

The informal science learning sector makes tremendous effort to reach new audiences with their programmes but often find they are not having the impact they desire. There are challenges in terms of who benefits most from the offer, raising questions about how the sector could better support people from minoritised backgrounds who have been historically underrepresented among visitors. Science Capital and the Equity Compass are two powerful research-based concepts that can support the development of more inclusive, equitable engagement at botanic gardens and other informal science learning settings, and inform evaluation and impact work from an equity perspective.

SCIENCE CAPITAL & EQUITY COMPASS: SUPPORTING INCLUSIVE, EQUITABLE ENGAGEMENT

Although, as a sector, outreach and public engagement programmes have many initiatives for reaching wider audiences who are traditionally under-served by informal science learning programmes, evidence shows that these often reproduce dominant relations of power and privilege (DeWitt & Archer, 2017). That is to say, the outcomes of such programmes are not always equitable.

In their report, *Redefining the role of botanic gardens: Towards a new social purpose*, Dodd & Jones (2010) highlight the equity issues for botanic gardens, which are predominantly visited by white and middle-class people. The authors advocate that “Examining their audiences and contributing to debates on social inclusion is vital if botanic gardens are to reach the widest possible audiences with their message and be socially responsible.” (p. 37). Botanic gardens also play an important role in supporting wider engagement with science. As Julia Willison, Head of Learning and Participation, Royal Botanic Gardens, Kew stated, “We know science impacts everyone’s lives, which is why we want to open our doors and contribute to diversifying participation.”

Our research has developed concepts that can support the development of more inclusive, equitable engagement at botanic gardens. The concept of Science Capital was introduced by Professor Louise Archer to help describe and summarise the science-related resources and dispositions of individuals.

↪ An individual’s Science Capital can be summarised by their science-related knowledge, attitudes, behaviours and contacts. ©UCL Institute of Education, *Enterprising Science* project in partnership with the Science Museum Group and BP.

Science Capital is a combination of four main areas: what you know about science, how you think about science, science-related activities you do (outside of formal science education) and who you know (do you know a lot of science-y people).

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Science Capital is important because it helps us understand why some people engage with science and other less so, highlighting that engagement is rarely reflective of interest alone, but shaped by a range of someone's resources and dispositions.

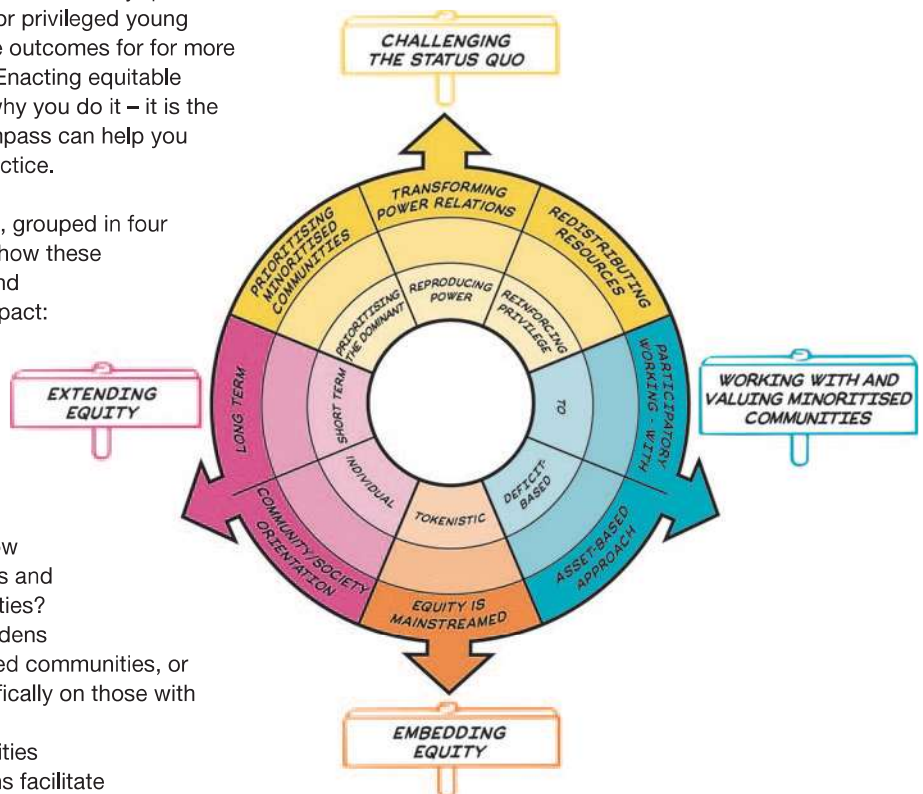
Research shows that those already participating in informal science learning (including botanical gardens) are more likely to have a high science capital. In order to diversify participation and better support minoritised* people's engagement with science, it is beneficial to develop longer-term initiatives while also levelling the playing field to ensure these initiatives have equity at the core of their design.

The Equity Compass was co-produced with informal science learning practitioners as part of the Youth Equity and STEM project (a 4-year, US-UK collaborative research project with a team at UCL Institute of Education) to help practitioners reflect on, develop and evaluate strategy and programmes from an equity perspective. While the project focused on young people aged 11 to 14, the resources developed in the project have been usefully applied to other ages and settings.

The Equity Compass tool asks the user to identify and critically question practices that are reinforcing positive outcomes for privileged young people versus those that are supporting equitable outcomes for more privileged people from minoritised communities. Enacting equitable practice is not about what you do, but how and why you do it – it is the equitable stance that matters and the Equity Compass can help you reflect on the perspective that underpins your practice.

The Equity Compass has eight equity dimensions, grouped in four overarching areas. Below, are some examples of how these dimensions could be used to help practitioners and organisations identify equitable outcomes and impact:

- Challenging the status quo
 - **Transforming power relations** – how do botanic gardens think about power and privilege? e.g. what 'counts' as science, biology and botany, or who can pursue a career in this sector?
 - **Prioritising minoritised communities** – how do botanic gardens support interests, needs and values of people from minoritised communities?
 - **Redistributing resources** – do botanic gardens predominantly engage people from privileged communities, or are efforts being made to focus more specifically on those with fewer resources and opportunities?
- Working with and valuing minoritised communities
 - **Participatory working** – do botanic gardens facilitate opportunities for working with minoritised communities (e.g. co-designing activities and projects), recognising them as producers of knowledge and not merely consumers?
 - **Asset-based approach** – do botanic gardens recognise and value diverse people's interests, knowledge and resources – or focus on what people are 'lacking' (which would signify a deficit-based approach)?



“Examining their audiences and contributing to debates on social inclusion is vital if botanic gardens are to reach the widest possible audiences with their message and be socially responsible.”
Dodd & Jones (2010, pg. 37)

“We know science impacts everyone’s lives which is why we want to open our doors and contribute to diversifying participation.”
Julia Willison, Head of Learning and Participation, Royal Botanic Gardens, Kew

↑ The Equity Compass uses four areas of evaluation: challenging the status quo, working with and valuing minoritised communities, embedding equity and extending equity.
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- Embedding equity
 - **Equity is mainstreamed** – how mainstreamed, intentional and foregrounded are equity issues in botanic gardens – are they everyone’s core responsibility or are they a peripheral concern?
- Extending equity
 - **Long-term** – are equity initiatives one-off, short term, or longer-term?
 - **Community/ society orientation** – to what extent do botanic gardens’ activities benefit wider community/society?

We give one illustrative example of how the Equity Compass could be used to guide evaluation and foreground issues of equity when planning to work with minoritised communities. Let’s take an example where a botanic garden develops a programme for local young people involving a cooking activity to teach participants about edible plants. Reflecting ‘**redistributing resources**’ dimension of equity, the programme could consider how and where the programme is being advertised, to include young people who might typically not attend such programmes. Thinking about ‘**prioritising minoritised communities**’, it would be useful to consider what the participants themselves would like and need from such an activity (rather than focusing predominantly on what knowledge the botanic garden team plans to teach). One way to better understand and engage with minoritised communities is through ‘**participatory working**’, such as inviting people to take part in co-designing the activity (YESTEM Project Team, 2021).

A good metric to evaluate the equity of the outcomes would be to find out whether participating young people report an attitude change in terms of seeing gardening and cooking as science when before they didn’t (‘**transforming power relations**’ and what ‘counts’ as science). Another would be to find out whether participants (especially those from minoritised backgrounds) felt that their existing knowledge, skills and experience were being heard, valued and recognised (reflecting an ‘**asset-based approach**’). For instance, the cooking activity could include asking participants to share family recipes, or experience using lesser-known plant-based ingredients, then ensure that their contributions were valued.

Thinking what impact a programme might have – and how it might affect people on a broader scale, it would be important to consider how equitable practice can be extended towards more **longer-term** benefits, not only for participating individuals, but also their families and their community (‘**community/ society orientation**’). It must be recognised that sustained, long-term engagement is key to increasing science capital, and for more minoritised young people to consider science as something that is ‘for me’.

To maximise equitable outcomes and impact, practices must be **embedded** over the entire organisation rather than rely on the outreach and education programme/s team – or a handful or passionate individuals. By making equity everyone’s core responsibility, botanic gardens can better support all people, young and old, to engage with and benefit from their resources, and taken an active part in the conversations about sustainability and conservation.

For more information, tools and resources, please get in touch on ioe.sciencecapital@ucl.ac.uk.

We will be publishing an insight on Equitable Youth Outcomes soon (see yestem.org or follow @YESTEM_UK on twitter).

*Using ‘minoritised’ rather than ‘minority’ puts the emphasis on the systemic issues and structures that are failing to sufficiently recognise, support and value some people. People can be minoritised within a particular society depending on their race/ ethnicity, gender, socioeconomic background, dis/ability, sexuality and other social axes.

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