

# Facilitating a Research-informed Framework for Equity in Sciences, Technologies, Engineering and Mathematics (STEM)

This project explores how equity is understood, resourced and practiced in higher education. It focuses on the different equity perspectives of academic and professional staff and students in the College of Engineering, Science and Environment (CESE) at the University of Newcastle.

The study aims to build better understanding of the challenges, dilemmas and opportunities of equity policies and practices in the diverse contexts of the CESE environment.

The research is outcome driven, generating practical recommendations and pedagogical resources to strengthen staff awareness of equity issues, and to provide support for professional development in addressing these issues.

To understand the different contexts for building equity in STEM, the project forms part of the program of work for the UNESCO Chair in Equity, Social Justice and Higher Education.

The Newcastle of University team (Centre of Excellence for Equity in Higher Education) is collaborating with Bath University in the UK. A collaborative strategy calls for establishing relationships amongst STEM disciplines both locally and internationally to create more global-minded and cooperative methods to addressing the problems of intersecting gender (and other) disparities. Partnerships combining science, engineering, and social sciences generate transdisciplinary knowledge and the opportunity to share the lessons learned from the projects in each partner institution.



**About the Centre of Excellence for Equity in Higher Education and the UNESCO Chair in Equity, Social Justice and Higher Education**

CEEHE is a site of innovative research and practice, brought together in critical thought to generate transformative impact for equity in and beyond higher education. Our work—in practice, research, facilitation and support— aims to address persistent inequalities and is grounded in a unique ‘praxis-based’ social justice framework.

In 2022, CEEHE Director Professor Penny Jane Burke was named UNESCO Chair in Equity, Social Justice and Higher Education.

The UNESCO Chair aims to:

- Identify intersecting inequalities and combat persistent injustices that impede transformative equity;
- Develop new research and programmatic strategies for transformative equity, drawing from cutting edge theories and praxis from the field; and
- Promote redistribution of higher education resources and opportunities to marginalised groups and communities.

## **How equity is shaped in higher education in Australia and the UK?**

HE equity policy has been established in broad terms that are open to a range of perspectives and practices across different institutional and disciplinary contexts. This is shaped by competing and often contradictory imperatives, including the ways equity is related to discourses of excellence, global prestige cultures and the ongoing intensification of the marketisation of higher education and moves towards employability and “job-readiness”.

Institutions are complex spaces in which different epistemological frameworks, perspectives, practices and discourses play out around “equity”. The strategies and practices of equity are formed by the structures in place, distribution of resources and the different roles and positions available. The translation of equity policy and the implementation of equity programs is thus shaped by a range of interpretations including social justice agendas, marketing campaigns, and the attitudes, values and culture within different academic disciplines and professional units.

This means that different intentions can be brought to equity practice, pedagogy, and administration often with little explicit attention to the implications of these differences culturally, structurally and/or institutionally.

***How does this affect differently positioned staff and what is the capacity of the institution to address complex questions of inequality that impact research, teaching and learning?***

***How do critical and feminist agendas, such as anti- or de-colonising practices, feature in efforts and struggles to build equity in higher education?***

Relatedly, an under-researched challenge of building equity in higher education is the manner in which it is governed, resourced and articulated across different disciplinary contexts of teaching, research and administration. Different approaches to equity significantly shape the possibilities for equity practice and have important implications for what we do institutionally to progress an equity agenda. The different meanings associated with equity guide teaching, learning, curriculum-development, research and administration practices which then shape staff and student experiences such as access, participation, belonging, connectedness, inclusion and representation.

## **Methodology and Methods**

One of the most diverse colleges within the University of Newcastle is the College of Engineering, Science and Environment (CESE). While the College comprises the traditional ‘hard’ sciences, it also administers areas including architecture, psychology and human geography. It houses five schools: Architecture and Built Environment, Engineering, Environmental and Life Sciences, Information and Physical Sciences and Psychological Sciences.

The research began in 2022 with an anonymous qualitative survey open to all staff across the college. Completed by 41 participants it was designed for staff to respond openly to questions of equity and its implementation. The survey was followed up with in-depth staff interviews (27 to date) to further explore the diversity of understandings of equity.

Survey and interviews were also conducted with CESE students. Over 200 students have completed a mixed methods survey with 24 taking part in an in-depth interview. Inclusion of student voices builds understanding of how interpretations of equity play out across all areas of activity in the College.

## **Pedagogical methodology: professional development workshops**

The project is framed by CEEHE's "pedagogical methodology" (Burke, Crozier and Misiaszek, 2017; Burke and Lumb, 2018), which involves embedded, rigorous and praxis-based professional learning and development opportunities. After completion of the data collection process, and drawing from the emergent analysis of these data, the research team is now working with participants to facilitate professional development workshops with the aim to create "communities of praxis" (Burke, 2020). Inviting participation across CESE to represent the different discipline-based contexts across the College, colleagues will have opportunities to discuss and critically reflect on key challenges identified in the research.

This pedagogical methodology provides spaces of co-development and peer-mentoring to build equity knowledge, understanding and capacity and to create the conditions for integrating equitable approaches into practice. It aims to foster cultural change towards equity and inclusion.

## **Insights from initial data analysis**

The research is framed by a social justice lens drawing on critical social theory. The project brings a social justice lens to equity, calling for collective spaces and dialogue that challenge structures, practices and cultures that produce and sustain inequalities, exclusion and disadvantage.

The following is a sample of initial insights emerging through the rich data.

### ***Marginalisation and Misrecognition***

Academic and professional staff and students experience forms of structural marginalisation and exclusion that are often ignored or hidden in quantifiable measures of equity (Burke, 2020). These accounts show how race and gender intersect to produce embodied and insidious inequalities that shape everyday experiences in the institution (Mirza, 2015).

*you're female, coloured - ... So I'm very isolated, I feel very alone. (academic participant)*

*There have many countless off-hand remarks of "a woman's place" and behaviour which favoured male peers. It is extremely frustrating to have to push through the misogyny within the field when all I want is an equal learning opportunity in engineering without the implication that I don't belong due to my gender. (student)*

*...what I still see is often the females are still given the roles that are less likely to lead them to promotion. (academic participant)*

Subtle processes of misrecognition play out in higher education contexts to subordinate some bodies of knowledge and people and privilege others. Participants express the effort required to assert their value and position against hierarchical structures.

*all of a sudden I'm surrounded by these professors... I was like I'm not a professor and I'm not intelligent, but it doesn't mean you get to treat me like just the secretary or whatever it is. (professional staff participant)*

### ***Diversity and identities***

Responses highlight the difficulty of participating in the context of complex power dynamics, that are often hidden or challenging to express. Participants often present a set of contrasting positions, reflecting these struggles that affect a sense of identity, being valued and belonging. Contradictions (between what participants experience and what they say is needed) is an important strand of discussion. The challenge remains how to claim positions associated with equity categorisations that have been historically marginalised and denigrated without reproducing inequities. This challenge, when not addressed, often generates resistance and resentment against equity, diversity and inclusion agendas.

***They [equity initiatives] make me angry. As someone that sits within an EDI category, I am now being forced to 'out myself' so [the institution] can meet a metric. Why does diversity have to be represented? Why can't it be people that can do the job effectively? Why do people from diverse backgrounds have to make it known that they have a different background? (academic participant)***

***when my gender is pointed as a reason for why I am considered for something I feel conflicted as I am glad that the issue is being noted and addressed but it can lend to a feeling of 'you only asked me because I'm a woman, you otherwise wouldn't have noticed that I am separate from that qualified for this activity' (academic participant)***

### **Perceptions and challenges of building equity**

The project shows that there are different and contested perspectives of equity, related to identity, experience and institutional position. Many respondents highlight the effort involved with convincing peers and colleagues that equity work is relevant and important. This is exacerbated when workloads are intensified and when equity policies and institutional responsibilities are not resourced adequately. Responses show how the labour of undertaking equity work is often devalued in a hierarchical and competitive academic context. Tensions between working to build equity and being recognised as an academic were regularly expressed.

***Those who carry most responsibility also are most affected by the lack of equity, and are active across the College and the University. Their contributions to promoting equity leave less time to contribute to other areas of academic activity (e.g., teaching and research) (academic participant)***

### **Equity in teaching and learning**

The project explores how staff and students understand, resist and/or develop equity in STEM teaching and learning contexts. Professional development often neglects the significant relationship between pedagogical and equity knowledge and capacity. This can result in disparities in learning and educational outcomes.

***The university made me feel ignored. They weren't paying attention. They were like 'go talk to AccessAbility', but the facilities that I need do not exist anywhere I look...one of my lecturers who I managed to get some time with and I was sitting with him and I said, 'I have severe depression, I'm autistic, I have executive dysfunction, can you recommend any material for me?' His response was, 'You just need to apply yourself.' (Student participant)***

### **Greater awareness and cultural change**

Participants articulate a sense that equity is not addressed systemically and treated as a standalone occurrence, without permeating the broader study and work culture. This reflects a need for more critical, collaborative and critically reflective opportunities for building equity in STEM disciplines and communities.

### **Next stage: Co-Developed Workshops**

The research team will work with participants to facilitate ongoing professional development in the form of workshops. Developed to generate time and space for deeper and richer engagement with equity, the workshops will engage with and refine a suite of CEEHE pedagogical resources. They will draw from social justice principles and creative methods to generate "transformative equity praxis"; with the aim to build and sustain "communities of praxis" (Burke & Lumb, 2024). This pedagogical approach draws on the insights generated through the project to enable time, space and resources for co- development and peer- mentoring to build (and harness) equity knowledge and practice.

## References

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