of EDI interventions

- 2.3.2. We have used evidence from existing interventions and the experience of the EDIS membership to make recommendations about impactful action under each of these cross-cutting priority areas ([3.4.3. Recommendations Table](#)).

¹ <https://socialmobilityworks.org/blog/webinar-and-panel-discussion-the-impact-of-covid-19-on-social-mobility-what-employers-can-do/>

² <https://www.rcplondon.ac.uk/projects/outputs/rcp-view-health-inequalities-case-cross-government-strategy>

³

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/6january2022>

⁴

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19andthedifferenteffectsonmenandwomenintheukmarch2020tofebruary2021/2021-03-10>

3. Main submission

3.1. Introduction

- 3.1.1. EDIS welcomes the opportunity to submit evidence to this inquiry. In our response, we summarise key barriers to equality, diversity and inclusion (EDI) in STEM, reflect on ‘what works’, and identify areas of greatest opportunity for impact.
- 3.1.2. Taking a social justice approach that addresses multiple levels of inequalities provides the opportunity to improve the research and innovation system, and to create an inclusive and sustainable society.
- 3.1.3. The aim as we see it is not to force more people into the same system, governed by the same forces that amplify and perpetuate inequalities - it is to evolve the eco-system together, holistically, so it is welcoming to all talent and potential, nurtures fulfilling careers and brings the benefits of research and innovation to those who most need it.

3.2. What are the barriers to diversity in STEM?

Key literature listed in the Appendix

- 3.2.1. To understand the barriers to diversity in STEM, we must consider the impact of social inequalities on the entire STEM pipeline from early education into careers. Unequal access to science capital begins in early education, framed by societal inequalities that compound and evolve into unequal access to the science capital needed for a successful STEM career. Unequal access to STEM careers in adults can be seen through things like mentoring opportunities and the ability to navigate narrow career structures and incentives.
- 3.2.2. As part of an evaluation commissioned by UK Research and Innovation (UKRI)⁵ to identify challenges and interventions, Advance HE identified 20 sources that explored EDI in the UK research and innovation landscape since 2011. The evaluation found that most primary evidence relates to gender inequality, with a much smaller proportion of literature exploring evidence relating to other characteristics including age, disability, socio-economic status, race and ethnicity. However, the evidence on gender inequality underscores the impact of STEM stereotypes and how they interplay with societal norms⁶.
- 3.2.3. The [ASPIRES team](#) introduced and explored the term ‘science capital’ to refer to “someone's science-related qualifications, understanding, knowledge (about science and 'how it works'), interest and social contacts (e.g. knowing someone who works in a science-related job)”. The ASPIRES project articulates the complex interplay of factors governing access to science capital as they exist in a wider social context – specifically, the structural and intersectional inequalities of gender, ethnicity and social class⁷, using this to inform educational interventions e.g. the Science Capital Teaching Approach⁸. To our knowledge, there has been no longitudinal study of STEM career progression and retention. The educational model

⁵ <https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-EDI-EvidenceReviewUK.pdf>

⁶ http://sciencegrrl.co.uk/assets/SCIENCE-GRRL-Stem-Report_FINAL_WEBLINKS-1.pdf

⁷

https://discovery.ucl.ac.uk/id/eprint/10092041/15/Moote_9538%20UCL%20Aspires%20%20report%20full%20online%20version.pdf

⁸ <https://www.ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/stem-participation-social-justice-research/science-capital-teaching-approach>

likely forms a sound basis, where the ‘educational factors and practices’ part could be replaced by workplace and research practices, culture and gatekeeping. Developing a systems model that captures intersectionality of barriers, and therefore the interdependence of effective interventions for workplaces and the research system could be a helpful step forward.

3.3. What could and should be done by the UK Government, UK Research and Innovation, other funding bodies, industry and academia to address the issues identified?

3.3.1. It is well-recognised that the systemic nature of the challenge means that complementary interventions are needed across education and employment^{9,10,11}. The ASPIRES and ASPIRES 2 projects have made robust recommendations in the context of STEM education. In the context of employment in research, it is important that complementary structures and interventions exist in tandem across two agencies: the direct employer (e.g. the University or company) and the funders with responsibility for provision of resources such as grants and fellowships. In the UK context, UKRI as a key research funder has a central role in setting norms and expectations. It aims “to build a thriving, inclusive research and innovation system”, underpinning this with key principles for promoting equality, diversity and inclusion.¹² and commissioned an evaluation to characterise the evidence base for ‘what works’¹³.

3.3.2. We have drawn on existing reports such as these and EDIS’s collective experience and knowledge to present interdependent recommendations by theme, which we hope will be intersectional and thus impactful at a systems level. We reviewed the reports referenced in the Appendix and discussed interventions and recommendations in EDIS as a cross-sector EDI expert working group. We have identified the following priority areas for action, and the following section expands on the impactful actions that can create change:

3.3.2.1. **1. Invest in inclusive STEM education, with a focus on building science capital at all stages:** those without access to STEM identity, sponsorship or opportunities are less likely to see a career as ‘for them’ or to have access to enabling tools and pathways. This includes making sure individuals are aware of any available access to support, and underrepresented individuals being proactively ‘approached’ to benefit from any support on offer.

3.3.2.2. **2. Take proactive steps to remove bias and commit to ensuring equal outcomes:** left unchecked, bias leads to nurturing, hiring and supporting those who already ‘fit the mould’ and leaving others behind. This includes individual bias, institutional bias, structural bias and system-level bias. This requires a suite of complementary, but diverse and tailored interventions to target each level of potential bias.

⁹ <https://www.britishtscienceassociation.org/inquiry-equity-in-stem-education>

¹⁰ <https://www.britishtscienceassociation.org/inquiry-equity-in-the-stem-workforce>

¹¹ <https://publications.parliament.uk/pa/cm201314/cmselect/cmsctech/701/701.pdf>

¹² <https://www.ukri.org/about-us/policies-standards-and-data/good-research-resource-hub/equality-diversity-and-inclusion/>

¹³ <https://edisgroup.org/wp-content/uploads/2021/01/EDI-in-research-and-innovation-UKRI-evidence-review-overview-1.pdf>

- 3.3.2.3. **3. Support organisations to create change and embed good practice:** inconsistent application of good practice, particularly where there is strong evidence (such as for careers advice, teacher training, pedagogy, recruitment process, funding process, flexible working and reasonable adjustments), perpetuates inequalities. This calls for a more collaborative and collective development of best practice guidance and implementation strategies by for instance twinning institutions whereby institutions more advanced in good practice mentor less advanced ones.
- 3.3.2.4. **4. Update legal frameworks and ensure dissemination and uptake of guidance:** The Equality Act (2010) needs reviewing and updating. There is a lack of clarity for how requirements and advice (e.g. on Positive Action) apply in research settings, making it harder to take action where we see systemic inequalities (such as degree awarding gaps, differential success rates for research funding and unequal career progression). The application of the Public Sector Equality Duty relating to STEM funding through UKRI, NIHR, Universities and other publicly funded institutions or partnerships (including with industry) is both unclear and inconsistently applied. This needs to be addressed at an institutional level and with the UK Government taking accountability for advancing equality at a system level.
- 3.3.2.5. **5. Invest in positive culture and incentives that reflect diverse contributions:** scientific progress is driven by a diverse range of contributions, but the research system currently favours success metrics that reinforce individual prestige and publication history, and undervalue other important skills and activities. A sector-wide conversation about research culture¹⁴ has brought many of these issues into the light and highlighted priorities for action. This includes changing how we assess research, re-contracting what we value in STEM culture and incentivising this.
- 3.3.2.6. **6. Improve consistency in the design, implementation and monitoring of EDI interventions:** a lack of consistency means that it is hard to assess impact and progress, compare methods and outcomes between organisations, and make clear recommendations about emerging good practice. Furthermore, it is often difficult to robustly assess status quo due to a lack of data or no data collection mechanisms in place, including for qualitative data.

3.3.3. Recommendations Table

3.3.4. 1. Invest in inclusive STEM education, with a focus on building science capital at all stages

Aim	Recommendations and actions
Learning organisations are equipped and supported to provide inclusive STEM education	<ul style="list-style-type: none"> • Make a commitment to social justice and equity through education, appointing a Minister in the Department for Education to drive change, working in collaboration with all levels of the system. • Develop inclusive pedagogy and curricula, including investment in education and careers content that challenges cultural STEM stereotypes (i.e. 'clever', 'masculine', 'elite') and traditional discovery stories - and also values the experiences and needs of different people, particularly where these may have been hidden or erased.
Provide equitable access and	<ul style="list-style-type: none"> • Ensure entry requirements for STEM subjects are not barriers

¹⁴ <https://wellcome.org/reports/what-researchers-think-about-research-culture>

support to science capital, education and careers	<p>(e.g. contextual offers for further and higher education), particularly in the context of inequalities in provision of Triple Award Science.</p> <ul style="list-style-type: none"> • Build science capital through enrichment activities that follow good practice principles (e.g. starting at an early age, ideally primary school; long-term interventions; connecting with real world relevance; access to a wide range of positive role models; valuing the time of STEM employees through their own career recognition, evaluation), prioritising schools with limited resources and supporting a collaborative, joined up approach. • Develop and communicate non-traditional entry pathways (e.g. apprenticeships, higher apprenticeships, paid work, conversion from other sectors) and ensure parity with higher education pathways for career progression. • Review and develop STEM careers interventions, with the aim of building science capital through access to high quality, inclusive materials and opportunities that: <ul style="list-style-type: none"> ○ help students understand and identify with the many and varied opportunities within STEM, ideally with the opportunity to have hands on experiences, ○ help students make decisions based on their values, motivations and needs, including salary expectations. • Invest in targeted scholarship/funding programmes as part of an equitable approach to building paid opportunities to experience STEM careers and widening participation and progression. • Support universities as anchoring institutions for local community-based engagement with STEM. • Continue building science capital at early career stages through mentoring, networking, transparent advice around careers decision points, and seed/travel funding.
Teachers are supported and equipped to encourage STEM education and careers for all	<ul style="list-style-type: none"> • Embed equity into teacher/educator training, to raise awareness of challenges and good practice. • Invest in specialist teachers, taking an equitable approach to recruitment and retention.

3.3.5. 2. Take proactive steps to remove bias and commit to ensuring equal outcomes

Aim	Recommendations and actions
Solution-focused toolkits are developed and embedded	<ul style="list-style-type: none"> • Develop, evaluate, implement and embed toolkits and approaches that embed fair decision-making practice into standard processes, building on learnings from existing interventions.
Bias is directly addressed through skills training	<ul style="list-style-type: none"> • Invest in evidence-based professional development activities. E.g. diversity and implicit, or ‘unconscious’, bias training at all stages of the skills and decision-making pipelines; use focused activities to provide training and support to groups more likely to experience discrimination.
Structural level bias (e.g. institutions) is removed	<ul style="list-style-type: none"> • Develop a greater understanding and awareness of the history and development of structures that conduct STEM and identify the ways in which the inequalities manifest themselves, are

	experienced and could be addressed.
System level bias (e.g. 'industry') is removed	<ul style="list-style-type: none"> Develop a system-wide understanding of points in the STEM system that reduce fairness and exclude diverse talent. Enable good practice by identifying clear mechanisms to address these and pilot and evaluate interventions. E.g. audit research funding to provide evidence about any bias in the grant awarding pipeline, providing information for targeted interventions.
Diverse contributions are valued	<ul style="list-style-type: none"> Identify ways to support and embed parity between sectors and individuals from diverse backgrounds and professions leading to a STEM culture and outputs that includes and reflects diverse experiences in society.

3.3.6. 3. Support organisations to create change and embed good practice

Aim	Recommendations and actions
Ensure sector-wide commitments to EDI	<ul style="list-style-type: none"> Working together, the government and sector can set the expectation that every STEM organisation should develop and implement an EDI strategy with visible senior buy in.
A culture of learning for EDI and social justice is embedded in STEM with links between workforce, research content and research outcomes/benefits/impact	<ul style="list-style-type: none"> Recognise that developing equitable and inclusive organisations takes time and is a journey that evolves, the sector should commit to facilitating dissemination of good practice, collaboration and shared learning through support for informal and formal networks dedicated to EDI that includes learning from other sectors. E.g. facilitate research on research collaborations with social science, public contributors and wider stakeholders.
System-level approach to diversity data collection, monitoring and purpose is established	<ul style="list-style-type: none"> Prioritise developing a shared approach to diversity data collection, monitoring and reporting with the aim of setting targets and measuring progress, considering qualitative/experiential data alongside quantitative metrics and building on existing good practice (e.g. DAISY guidance¹⁵).
Strong inclusive leadership and continuing professional development (including people management) is valued in STEM	<ul style="list-style-type: none"> Develop leadership and management competencies that clearly define the values, behaviours and skills required to be an effective supervisor or line-manager (in the research and wider STEM sector). Support people to meet these by providing training and professional development.

3.3.7. 4. Update legal frameworks and ensure dissemination and uptake of guidance

Aim	Recommendations and actions
Support the sector to counteract inequality of opportunity through equitable actions	<ul style="list-style-type: none"> Positive action is a well adaptable intervention¹⁶ evidenced to be effective in improving representation and reducing bias¹⁷. There should be clear guidelines and frameworks developed to enable implementation of positive action in STEM, including in research grant awarding, and in hiring in universities and public

¹⁵ <https://edisgroup.org/wp-content/uploads/2021/01/Diversity-and-Inclusion-Survey-DAISY-question-guidance-v1.pdf>

¹⁶ <https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-EDI-EvidenceReviewUK.pdf>

¹⁷ <https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-EDI-EvidenceReviewInternational.pdf>

	sector-industry partnerships e.g. The Sanger Excellence Fellowship ¹⁸ .
Improve support and access for disabled people and people with long-term health conditions	<ul style="list-style-type: none"> • Update legislation and support for disabled people and people with long-term health conditions including: <ul style="list-style-type: none"> ○ improve standards of accessibility such as designing, adapting and building accessible research facilities, and implement time limits for workplace adjustments to be made, ○ simpler and supportive legal routes for employees to challenge employers including support from research funding bodies, ○ expectations from funding bodies of institutional accessibility as a condition of institutional level grants with accessibility statements made publicly available and audited for improvement actions on a regular basis, ○ legislated additional funding and opportunities for disabled students, researchers and employees within the STEM sector. • We echo and support the recommendations of the National Association of Disabled Staff Networks' (NADSN) recommendations to: <ul style="list-style-type: none"> ○ change pension provision rules to allow continued involvement of disabled academics within the sector on a part-time basis due to the inflexibility of incapacity provision in pension systems, ○ create a dedicated Access To Work service to serve academia.
Updated Equality legislation recognises and addresses structural and intersectional discrimination	<ul style="list-style-type: none"> • Review and update The Equality Act (2010) to help tackle intersectional discrimination and inequalities. Updates should include: <ul style="list-style-type: none"> ○ protection of people against intersectional discrimination and harassment such as that experienced by Black female academics¹⁹ through section 14, ○ remove and update language in line with previous recommendations^{20,21} to reflect better the support and protections needed against discrimination, ○ consideration of how the Equality Act and other legislation can be used to address structural discrimination.
Public Sector Equality Duty Act is applied for all aspects of STEM research and innovation funding	<ul style="list-style-type: none"> • Equality Impact Assessment (EIA) responsibility could be established at a public sector funding (systems) level as well as applied consistently at the local level (institutions). This could address issues including routine use of short-term contracts in STEM even though they indirectly discriminate against many

¹⁸ <https://www.sanger.ac.uk/about/equality-in-science/sanger-excellence-fellowship/>

¹⁹ https://www.ucu.org.uk/media/10075/Staying-Power/pdf/UCU_Rollock_February_2019.pdf

²⁰ <https://www.equalityhumanrights.com/en/advice-and-guidance/gender-reassignment-discrimination#recommendations>

²¹ <https://equalitytrust.org.uk/socio-economic-duty>

	disabled researchers and those with caring responsibilities.
Accountability for STEM sector-wide changes to improve equality and inclusion is improved	<ul style="list-style-type: none"> Statutory workforce diversity data and grant awarding application and success rate monitoring should be supported for the STEM sector, using harmonised approaches to data collection²². Inequalities should be countered with interventions such as positive action schemes. The 'Independent Review of Research Bureaucracy: interim report' notes that EDI data is important for providing information about fairness in the research system. This data provides the evidence as to whether the sector's activities are counteracting its own entrenched systemic biases and discrimination or not.
Improved expectations and behaviours in the sector as whole	<ul style="list-style-type: none"> Issues relating to professional conduct, including bullying and harassment, must be addressed at organisational levels; to do so there is a need to set standards and establish appropriate ways to maintain these (e.g. incentives and sanctions).

3.3.8. 5. Invest in positive culture and incentives that reflect diverse contributions

Aim	Recommendations and actions
A shared view about the content of a positive, inclusive research and innovation system, and how its various parts can interact to create change	<ul style="list-style-type: none"> Stakeholder organisations at all levels should commit to a sector vision/roadmap and hold each other to account on progress. This could be led by the government in the context of the People & Culture Strategy and Levelling up Strategy, and could establish a shared definition of positive research culture.
Good practice is disseminated and taken up by all in the STEM system	<ul style="list-style-type: none"> Promote and showcase good practice. Identify instances of good practice from a range of sectors in STEM and communicate these across the STEM system.
Funding structures for competitive awards (e.g. grants) account for diverse contributions	<ul style="list-style-type: none"> Design funding structures that account for diverse contributions to widen the potential applicant and successful grantee pool. Learn from good practice in research funders (e.g. UKRI) and develop and promulgate approaches that reduce bureaucracy and support career development.
Systemic funding structures for STEM are refined to take greater account of diversity and inclusion	<ul style="list-style-type: none"> Systems that fund and incentivise STEM are examined for the ways in which they impact on diversity and inclusion and this informs refinements. E.g. further, evidence-based refinements to the Research Excellence Framework (REF) processes.
Evolution of STEM to welcome all talent and potential, to nurture fulfilling careers and bring the benefits of research and innovation to those who need it most	<ul style="list-style-type: none"> Identify, implement, evaluate and support practices that value diverse contributions to STEM, the role of team effort and diverse, wider stakeholders. E.g. support take-up, implementation and evaluation of impact of the Résumé for Researchers²³ that represents a shift to inclusion of all relevant skills and activities that contribute to support for the culture and delivery of STEM, recognise the role of team science and a range of professions, and foster community-led research.

²² <https://edisgroup.org/wp-content/uploads/2021/01/Diversity-and-Inclusion-Survey-DAISY-question-guidance-v1.pdf>

²³ <https://www.ukri.org/apply-for-funding/how-were-improving-your-funding-experience/introducing-a-better-way-for-you-to-evidence-your-contributions/>

3.3.9. 6. Improve consistency in the design, implementation and monitoring of EDI interventions

Aim	Recommendations and actions
Consistent design implementation and monitoring of interventions improves identification, dissemination and uptake of good practice	<ul style="list-style-type: none"> • EDI interventions in the sector should be a key area of research on research, supported by social sciences, behaviour change theory and social justice frameworks. • Longitudinal EDI data should be collected and used to identify where and when intervention may be warranted and to assess impact of interventions.
New interventions are explored and supported as part of discovery and evidence building	<ul style="list-style-type: none"> • Offer support and public funding for well-designed, collaborative pilots of EDI interventions. Funding must support design, testing, and stopping interventions including sharing learnings – acknowledging that not all will work. • Collaborations should be fostered between different areas of the sector to trial and coordinate interventions. Co-creation of interventions with the communities most impacted by barriers to ensure their effectiveness should be supported.
Ensure good practice is disseminated and taken up	<ul style="list-style-type: none"> • Where pilots demonstrate potential benefit of interventions, further support should be given to scale up these initiatives including providing resources, funding and dissemination of good practice. E.g. Daphne Jackson Trust fellowships are an established intervention that supports returners to research after career breaks.
Prevent replication of known ineffective practice	<ul style="list-style-type: none"> • Support sharing of all findings relating to evaluation of interventions, including null results, unintended consequences, and evidence indicating that interventions are not feasible, acceptable or appropriate.

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4. Bullying and Harassment in Research and Innovation Environments: An evidence review, UKRI14	
5. The contribution made by the technical workforce to research culture, Wellcome.....	14
6. What Researchers Think About the Culture They Work In, Wellcome.....	15
7. Wellcome Research Culture Townhalls Report, Wellcome	16
8. Accelerating Change: Improving Representation of Black People in UK Motorsport, Hamilton Commission	17
9. Through both eyes: The case for a gender lens in STEM, Science Grrl	18
10. ASPIRES 2: Young people's science and career aspirations, age 10–19.....	19
11. Equity in STEM education inquiry, British Science Association	20
12. The ARMA Survey on Research Culture 2020, Association of Research Managers and Administrators	22
13. Improving Diversity in STEM, CASE (2014)	22
14. Qualitative research on barriers to progression of disabled scientists, CRAC for Royal Society23	
15. Exploring the Workplace for LGBT+ Physical Scientists, RSC & IOP & RAS	24
16. The Broken Pipeline – Barriers to Black PhD Students Accessing Research Council Funding, Leading Routes	25
17. Life Sciences Equality, Diversity and Inclusion Report - Putting workforce diversity at the heart of the Life Sciences sector (2021)	26
18. BME in STEM report: In Higher Education and Beyond, University of Bristol	26
19. Improving recognition of team science contributions in biomedical research careers, Academy of Medical Sciences (2016)	26
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7. Baselines for Improving STEM Participation: Ethnicity STEM data for students and academic staff in higher education – JISC for Royal Society	27
8. Disability STEM data for students and academic staff in higher education 2007/08 to 2018/19, JISC for Royal Society	28
9. Quick Take: Women in Science, Technology, Engineering, and Mathematics (STEM) (2020), Catalyst	28
10. European Commission, Directorate-General for Research and Innovation, She figures 2018, Publications Office, 2019	28
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1. Diversity wins: How inclusion matters 2020, McKinsey	28
2. Delivering through diversity, 2018, McKinsey	28
3. Why diversity matters, 2015, McKinsey	28
4. Diversity is the solution, not a problem to solve, 2018, The Diversity Project & PwC	28
5. Working Globally: Why LGBT+ Inclusion is Key to Competitiveness, 2020, Open for Business	28
6. Strengthening the Economic Case, 2018, Open for Business	28
7. The Economic and Business Case For LGBT+ Inclusion, 2015, Open for Business	28

List of STEM specific reports with recommendations to draw on

1. APPG Equity in STEM workforce, British Science Association

<https://www.britishtscienceassociation.org/Handlers/Download.ashx?IDMF=3d51130a-458b-4363-9b2b-d197afc8382a>

Key findings:

- The STEM workforce is less diverse than the wider workforce, but consistent data collection and sharing is lacking.
 - There is a need for the Government to take a multi-pronged approach to drive equity in the STEM workforce.
 - Intersectional barriers continue from STEM education into the workforce.
 - There is awareness of structural inequity in some large STEM organisations, but no consensus on solutions.
 - There is already considerable inequity in STEM, but COVID-19 is making it worse
- I. The UK Government and STEM organisations, across the private, public and voluntary sectors should commit to leading a ‘STEM Diversity Decade of Action’ to tackle the historic and systemic underrepresentation of minoritised groups at all levels in the sector.
- a. The Prime Minister and UK Government should set a bold vision for a diverse and equitable STEM sector at the heart of their ambitions for the UK to become a ‘global science superpower’
 - b. STEM leaders from organisations from across the private, public and voluntary sectors should work together to form and co-fund an Employers’ Coalition for STEM Diversity to address the structural inequity in the STEM workforce and drive long-term change.

- II. The UK Government must deliver a statutory workforce data strategy and drive forward changes in policy and legislation to support employers to improve equity for minoritised communities in many sectors of the UK workforce, including STEM.
- III. The UK Government and STEM organisations must quickly look to address and reverse worsening inequity within the STEM workforce as a result of the pandemic.

For reference, EDIS submission to APPG on equity in the STEM workforce:

<https://edisgroup.org/appg-on-diversity-in-stem-enquiry-into-equity-in-the-stem-workforce-written-evidence/>

2. Equality, diversity and inclusion in research and innovation: UK review, UKRI

<https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-EDI-EvidenceReviewUK.pdf>

Key recommendations for policy makers, funders, employers and research

- I. Implement interventions identified in the review, as appropriate to organisational contexts.
- II. Develop interventions that address EDI challenges beyond those related to gender.
- III. Develop interventions for areas of the R&I landscape that have historically received less attention, such as non-STEM industry collaboration.
- IV. Expand the use of sophisticated and longer-term evaluation of EDI interventions to determine interventions' effectiveness across different contexts.
- V. Harmonise data collection methods across different parts of the R&I landscape, as far as is practicable, and develop overarching EDI benchmarking data.
- VI. Consider ways to encourage, recognise and reward organisations leading on EDI in R&I.

3. Equality, diversity and inclusion in research and innovation: international review, UKRI

<https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-EDI-EvidenceReviewInternational.pdf>

This report details specific recommendations for policy makers, R&I funders, employers and researchers. These range from actions or approaches to support successful practice, to more effective evaluation. Key recommendations include:

- I. co-ordination of further reviews and research to fill 'gaps' in the evidence base (Chapter 4: Previous studies)
- II. investigate new tools and resources for comparative analysis of EDI progress, sensitive to varied disciplinary, sector and national contexts; an exploration of attitudes to data collection across a wide range of characteristics in international research and innovation may be required (Chapter 7: Enhancing data and disclosure)
- III. foster collaboration within and between organisations to fill skills and resource gaps relating to evaluation, avoid duplication and share best practice (Chapter 6: Measuring success; Chapter 8: Leading organisations)
- IV. ensure alignment between organisational EDI strategy, messaging and practice, and between the attitudes of senior leaders and those delivering EDI interventions (Chapter 5: What works)
- V. reflect on definitions of 'leadership' and future methods for recognising and rewarding innovation, commitment and collaborative practice (Chapter 8: Leading organisations).

EDIS Summary of 2 and 3: <https://edisgroup.org/wp-content/uploads/2021/01/EDI-in-research-and-innovation-UKRI-evidence-review-overview-1.pdf>

4. Bullying and Harassment in Research and Innovation Environments: An evidence review, UKRI

<https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-BullyingAndHarassmentEvidenceReview.pdf>

Ways that institutions can improve on current practice:

- I. See bullying and harassment as an organisational, not an individual, issue and adopt a whole organisation approach for culture change – rather than addressing issues case by case or leaving individuals to pursue solutions.
- II. Secure visible senior leadership commitment to tackling the issue.
- III. Do more than establish a policy, which is not sufficient in isolation: the culture of the organisation must be supportive of the policy.
- IV. Adopt preventative strategies by developing codes of conduct on expected conduct and delivering training programmes that clarify and re-set norms of inclusive, supportive and respectful behaviour. These should be focused on leaders and managers.

5. The contribution made by the technical workforce to research culture, Wellcome

<https://cms.wellcome.org/sites/default/files/2021-06/contribution-of-technical-workforce-research-culture.pdf>

- I. Develop Wellcome's future institutes and centres as "centres of excellence" in recruiting, retaining and managing technical staff. Scope out the development of a skills framework that builds in diversity from the start. Draw on models such as the Global Skills Framework for a Digital Age, the Technician Commitment, the National Technician Development Centre and the wider university sector. Develop a simple common language for skills and competencies that can be reflected in research funding assessment, institutional workforce planning, recruitment and staff development.
- II. Wellcome to extend this rapidly into their Africa and Asia programmes to provide a global perspective.
- III. Change eligibility to apply for funding to routinely include technical staff as leads (including computing and data science specialists).
- IV. Work out how to give credit to grant applications that name technical experts, in the same way that named researchers are credited.
- V. Explore processes that will ensure grant applications are consistently given credit for costing appropriate technical staff time including training provided on new equipment.
- VI. Make it a requirement that technical staff are credited for their contributions in published outputs (e.g. using the CASRAI CRediT or Contributor Roles Taxonomy system¹²) and monitor this as part of institutional / team assurance.
- VII. Pilot cross-institute/centre approaches that support diversity in recruitment.
- VIII. Build diversity for technical staff into assurance across funders.
- IX. Undertake an options appraisal with four to five institutions on ways to bridge the gap or transition between Grades 1-3 and Grades 5-6 and above.
- X. Pilot cross-institute/centre approaches that support ability for technical staff to transition to different research teams.
- XI. Build progression for technical staff into assurance across funders

6. What Researchers Think About the Culture They Work In, Wellcome

<https://cms.wellcome.org/sites/default/files/what-researchers-think-about-the-culture-they-work-in.pdf>

Many ways to improve research culture were suggested, targeting a broad range of areas. These included:

- I. Changes to funding structures:
 - a. Anonymous grant submissions.
 - b. Padding on short grant contracts to allow time for quality control.
 - c. Specific funding for groups more likely to experience discrimination (such as women, BAME researchers and those with disabilities or long-term health conditions).
 - d. More diversity on funding panels.
 - e. Greater availability of smaller funding awards.
 - f. Simple applications with quick turnarounds (two-phase application process).
- II. More support for early-career researchers:
 - a. Programmes to help researchers get started in their careers – including training and continued mentoring.
 - b. Specific funding for early-career researchers, like seed funding.
 - c. Rewards for those who don't publish – rewarding ideas as well as the final output.
 - d. Events to bring researchers together – allowing them to make further contacts.
 - e. Creating clearer road maps of opportunities.
- III. Rethinking funding criteria and incentives:
 - a. Shift away from the focus on rewarding publications and impact, to seek to motivate good research culture and rigorous ethics.
 - b. Set a precedent by assessing the health of a research environment, the satisfaction of their staff and the rigour of their work prior to allocating funding.
 - c. Take into consideration research findings that may not have been published but exemplified high ethical standards.
- IV. Training to help researchers promote good culture through managing and mentoring:
 - a. Set up courses led by experienced academics, with proven success in mentoring early-career researchers.
 - b. Draw on best practice from other sectors (including industry and large corporates).
 - c. Offer advice on how to manage a diverse team.
 - d. Help develop understanding of how to recognise and respond to mental health issues.
 - e. Aid leaders to manage finances effectively.
 - f. Champion mentorship and demonstrate what good mentoring looks like.
- V. Identify bad behaviour in order to deter it:
 - a. Give staff surveys more power – using them more effectively to play a part in identifying problems and highlighting where managers are not supporting staff.
 - b. Use 360° anonymous appraisals and do not base promotion merely on publication.
 - c. Have zero tolerance of abuse in the workplace, including refusal to fund individuals/institutions with poor culture and rewarding those demonstrating good practice.
- VI. Ways for researchers to raise concerns without fear of reprisals or prejudice:
 - a. Offer an impartial space to raise concerns for those fearing reprisals for reporting poor behaviour.

- b. Set up a new ombudsman for research culture, allowing concerns to be collected and considered carefully and impartially (although processes and powers would need to be able to take into account nuance and grey areas).
 - c. Encourage institutions to set up spaces where concerns could be raised and investigated without prejudice (although trust in the institution may need to increase considerably first).
 - d. Encourage funders to provide spaces for research team members to directly report concerns or introduce final feedback forms covering specifics of the culture.
- VII. Promoting good practice:
- a. Provide the research community with examples of what good culture looks like, in order to help institutions and individuals make real change.
 - b. Build on current good practice guidelines from bodies such as Wellcome, REF and the Royal Society which touch on research culture, creating guidelines with a more specific focus.
 - c. Establish research culture “cafes” to share best practice¹¹, offering researchers time and space to actively consider culture and the personal responsibility they have to make positive changes (no matter how small).
 - d. Offering a charter for research culture (similar to Athena SWAN), incentivising institutions to actually embed good practice.

7. Wellcome Research Culture Townhalls Report, Wellcome

https://cms.wellcome.org/sites/default/files/wellcome-research-culture-townhalls-report_1.pdf

Challenges

- I. We need to create structures and systems that reward the activities and behaviours that we all see as valuable contributions. Being a great manager takes time and energy. That investment needs to be properly incentivised.
- II. We need to communicate in a clearer, more targeted way to ensure that everyone knows where to seek support or raise grievances. Tellingly, many of the ideas raised through the Townhalls already exist in one form or another, reminding us that creating new initiatives is only part of the solution.
- III. We need to rebuild people’s confidence in institutions and approaches. Many conversations revealed a lack of trust in areas such as the handling of complaints, and a belief that the system isn’t built on fairness. This will be a hard challenge to solve, but the whole community must consider how to better hold itself to account in an open and honest way.

Issues to address

- IV. Unstable contracts & careers
- V. Bullying & harassment
- VI. Unhealthy competition
- VII. Poor management
- VIII. Deteriorating mental health
- IX. Long hours culture
- X. Inaction on diversity & inclusion
- XI. Mistrust of complaints procedures
- XII. Early career challenges
- XIII. Pressure to publish
- XIV. Lack of recognition & promotion
- XV. Gender inequality & personal sacrifices

Proposed solutions:

- XVI. Implementing 360° feedback opportunities,
- XVII. clarifying the skills required to become a supervisor,
- XVIII. reviewing the timing of submission deadlines, publishing negative results, and
- XIX. sharing more guidance on promotion criteria.

8. Accelerating Change: Improving Representation of Black People in UK Motorsport, Hamilton Commission

<https://static1.squarespace.com/static/5f29736c8982c82f61df71e0/t/60edd33a6f118478735acbbc/1626198854176/THC+-+Accelerating+Change+-+July+2021.pdf>

- I. SUPPORT AND EMPOWERMENT Engendering a sense of agency among young Black people and supporting progression to engineering careers.
 - a. We recommend that Formula 1 teams and other motorsport businesses broaden access to motorsport by expanding the apprenticeships provision to include higher apprenticeships and degree apprenticeships as an alternate pathway into the sector, as well as availability to paid work placement and work experience schemes.
 - b. We recommend that a new exclusions innovation fund be established, developing programmes that address the factors that contribute to the high proportion of students from Black backgrounds being excluded from schools
 - c. We support the piloting of new approaches to increase the number of Black teachers in STEM subjects that lead to careers in engineering, namely mathematics, physics, design and technology, and computing
 - d. We recommend the creation of targeted support programmes for Black students in post-16 education to enable greater progression into Higher Education courses and work-based training opportunities linked to the motorsport sector.
 - e. We support the creation of scholarship programmes to enable Black graduates from degrees in engineering and allied subjects to progress into specialist motorsport roles.
- II. ACCOUNTABILITY AND MEASUREMENT Accountability of those in authority, evidenced through consistent collection and sharing of data.
 - a. We ask that Formula 1 teams (and other Motorsport organisations) take the lead in implementing a Diversity and Inclusion Charter for motorsport to commit the sector to improve diversity and inclusion across all organisations.
 - b. We support the promotion of the National Education Union Anti-Racism Charter for schools, and we call on teachers' unions and other leadership bodies in education to work with us to ensure widespread adoption of the Charter.
 - c. We call on the Department for Education and other bodies holding education data to enable easier public access to disaggregated data on student and staff characteristics at subject level.
- III. INSPIRATION AND ENGAGEMENT Enabling young Black people to visualise what these careers involve and see themselves in these roles.
 - a. We recommend the development of best practice guidance for STEM inspiration and outreach activities to enable inclusive engagement with Black students in schools, and with those who influence them.
 - b. We recommend that additional STEM activity support be provided to supplementary schools that are led by Black community groups across the UK.

9. Through both eyes: The case for a gender lens in STEM, Science Grrl

http://sciencegrrl.co.uk/assets/SCIENCE-GRRL-Stem-Report_FINAL_WEBLINKS-1.pdf

- I. Leadership on gender equality
 - a. Cultural straightjackets are reinforced by stereotypes and social structures. This has long been debated and challenged in the academic literature. We want Government to explicitly support the translation of such literature into public policy – from teacher training, to a ‘duty of care’ in marketing and retail, to workplace structures.
- II. Rebranding STEM
 - a. We would like to see a campaign that is focused on breaking down the STEM stereotype. We believe that current plans for a National campaign to attract women into STEM should use this approach.
- III. Role models
 - a. We recommend creative partnerships that aim to raise girls’ confidence and their families’ and teachers’ expectations through showcasing non-stereotypical careers, female role models and non-traditional male role models.
- IV. STEM mentoring and sponsorship
 - a. We believe effort must go into increasing and consolidating links between the STEM sector and schools. These provide genuine opportunities for progress. We recommend STEM Ambassador ‘Buddy Schemes’ for teachers.
- V. Bringing the gender lens to teaching
 - a. Teachers’ unconscious bias impacts upon girls in the STEM classroom, and on boys in other subjects. We recommend equality and inclusion training be mandatory for teacher training. Funding for leadership positions in schools that have the explicit responsibility of embedding gender equality into a whole school ethos should be considered. We support recommendations that gender equality should be part of the Ofsted inspection criteria.
- VI. Primary school science
 - a. Identifying with STEM is key to pursuing it and identities develop early. We recommend proactive STEM sector support of primary schools, and increased funding for such initiatives. We support recommendations to incentivise recruitment of specialist teachers.
- VII. Bringing the gender lens into the curriculum
 - a. Female scientists and engineers are largely hidden in our society and this influences girls’ identity. We recommend a diversity review of STEM curriculum that includes topics covered, pedagogy and assessment, the inclusion of women and non-stereotypical STEM careers.
- VIII. Support project based, creative & real-world learning
 - a. Liking STEM isn’t enough: students must engage with it and see how it is relevant to their identity and future. We recommend continued and increased support for the CREST Awards, Tomorrow’s Engineers, The Big Bang Near Me scheme and STEM Clubs. These stakeholders must collaborate more effectively, and we recommend an open data pledge and progress meetings to capitalise on opportunities for synergy. We recommend that local employers are encouraged to support these schemes.
- IX. STEM resources: technical routes
 - a. Cultural straightjackets are restrictive when it comes to following technical routes like apprenticeships and University Technical Colleges, and particularly so for young women. We recommend gender-aware training for teachers to raise the profile of such routes.

- X. Unifying the STEM ecosystem
 - a. Mechanisms that provide STEM education and careers advice are disjointed. We recommend more rigorous investment in developing core principles for enhancement and enrichment activities and their metrics, based on the RCUK Concordat on Engaging the Public with Research and UK Science and Society Charter. We recommend seeking public and private sector signatories to such a document. The Government should encourage and incentivise collaboration using various tools from procurement and funding processes to policy incentives and kite marks.
- XI. Leadership on careers advice
 - a. There are currently insufficient resources to fully devolve responsibility of careers advice to schools – a transition plan is needed. We recommend that DfE leads on a clear framework that unifies careers messages across the sector and that this is embedded into teaching using input from BIS on good practice in work-related learning. These messages should include: earning potential; marketability of STEM skills; and that STEM is creative and imaginative, has societal impact and offers diverse opportunities. Lastly, technical and academic routes must be given parity. We recommend this framework be delivered to schools as a single ‘STEM careers framework’ through DfE.

10. ASPIRES 2: Young people's science and career aspirations, age 10–19

<https://discovery.ucl.ac.uk/id/eprint/10092041/>

Changing how we think:

- I. Focus on changing STEM education, not young people.
 - a. The sector needs to recognise and challenge the processes that maintain and perpetuate the elitism of STEM, which underpin and drive low and unequal participation. Widening participation in STEM requires changes in power relations and cannot be achieved by continuing with ‘business as usual’.
- II. Foreground equity in all STEM education policy and practice.
 - a. Acknowledging how social inequality drives aspirations and self-identity in science, equity and social justice should be placed at the heart of STEM education. Where equity is not foregrounded, the default will be the reproduction of inequalities.
- III. Employ a social justice mindset.
 - a. Applying a social justice framework to STEM education policy and practice can support more equitable and informed approaches to improving STEM participation.

Changing what we do:

- IV. Building science capital: Building science capital in young people requires relatively long-term changes to core pedagogical practice and cannot be achieved solely through short-term and/or ‘one off’ approaches. Key recommendations for building science capital include:
 - a. Starting as early as possible (ideally from early in primary school).
 - b. Moving away from single experience initiatives towards longer term, regular partnership work with young people.
 - c. Focusing efforts and resources particularly on working with under-represented communities.
 - d. Focus not only on the science content, but really prioritise the mindset through which science is taught, to better connect with and value the identities, knowledge and interests of all students.

- e. Using the principles of The Science Capital Teaching Approach (see <http://bit.ly/SCTeach>)
 - f. Use the YESTEM compass to help you develop and apply a social justice mind set to policymaking and practice.
 - g. Working with others across the sector. Change will only happen when we work together towards the same aims (see <http://bit.ly/PolicySciCap>).
- V. Identifying and transforming educational practices
- a. Focus on reforming the systems and practices that support and perpetuate notions of ‘clever’ science and ‘masculine’ science, especially gatekeeping practices that restrict access and/or resources for certain groups of young people in your setting.
 - b. Lobby for changes to educational gatekeeping practices that restrict and narrow the pool of young people continuing with science/ STEM.
 - c. Support increased resourcing for earlier, better quality, targeted careers provision for all young people.
- VI. Identifying and challenging dominant representations of STEM
- a. Audit and address how science and STEM are portrayed, represented and accessed in any given setting.
 - b. Support a meaningful discourse among STEM educators and professionals to help identify, reflect on and challenge common practices and ideas about who does science and what gets recognised as ‘being good at science’.
 - c. Challenge notions of STEM as being ‘hard’, ‘difficult’ or for the ‘clever’ and the idea of there being a ‘science brain’.

11. Equity in STEM education inquiry, British Science Association

<https://www.britishtscienceassociation.org/Handlers/Download.ashx?IDMF=debd2fb-5e80-48ce-b8e5-53aa8b09cccc>

- I. There should be a minister responsible for addressing inequity within the education system and widening participation within higher and further education to prepare young people for the future.
 - a. We recommend this portfolio sits within the Department for Education and supports cross departmental co-ordination on related policy areas for the future skills for young people, whether or not they go on to work in a STEM field.
 - b. We call for this Minister to set up a Commission for Future STEM Skills to set a clear strategy to improve Britain’s productivity and enable all citizens to fulfil their potential.
 - c. Government should conduct an in-depth review of each stage of education pathways to identify policies and measures to reduce inequity and loss of opportunity.
- II. STEM education should be more relevant to the lives of all young people, appeal to a wider cross section of young people and do more to create the conditions to enable students to experience STEM as inclusive and ‘for me’.
 - a. We ask that equity is given greater weight when monitoring and reviewing STEM education and barriers to the participation of students, particularly in relation to low aspirations and links between grading and perceptions of difficulty.
 - b. Steps should be taken to ensure that all teaching and learning approaches and resources are broad and inclusive in the knowledge and practices that they represent and that they do not reproduce normative ideas of who does STEM.

- c. We call for the Government to improve the capturing and sharing of information on the effectiveness of interventions that reduce misperceptions and raise aspirations.
 - d. We recommend that an organisation is chosen or a coalition is created that can work with the Careers and Enterprise Company, STEM Learning, employers and the full range of providers of cost-effective, high quality STEM enrichment in order to provide an easily accessible and user-friendly mechanism by which schools and teachers can connect with them.
- III. There should be more action to address teacher shortages in STEM subjects and more support for teachers to access to specialist skills and knowledge linked to improving equity.
 - a. Recognising that Government policy is supportive, we call for more resources to strengthen the recruitment and retention of specialist STEM teachers in schools/colleges in disadvantaged areas, with a particular focus on physical sciences, maths and computing.
 - b. We call for the Department of Education to update Initial teacher education (ITE) and continuing professional development (including within the Early Career Framework courses) for all teachers to better prepare them to tackle inequity in the classroom.
- IV. Changes to careers support and guidance suggested by the Careers Strategy for England (2017) must be fully implemented and followed up to ensure it is consistent across all schools and reaching all young people.
 - a. Government should ensure that support for implementing new arrangements is speeded up, any gaps in delivery are urgently identified, and additional support is provided to schools if needed.
 - b. Robust evaluation, monitoring and reporting is needed to ensure that the changes are reaching those that need it most and are effective in reducing inequity.
- V. The Government should take steps to address the existing inequalities in provision of Double Award and Triple Science at GCSE.
 - a. We recommend the Government identifies what further support is needed by schools in England that are currently not offering Triple Science at GCSE to enable them to do so, and take steps to ensure that this is provided without delay.
 - b. We request Government considers what policy changes or other measures are necessary to ensure that decisions about whether individual students take Double Award or Triple Science are most appropriate to the individual student as a matter of urgency.
 - c. We ask the Government to ensure schools' public reporting includes annual uptake of Triple Science and Double Award compared to overall pupil characteristics.
- VI. There should be a review of fundamental changes to STEM GCSEs which considers equity issues, providing findings to those preparing the next round of reforms. We recommend that Government initiates a review addressing the following issues that involves key stakeholders, builds on prior evidence, and commissions new research and evaluation where necessary:
 - a. The possibility of a revised common single route of study in the sciences up to the age of 16 that is accessible to all learners.
 - b. The role that students' practical work plays in equity and how they perceive science, including the content of practical work, how it is assessed and how it is resourced in all schools.
 - c. Potential interventions or policy changes that could reduce the growing and acute gender divide in computer science.

- d. Changes that may help ensure computer science is offered in all schools, including the possibility of adjusting the qualification and/or training arrangements so as to broaden the pool of teachers who can deliver it to a good standard.

12. The ARMA Survey on Research Culture 2020, Association of Research Managers and Administrators

<https://arma.ac.uk/wp-content/uploads/2021/03/ARMA-Research-Culture-Survey-2020.pdf>

- I. Promoting parity of esteem between job families to move away from the 'Them vs Us' mind set between different roles, e.g. academics and administrators.
- II. Integrate other job family expertise in the research experience.
- III. Recognise a broad range of qualifications and professional experiences within RMA careers and value different perspectives, knowledge and skills that can apply in the professional support/RMA career pathways. Reduce reliance on PhDs to do RMA roles and instead lobby for professionalisation of the community. Value diverse career pathways and experiences.
- IV. Having the difficult conversations to address unwelcome behaviour, regardless of who it is (e.g. an academic 'celebrity').
- V. Make visible the invisible work of those who support research. Adopt transparent contributorship models e.g. CRediT – Contributor Roles Taxonomy.
- VI. Reduce the use of short term/fixed term contracts for RMA roles.
- VII. Raise visibility with academics of the activity of RMAs to facilitate two-way appreciation. Shadowing of people in different job families, e.g. academics shadowing RMAs and vice versa, to generate mutual understanding of their roles and functions.

13. Improving Diversity in STEM, CASE (2014)

<https://www.sciencecampaign.org.uk/static/uploaded/50c4b928-d252-4ce8-825065f92d8deca3.pdf>

QUICK' WINS

- I. Make unconscious bias training mandatory for all members of grant awarding boards and panels across all 7 Research Councils.
- II. Halt the announced changes to the Disabled Students' Allowance and instead removes caps on financial support bringing it in line with employment support.
- III. Urgently review and amend the National Careers Service website with input from STEM careers specialists.

'BIG' WINS

- IV. Make diversity a central consideration in the development and implementation of all government policy making for STEM, including apprenticeships, teacher training, university funding, curriculum reform and careers advice.
- V. Proactively engage with the Equality Challenge Unit's Race Equality Charter Mark to uncover and address barriers to access, progression and success for staff and students.
- VI. Appoint and train a science subject leader in every English primary school by the end of the next term of Government.

Policy update for gov: <https://www.sciencecampaign.org.uk/static/uploaded/f3c01267-0a43-40a5-8014124b27ffb052.pdf>

14. Qualitative research on barriers to progression of disabled scientists, CRAC for Royal Society

<https://royalsociety.org/-/media/policy/topics/diversity-in-science/qualitative-research-on-barriers-to-progression-of-disabled-scientists.pdf>

Recommendations for the sector:

- I. To encourage disclosure, the sector should agree and embed a consistent definition of what is considered to be a disability, including mental health conditions, and publicise more widely how the process of disclosure works (including being clear on how parties will share and use the information if a disability is disclosed);
- II. The sector should encourage and/or develop initiatives which celebrate the work of disabled scientists, recognising the positive impact of role models, especially senior academics but also early career scientists who are pursuing a research pathway;
- III. The sector should undertake work to challenge the culture that currently anticipates early-career research solely to be a full-time endeavour that will require uniformly high productivity and demand that researchers work more than 100% of full-time employment hours, such as aiming to introduce flexible working opportunities wherever possible;
- IV. The sector should undertake research to understand more about the use of research-only and teaching-only contracts, particularly to assess whether more disabled scientists are selecting teaching-focused pathways (and why) or whether circumstances are resulting in more of them being employed in such roles;
- V. The sector should undertake further research work to investigate the reasons for the very low levels of disclosure at senior career stages, if necessary, exploring barriers to doing so for senior scientists and what steps could be taken to enhance this.

Recommendations for HEIs:

- VI. HEIs should increase disability awareness training and inclusive recruitment/selection training for their staff involved in recruitment, progression decisions and line management. There is much to be learnt from sectors other than HE, which have made more progress towards inclusive progression;
- VII. HEIs should aim to collect systematic detailed diversity data on the number of disabled applicants/employees they have, as well as information on the number and quality of adjustments that have been sought and offered;
- VIII. HEIs should provide clear guidelines on what types of reasonable adjustments are available and state clearly on job applications, as well as on relevant webpages for staff and applicants, some examples of the types of adjustments that can be requested (and state that a wide range of possible adjustments can be offered in order to meet individuals' specific needs) to provide a flexible, inclusive approach;
- IX. HEIs should ensure they provide clear guidance for disabled staff and applicants on how to access support, information, advice, services, and funding, as well as providing specific information, training and assistance to line managers. Employers should do this collaboratively, working with trade unions and staff who are trained and supported to act as disability or equality contacts or co-ordinators within departments;
- X. HEIs should support and increase the visibility of disabled staff networks to facilitate peer support and the ability of individuals to hold institutions to account in relation to access to reasonable adjustments. This could involve working with NASDN to do so;
- XI. HEIs should undertake research to ensure that advice and support provided by Research Offices is fully inclusive, whether they are supporting disabled external grant applicants, and

how they are currently contributing to breaking down barriers or reinforcing perceptions of a lack of inclusivity from funders;

Recommendations for funders:

- XII. Funders should collect systematic detailed diversity data on the number of disabled applicants and awardees they have, as well as information on the number and quality of adjustments offered and taken up by applicants and awardees;
- XIII. To support disabled applicants, funders should demonstrate a more proactive approach to inclusivity in the process of advertising grant/funding opportunities, handling applications and managing awards. This should involve providing clear guidelines on what types of reasonable adjustments are available to applicants within the application process itself, as well as for successful awardees within their funding;
- XIV. Within the applications process, funders should clearly state a definition of what is considered to be a disability (including mental health conditions) in order to encourage disclosure at application stage, and offer adjustments such as providing additional time to apply and/or rolling deadlines, allowing for applications in different formats and providing room for contextualisation of CVs and research outputs;
- XV. Funders should promote the availability of specific adjustments in the support available to disabled awardees such as: allowing grants to be taken up on a part-time/flexible basis, potential for discrete additional funding for costs incurred specifically by disabled scientists, and clarifying with HEIs where financial responsibilities lie for providing different types of adjustments.

15. Exploring the Workplace for LGBT+ Physical Scientists, RSC & IOP & RAS

https://www.rsc.org/globalassets/04-campaigning-outreach/campaigning/lgbt-report/lgbt-report_web.pdf

- I. Building a visibly welcoming community
 - a. Support for LGBT+ staff needs to be visible and not just in place on paper. Senior leaders and managers should proactively act as champions and advocates by speaking out about LGBT+ issues.
 - b. Everyone should be able to bring their whole selves to work. The key to this is creating safe spaces where people can speak about their lives outside work and get to know each other. Small daily actions can build up to create an atmosphere of hostility, and addressing this requires effort at all levels, from the individual to the organisation.
 - c. Guidance is needed on understanding and using inclusive language, including the use of pronouns.
 - d. Events, networks and conferences should be fully inclusive of LGBT+ scientists. Discrimination and harassment are disproportionately experienced by the LGBT+ community and this needs to be addressed in statements of professional practice and expected behaviour.
- II. Reviewing and improving policies
 - a. All workplace policies and provision should be audited to ensure that LGBT+ staff are specifically protected. Policies addressing poor or difficult behaviour should be implemented to address discrimination and harassment of every kind, from the use of homophobic language in jest to the exclusion of subgroups from LGBT+ networks.

- b. Ensuring that the international nature of science is reflected in these policies is essential and guidance should be shared to support LGBT+ scientists travelling abroad.
 - c. Managers should be trained on policies and implement them consistently.
 - d. Software systems with the flexibility for individuals who change names and genders should be considered.
- III. Introducing and improving training
- a. Training that supports LGBT+ staff could be used more effectively in nearly all work environments including training on transgender inclusion and correct pronoun usage, and bystander training.
 - b. LGBT+ staff groups should be consulted in the development of training and be given the opportunity to participate in its delivery, to ensure relevance and increase visibility of LGBT+ staff.
 - c. Providing a non-judgemental space for difficult questions, and practical advice on how to use language and deal with difference is essential.
 - d. Management and senior leaders need to exemplify good practice, reinforcing messages from the training.
 - e. Training options should also be provided for managers at every level of the organisation to enable them to resolve difficult situations, to deal with differences in culture, and to ensure policies and practices that support LGBT+ staff.

16. The Broken Pipeline – Barriers to Black PhD Students Accessing Research Council Funding, Leading Routes

<https://leadingroutes.org/mdocs-posts/the-broken-pipeline-barriers-to-black-students-accessing-research-council-funding>

- I. Improve national data collection processes and address data collection gaps in applicant demographics for funded PGR study - from application stage through to place confirmation. Conduct research into Black students' experience of applying for and undertaking funded PGR study. The potential postgraduate taught attainment gap and its impact should also be explored by the sector.
- II. Adopt a more open approach to assessing academic ability and defining 'excellence' possibly considering applicants on the basis of a diagnostic essay, or using a competency-based approach (Sørensen, 2016).
- III. Ensuring PGR interview panels are diverse may help to tackle issues around discrimination and bias.
- IV. Clarify ownership of PGR admissions processes to establish where the locus of change sits with regards to improvements to admissions. Research councils should give institutions the 'green light' to proceed with major changes.
- V. Provide opportunities for PGR applicants to gain relevant research experience via paid internships
- VI. Ensure application guidance is effectively disseminated and that admissions processes are transparent to all applicants.
- VII. Ring-fencing funding for Black PGR students can be explored as a form of positive action to address under-representation at this level of study.
- VIII. Adopting a team supervisory model gives PGR students the opportunity to engage with a diverse range of academics during their studies.

17. Life Sciences Equality, Diversity and Inclusion Report - Putting workforce diversity at the heart of the Life Sciences sector (2021)

<https://www.scienceindustrypartnership.com/skills-issues/life-sciences-equality-diversity-and-inclusion-report/>

- I. Creating an inclusive workplace through:
 - a. Organisational culture
 - b. Meaningful change
 - c. Employee engagement
 - d. Employee network groups
- II. Advancing and increasing diversity through:
 - a. Careers outreach
 - b. Apprenticeships and social mobility
 - c. Mitigating the impact of bias
 - d. Positive action
- III. Career progression and retention of under-represented employees through:
 - a. [Addressing] unequal access
 - b. Transparent processes
 - c. Succession planning and mentoring
 - d. Employee wellbeing
- IV. Measurement and accountability through:
 - a. Diversity managers
 - b. Collecting data and setting diversity metrics
 - c. Pay gap reporting

18. BME in STEM report: In Higher Education and Beyond, University of Bristol

<http://www.bris.ac.uk/media-library/sites/chemistry/documents/Final%20Report%20on%20BME%20in%20STEM.pdf>

Primary recommendations (for within 1-5 years implementation) are:

- I. Unconscious bias training for all University staff and students, mandatory for members of committees or interview panels, and for personnel involved in teaching.
- II. Instigate mentoring schemes aimed at supporting BAME accepted applicants, students, and staff.
- III. Provide a diverse curriculum that includes BAME contributions to science and ensure diversity on teaching committees. Where it is not possible to find diversity in professorial staff, the introduction of BAME post-doctorates and postgraduates to the committee should be implemented.
- IV. Introduce anonymised applications in the undergraduate recruitment process.
- V. BAME role models are needed at all career stages and can be provided through outreach activities, invited speakers and by ensuring the curriculum includes contributions made by BAME individuals to STEM

19. Improving recognition of team science contributions in biomedical research careers, Academy of Medical Sciences (2016)

<https://acmedsci.ac.uk/file-download/6924621>

- I. All research outputs and grants should include open, transparent, standardised and structured contribution information

- II. The most effective way of providing contribution information will be an open and transparent research information infrastructure which links all research inputs and outputs to individual contributors
- III. Information infrastructure must minimise researchers' overall administrative burden and should be interoperable
- IV. The use of 'key' positions on publications and grants as the primary indicator of research performance, leadership and independence in team science projects should be replaced by transparent, fair processes.
- V. Team science funding should provide the length, breadth and magnitude of support required by recognising the longer timescales often needed to achieve outputs and additional costs associated with effective team working
- VI. Team science grant proposals need to be appraised holistically, as well as from the perspective of the relevant disciplines
- VII. The value of project leadership should be evaluated when appraising team science grant proposals
- VIII. Researchers should drive change through their crucial roles as team members, peer reviewers and participants on recruitment, promotion and funding panels
- IX. Focused and appropriate training in team skills should be provided
- X. Clear career paths and development opportunities should be provided for researchers outside of the 'PI track' who play key roles in (and provide key competencies to) team science, such as skills specialists

A 2 year update was published <https://acmedsci.ac.uk/file-download/29694340> with an accompanying news story <https://acmedsci.ac.uk/more/news/now-is-the-time-for-a-team-based-approach-to-team-science>

Statistics based reports

1. HESA data analysed by AdvanceHE
<https://www.advance-he.ac.uk/knowledge-hub/equality-higher-education-statistical-report-2020>
2. WISE Campaign
<https://www.wisecampaign.org.uk/statistics/updated-workforce-statistics-to-september-2020/>
3. UKRI funding data
<https://public.tableau.com/app/profile/uk.research.and.innovation.ukri./viz/EDIfundingdata2021/Awardrate>
4. UKRI detailed ethnicity data
<https://www.ukri.org/wp-content/uploads/2021/10/UKRI-061021-EthnicityAnalysisReportFinal.pdf>
5. Wellcome funding data
https://cms.wellcome.org/sites/default/files/2021-03/Report_Wellcome_Grant_Funding_data_2019-20.pdf
6. CRUK diversity data report
https://www.cancerresearchuk.org/sites/default/files/cruk_diversity_data_in_our_grant_funding_2017-2019_feb_2021.pdf
7. Baselines for Improving STEM Participation: Ethnicity STEM data for students and academic staff in higher education – JISC for Royal Society
<https://royalsociety.org/-/media/policy/Publications/2021/trends-ethnic-minorities-stem/Ethnicity-STEM-data-for-students-and-academic-staff-in-higher-education.pdf>

8. Disability STEM data for students and academic staff in higher education 2007/08 to 2018/19, JISC for Royal Society

<https://royalsociety.org/-/media/policy/topics/diversity-in-science/210118-disability-STEM-data-for-students-and-staff-in-higher-education.pdf>

9. Quick Take: Women in Science, Technology, Engineering, and Mathematics (STEM) (2020), Catalyst

<https://www.catalyst.org/research/women-in-science-technology-engineering-and-mathematics-stem/?s=03>

10. European Commission, Directorate-General for Research and Innovation, She figures 2018, Publications Office, 2019

<https://data.europa.eu/doi/10.2777/936>

List of other sector reports to draw on

1. Diversity wins: How inclusion matters 2020, McKinsey
2. Delivering through diversity, 2018, McKinsey
3. Why diversity matters, 2015, McKinsey
4. Diversity is the solution, not a problem to solve, 2018, The Diversity Project & PwC
5. Working Globally: Why LGBT+ Inclusion is Key to Competitiveness, 2020, Open for Business
6. Strengthening the Economic Case, 2018, Open for Business
7. The Economic and Business Case For LGBT+ Inclusion, 2015, Open for Business

(January 2022)