# Research & practice agenda

**Equity pathways in informal STEM learning**

## About the project

This Research & Practice Agenda is a synthesis of findings from the Youth Access & Equity in Informal Science Learning (ISL) partnership, a UK-US researcher-practitioner project, funded by the Science Learning+ Initiative. Activities included a survey administered in the UK and US with 134 ISL researchers and/or practitioners; workshops with 111 participants in both the UK and US; a literature review; and a joint UK-US workshop conducted in the UK. This set of activities generated a range of data, resources and raised questions, both research questions and questions of practice, which we have integrated into a research & practice agenda. The project focused on youth aged 11-14, primarily from under-represented and non-dominant communities. Participants were researchers and practitioners from ISL settings, including designed spaces (eg museums, zoos, science centres); community-based offerings (eg after school clubs, Boys and Girls Clubs) and everyday science spaces/experiences (eg media, at home).

The project involves research partners from King's College London, University College London, Michigan State University and Oregon State University. Our practice partners include informal science learning organisations across the UK and US such as At-Bristol science centre, STEMNET, Zoological Society of London, Open University media, American Museum of Natural History, Community Science Workshop Network, and KQED Public Media for Northern CA.

Science Learning+ is an international initiative established in partnership between the Wellcome Trust in the UK, the US-based National Science Foundation and the UK-based Economic and Social Research Council, and in collaboration with the Gordon and Betty Moore Foundation, the MacArthur Foundation and the Noyce Foundation, all in the US.

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# Equity pathways in Informal STEM Learning (ISL): research and practice agenda

There are some issues to consider that will contextualise and explain the direction we chose to take in the agenda. First and most importantly, we view this agenda as organic and unfolding, rather than a finished product. That is, we assume, in fact, we hope, that the agenda will change as it is vetted beyond our project and is built upon, hopefully not only by us but also by other researchers/practitioners working in this area. We hope that this agenda stimulates discussion, reflection, critique and action!



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Second we are very explicit that this is both a research and practice agenda. We have all previously been involved in efforts to create research agendas that often remain as documents on the shelf. We feel strongly that the agenda needs to have at its core not only research but also strong practice ideas. Thus, we deliberately did not separate it into different priorities and questions for research and practice because we want to advocate a partnership approach, bringing research and practice together. As a result, the agenda reflects several tensions that arose throughout the project.

The major 'friendly' tension was between researchers and practitioners. Interestingly, all of our workshops included both practitioners and researchers and we worked diligently to try to create a level playing field, not privileging any particular group. However tensions arose primarily because of the cultural differences between the two. Some of this was reflected in terms of the questions raised by the two groups (applied versus basic research; evaluation rather than research), as well as timeline and practicality issues. The good news is that across the board, as noted in our Equity in ISL Brief, there is a sense of urgency to change unequal patterns of participation in ISL (who is it for, by, with and about). However, as we note below, we all believe it is central to bring in youth participants as a third voice in this process, for this agenda is meant to reflect their lives and opportunities.

Another tension was grain size. Do we focus on youth closely, taking a youth-centred perspective? Or do we try to understand the practices of ISL professionals? Or are we better served studying the institutional factors affecting equity and access? We decided that all of these questions are valid depending upon the context, needs and interests of researchers and practitioners in the community or project. As a result, the agenda has questions at various levels and grain size: 1. youth; 2. ISL professionals; 3. institutions/organisations/spaces; 4. community; and, 5. society.

The major over-arching question is:
How can we work collaboratively with youth to change our practice as researchers and practitioners, our institutions/organisations/ spaces, and our societies, as well as youth through access and equity opportunities, both in ISL, science/STEM and beyond? Key to this is our commitment to the importance of youth receiving opportunities for recognition, representation and transformation as they actively participate in ISL. Our phase one project findings suggest that bringing young people into this conversation as partners (alongside practitioners and researchers) is crucial.

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# Summary of the five key research and practice priorities

We have identified five key research and practice priorities. There is a set of guiding questions for each of these – detailed below. As a conclusion to this brief, we also include some wider, societal questions for equity work in ISL.

1. **Build the knowledge base around equity and ISL, for example, we need to know more about patterns of access and opportunity within and across ISL sectors.**

   a. What are the different patterns of access and participation within and across ISL sectors? And how might novel participatory methods/approaches help us gain insight into these patterns?

   b. How can we learn more about under-served groups and how issues of ISL access and opportunity differ for different communities within and across different ISL sectors and national settings? What are the different affordances of the ISL spaces in which youth participate?

   c. Are there organisations/institutions/spaces in which youth (and their families) from under-represented and non-dominant communities feel most comfortable? How can ISLs broadly defined (designed spaces, community-based, everyday science) build long term and trusting relationships with youth and their communities including groups with whom they identify: their families, schools and existing community services?

2. **Articulate and further develop what equitable ISL experiences looks like especially for youth from non-dominant communities and from a youth-centred perspective, within and across programmes/sectors, in practical and conceptual terms.**

   a. What would youth voice and youth empowerment look like in our institutions/organisations/spaces?

   b. How can we develop safe spaces within our organisations/institutions in which to develop capacity, experiment and share our experiences with equity work in ISL and grow?

   c. What are the factors in ISL spaces (parent-child interactions, design, staff interactions) that influence the development of identity and agency in STEM and learning broadly writ (critical thinking, creativity, innovation) in ISL spaces?

3. **Identify, articulate and provide evidence for what research and practices will best support the take-up of equitable ISL practice within the ISL field, communities and societies, in practical and conceptual terms.**

   As part of this consider what high leverage ISL equity practices might be, teasing out what works, for whom, why and under what conditions?

   a. How do we build capacity and take action? For example, how can we build youth participatory methods into programming?

   b. How do beliefs about learning from the perspective of researchers, practitioners, parents, teachers, stakeholders, and funders, impact how ISL spaces support youths' identity and agency in STEM and learning broadly writ (critical thinking, creativity, innovation)?

   c. How do we conceptualise and 'measure' high leverage ISL equity practices? Are there effective strategies/practices/ interventions among both researchers and ISL professionals that can help youth, particularly those from communities that have been historically excluded from science, feel at home around informal science/STEM, able to take ownership of science and participate in it?

   d. What factors contribute to sustained engagement and/or repeat engagement by youth (and their families) in the diverse environments of ISL (designed spaces, community-based, everyday science)?

4. **Understand the possible pathways that youth (might) navigate in ISL towards greater STEM learning and development.**

   a. What would an equitable youth ISL pathway look like?

   b. How can we learn about/create/use youth-directed tools and pathways maps to promote equity?

   c. How can youth equity pathways in/through ISL spaces help build youth science capital?

5. **Supporting connections across and through different settings.**

   a. How does the ISL ecosystem work from a youth perspective? How can it become more equitable for disadvantaged youth?

   b. How can we bridge resource gaps with more connected pathway designs?

   c. What would a common pathways framework look like that can be used across diverse ISL settings?

We believe that it is important to initiate a societal discussion about broadening the notion of STEM/science outcomes beyond improved achievement in science/STEM and STEM careers. We wish to move the discussion away from a narrow focus on the STEM pipeline which is often an impediment to access and equity work.

We need to help stakeholders (parents, teachers, educational administrators, policy makers, legislators, business people) understand broader STEM/science outcomes, such as how ISL can transform youths' lives through identity development and agency, empowering them and transforming historic patterns of participation in lifelong STEM/science activity (not just careers, but through informed decision-making, hobbies and pursuits).

The ISL community as a whole needs to take responsibility for making equity and access a central, sustainable and commercially viable core practice.

## We all need to play a part in the solution.

# Other project publications

All available from: /www.kcl.ac.uk/sspp/departments/
education/research/crestem/Research/Current-
Projects/YAERPA/Home.aspx
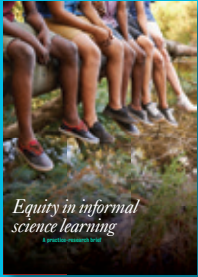
*Research and practice brief 1:
Equity in informal science learning*

*Research and practice brief 2:
Pathways in informal science
learning*

*Youth equity pathways in informal
science learning: infographic*

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## Further information

For more information about our
project please see http://www.kcl.
ac.uk/sspp/departments/education/
research/crestem/Research/
Current-Projects/YAERPA/Home.
aspx

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