



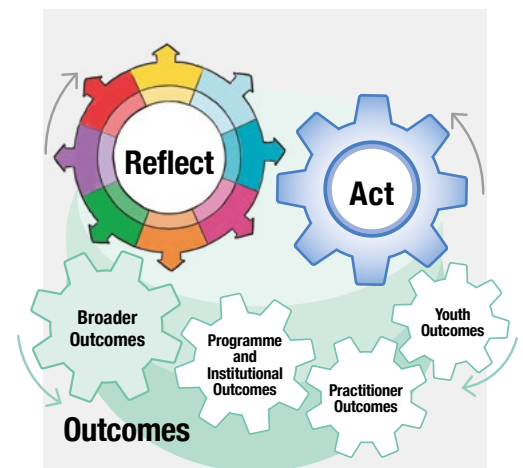
What are Core Equitable Practices in informal STEM learning?



YESTEM Insight #2

What is the issue?

- Informal STEM learning (ISL) settings hold promise in disrupting current systemic patterns of underrepresentation in science, technology, engineering and mathematics (STEM). However, while informal STEM programs and practices may be made accessible to a wide range of audiences, the learning experiences themselves may welcome some participants while excluding and alienating others.
- Whether youth feel comfortable engaging in ISL is partly a result of their experiences and their family and communities' cultural practices. **If STEM programs and activities do not encourage and support youth in ways that leverage their cultural experience, their opportunities for meaningful learning may be foreclosed.** ISL educators' practices play an important role in whether and how youth are welcomed into STEM.



YESTEM Model for equity in ISL

Please see yestem.org for the full model and related Insight documents detailing each component.

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Our approach: Core Equitable Practices of informal STEM learning

Core Equitable Practices are pedagogical practices that support youth's learning and engagement in STEM in empowering ways. When educators engage in Core Equitable Practices, they take the stance that educators and youth are co-learners, co-disruptors and co-creators of a more just world with and in STEM. These practices pay attention to whose ways of knowing and discourses are valued in STEM, and why that matters. We refer to these practices as **Core Equitable Practices** because these practices are meant to be a part of an educator's **everyday practice**.

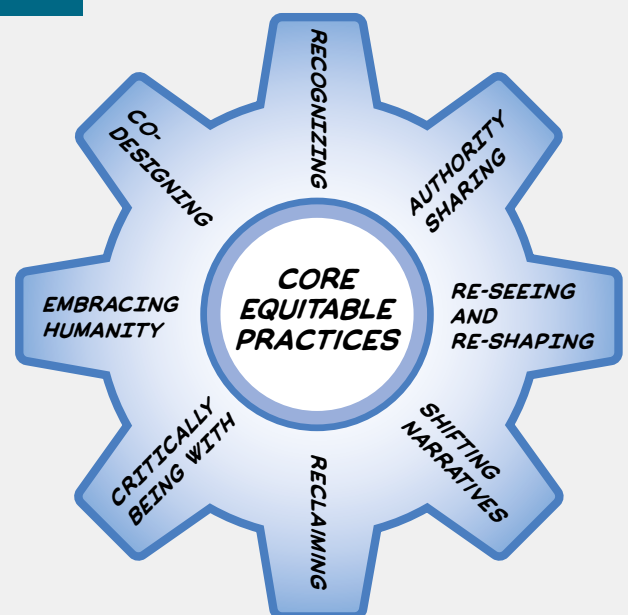
Core Equitable Practices:

- **Welcome and legitimize youth's lives, communities, histories, presents and hoped-for futures**, in the effort to re-imagine what engaging with STEM is and could be. All youth deserve opportunities to learn and become in STEM in ways that matter to them and to their communities. These practices support educators in noticing, centering and amplifying the cultural knowledge and community wisdom youth bring to learning. This is particularly important when the powerful knowledge youth bring may not have been legitimized historically in STEM spaces.



- **Disrupt dominant and unjust power relations** that have historically marginalized low-income youth, youth of Color, and girls in STEM. This involves recognizing that power and representation shape opportunities to learn through how they organize legitimate forms of knowing, doing, being, and succeeding. This also involves flattening knowledge and power hierarchies through valuing discourses, practices and forms of representation that reflect broad cultural diversity.
- **Support equitable youth outcomes in ISL**, in both individual and collective ways. These outcomes include supporting youth in developing STEM knowledge and practice alongside other powerful ways of knowing. These outcomes can help youth in participating in new ways, developing STEM agency and identities.

Act



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Considerations

How Core Equitable Practices work

- **Core Equitable Practices are dynamic and meant to be adapted.** They may shape whole group, small group, or individual interactions/instruction, and they can, and should, be adapted to context. Learning to engage the Core Equitable Practices of ISL requires educators to learn how to notice and leverage upon youth’s repertoires as well as to challenge their own personal perspectives as they learn from youth. As educators become more familiar with these practices they can employ them in more complex ways. All core equitable practices allow for variations in enactment as educators develop their craft.
- **Core Equitable Practices work across settings and time.** These practices may shape pedagogical and program activity in the moment (short-term) or over time (long-term). Educators can use the learning tools which accompany these practices to more equitably shape interactions and power dynamics in the

learning environment, as well as across learning environments, programs, and institutions. These practices are meant to shape and direct a wide range of planning, teaching and reflection activities in ISL towards more just outcomes for youth and their families and communities.

- **Core Equitable Practices work as a system of practice.** These practices are not individual or one-off or piecemeal actions. Instead, they are integrative, cross-cutting, and critically connected actions that occur across multiple scales of activity simultaneously. When enacted together, these practices are stronger than the sum of their parts and produce equitable outcomes.

A set of Core Equitable Practices. Below we offer a set of eight Core Equitable Practices. These practices are common across different kinds of ISL experiences and programs, ages and contexts.

Table 1. Core Equitable Practices defined

Practice	Definition
Recognizing	Being explicitly and publicly aware of the power of cultural knowledge and practice youth bring to STEM learning spaces, and of youth identity, agency, and expertise in STEM.
Re-seeing and Re-shaping	Building new possibilities for youth engagement in ISL through relationship building among youth, educators, space, and resources.
Co-designing	Collaboratively creating experiences, artifacts, space and desired outcomes.
Reclaiming	Fostering community dialogues and asset mapping towards creating a visible, enduring presence, disrupting and transforming what counts as STEM in the learning environment through how it’s represented socially, spatially and discursively.
Shifting Narratives	Purposefully challenging and changing stories about what counts as STEM, who does STEM and how STEM ought to be done, opening up opportunities for youth to be recognized and valued for pursuing STEM experiences on their own terms.
Critically Being With	Slowing down and staying in the moment-in-action, to allow critical dialogue around inequitable classroom practices, interactions in the here-and-now and towards imagined futures.
Embracing Humanity	Valuing individual members of the teaching and learning community as fully human: as just who they are, not who they are expected to be.
Authority Sharing	Offering youth opportunities to be an expert/authority because of who they are and what they know. Giving up the centrality of adult-authority and traditional forms of STEM-authority. Supporting new forms of authority that center and amplify hybrid expertise.

Spotlight on practice: “This is Stupid!” (US)

Supporting youth in drawing upon their strengths and agency to take actions through ISL on the issues they care about is integral to how educators approach their roles at the Community Center in Lansing. Maria, one of the STEM Club educators, spoke about how it was important for her to **critically be with** the youth during their club sessions so that she could better recognize and respond to their ideas and worries from a place of their strength. This often caused her to pause in her own facilitator efforts to **share authority** with youth, **to critique or change an activity in the moment**.

Maria, an educator in an afterschool STEM club, explained how critically being with helped her to understand one youth, William’s, frustration, when he found an e-textile activity not worth the effort to struggle through the complexities of making circuits with conductive thread. She reflected:

When William threw down his bookmark during [our e-textile unit] declaring loudly, ‘this is STUPID! I want to make a fanny pack!’, at first I thought he was just frustrated with how his circuit kept shorting. You know using that conductive thread is not easy. It frays and you can short circuit without even knowing you did so. He had been so proud that his grandma taught him to sew, and I didn’t want to lose that connection. All eyes were on him as his peers stopped what they were doing and looked on. I just wanted to give him some space in that moment to express his frustration, but I also didn’t want him to just give up, and like I said everyone was watching. So, I just decided to take him at his word and ask, ‘What should we do? What do you need?’ It was then he said he wanted to make a fanny pack because it was something real, something he was gonna actually use.

In this comment Maria **recognized** how the challenges of constructing e-textiles might be too frustrating, especially if youth did not see real value in the activity itself. In that moment, she chose to **legitimize his frustration** when she said **“What should we do?”** in response to William’s expression of his frustration. She explained that when she asked the question about what to do, William said a fanny pack would be a more useful project because he could put his money and other prized items in it, and keep it on his body to prevent it from being stolen. She explained how his peers joined in, offering different ideas for why a fanny pack was a good idea:

After that a whole group was making fanny packs, using William’s pattern. While they were making, they started talking about an incident in the lunch room that day. One of the girls said a friend’s purse had gotten stolen at the lunch room that day, and another girl replied, ‘You mean her money got stolen.’ And I remember that’s when William declared, sort of matter-of-factly, “and that’s why you gotta have a fanny pack.” It was a powerful moment as I had not realized how much that meant in that moment.

Making a fanny pack did not change the technical challenges presented by e-textiles that William encountered with the bookmark. However, **William viewed the fanny pack as a worthwhile space in which to engage with both the technical and social dimension of the project**. Also, layered into his new engagement were the potentials for the “afterlife” of his project – how his fanny pack might be used, by whom, and with what impacts. Opportunities for this new form of engagement expanded the ways in which William’s cultural knowledge/practice (e.g., sewing, knowledge of his peers’ needs) became more legitimized in and hybridized as a part of a STEM project, re-shaping whose cultural knowledge had capital.

Maria’s comment further reflected the stance held by our educator partners who viewed youths’ oppositional action not as a form of misbehavior, but rather as an effort to make visible – to help educators recognize – what was unfair or inequitable in their learning spaces. Supporting William in this moment meant helping him and his peers re-imagine the task into one that made visible the ways in which e-textile making carried salience in their lives in that moment.



Spotlight on practice:

Core Equitable Practices at a community zoo (UK)

Supporting and working with a wide range of people in the local community, particularly those from marginalized groups, is an integral part of the work at the community zoo in London. Through educational programs focusing on conservation, the zoo has worked with young people attending alternative educational provision, those with special educational needs, young people on youth justice schemes and those living at a local homeless shelter.

Kevin, one of the zoo practitioners, spoke about the importance of including and welcoming these young people at the zoo and showcasing their work so they are recognized and valued as members of the zoo community. For instance, young people's artwork is displayed prominently and signage, enclosures and gardens in the zoo are all made by program participants, reflecting the practices of **Co-designing** and **Reclaiming** the space. Kevin explains "A lot of the reason we started these programs was to help show the public the value and contributions that these people make."

Showcasing the young people's work in the zoo also exemplifies the practices of **Recognizing** young people's skills and expertise, within and beyond STEM and **Authority Sharing** – as the young people played a key role in shaping the design, look and feel of the zoo.

The task of embedding Core Equitable Practices is not always easy. In the early days, the zoo's approach faced resistance from some local wealthy residents, who complained that displaying young people's work 'lowered the tone' of the zoo. However, the zoo team persisted and are pleased that their approach is now widely accepted and praised within the community.

Cole, who facilitates the education program with young people at the zoo, recognizes that respecting and valuing young people's identities, interests and existing knowledge in STEM and beyond is a key feature of his practice of **Embracing Humanity**. Cole's caring relationship with the young people is characterized by mutual trust, sharing and valuing between himself and the young people, which is evident not only in formal sessions but also during informal break times, when he chats with young people about their lives. In addition to valuing and engaging with young people, Cole also explicitly foregrounds societal injustices within his pedagogy, as exemplified by his practice of **Critically Being With**, when he openly talks with and listens to the young people, as they discuss the various challenges they experience, such as school bullying, racism and sexism.



Additional tools and resources

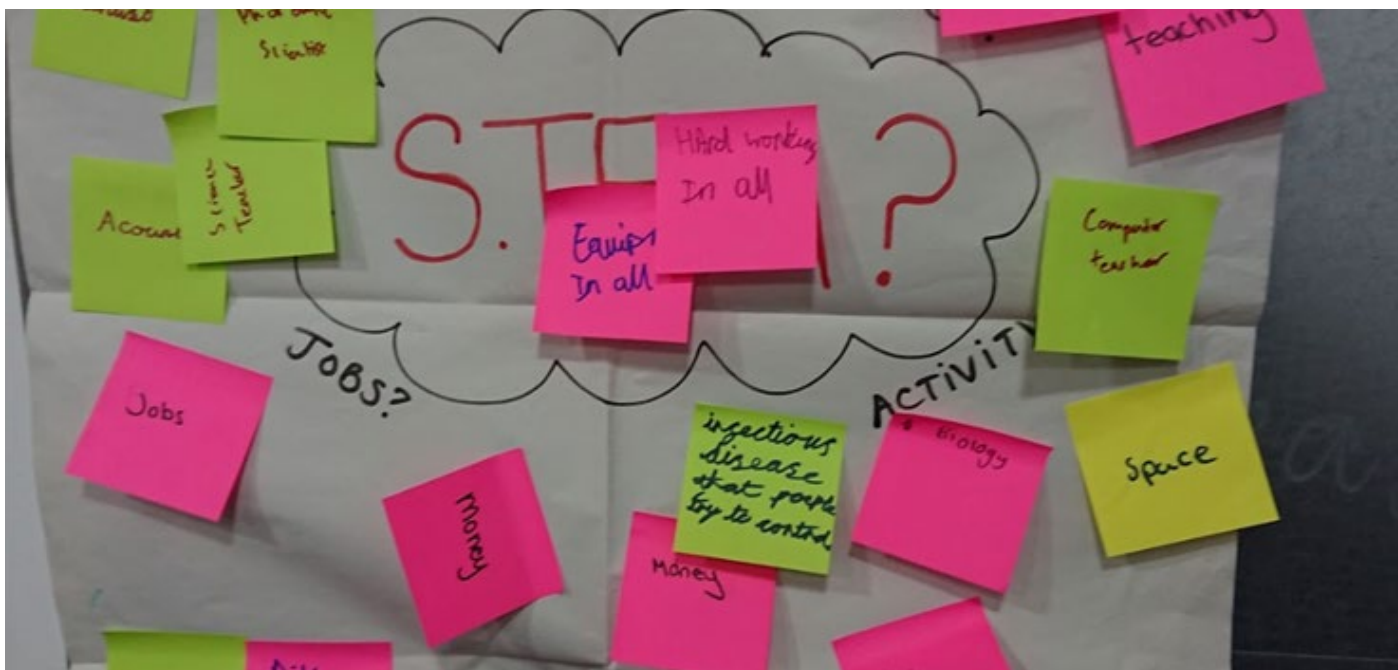
Our research-practice partnerships (RPPs) collaboratively co-authored a “suite of tools” for how each Core Equitable Practice may be implemented in context.

These tools include:

- *RPP Insights* describing the Core Equitable Practices.
- Associated “postcards” of practice, with illustrative vignettes of the Core Equitable Practices.
- Tools to support educators in planning with and enacting Core Equitable Practices.
- Practical measures for documenting impact of Core Equitable Practice implementation.

About our project

- Over four years, our project involved researchers, ISL educators and young people working in partnership to develop new understandings and insights about how ISL might better support equitable outcomes for young people aged 11-14 from minoritized communities.
- Our project partnership involved data collection in the UK and the USA with partners in two science centres, two community STEM clubs, a zoo and a digital arts centre.
- Overall, 260 young people and 30 practitioners took part.
- In the wider project we also conducted surveys with 2,783 young people.



For the full range of Insights documents summarizing the project’s tools and resources, including Core Equitable Practices and Equitable Youth Outcomes Model, please see yestem.org

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