# YOUTH AND ADULT NEEDS IN EQUITY-ORIENTED INFORMAL STEM EDUCATION

By Choua Her, June 2021

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# OVERVIEW

*STEM Justice: Building Youth Science Capital* (NSF award #1612782) was a three-year NSF funded research project that used a participatory approach to study an informal STEM education program for high school age youth[1]. At the heart of the project was the Kitty Andersen Youth Science Center (KAYSC) at the Science Museum of Minnesota (SMM). The mission of the KAYSC is to *"empower youth to change our world through science."* The KAYSC addresses systemic inequities in informal STEM education and the STEM enterprise through its programming for youth who are historically under-represented in STEM—girls, youth from low-income households, and youth of color—and by serving as a resource to advance equity and inclusion. In the KAYSC, social justice is not an add-on; instead, it's part of "the why" for the work. An example of this ideology in action is that most KAYSC adult staff identify as BIPOC (Black, Indigenous, and People of Color), which intentionally reflects the racial/ethnic backgrounds of many youth and communities they work with. As early as 5 years old, youth are invited to join a programming pathway that includes ages 5-14 (grades K–8); ages 15-18 (high school); and extends into ages 19-25 (post-secondary years). Across all programming pathways, participants engage in activities and project-based learning that are based in both STEM and social justice, coined in the KAYSC as "STEM Justice."

# WHAT'S IN THIS BRIEF?

This brief covers research activities, during the final year of the project, that mostly focused on the high school program in the KAYSC. Young people in this part of the programming pathway are organized into teams of up to 20 youth (a "crew") with an adult practitioner ("track manager") who delivers programming based on a STEM content area. As part of our study, we wanted to understand youth and adult needs that exist in an informal STEM education program that weaves equity into its core. This brief offers insight into the lived experiences and knowledges of young people and adults who are usually missing from the canon. In other words, young people and adults from diverse socio-economic, cultural, ethnic, and racial backgrounds are centered in this research rather than situating them as outside the norm.

This brief also presents both youth and adult needs together rather than as needs that are exclusive of each other. Especially as both young people and adults engage in shared experiences through programming, it is important to understand both. As pointed out by an adult staff, *"I like how we're actually doing what we say that we do which is having intergenerational spaces or more communal spaces."* The distinction of shared experience, rather than the same experience, acknowledges how youth and adults may be together in a space and still experience programming

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[1] Note: in this brief, "youth" and "young people" are used interchangeably, to assist with writing flow, with recognition that these two terms can be and are defined differently by people and societies around the world. In addition, the use of the term young people in this brief inherently acknowledges youth as people bringing with them their whole selves, capable and competent as is, to actively contribute to and participate in society.

differently because they occupy different roles and perspectives in the space. Therefore, it is helpful for youth and adults to be aware of each other's needs. Another way to consider this is, as youth identify their needs, adults also have needs that must be identified in order to allow them to develop their own capacities to respond to youth needs. For example, a youth need of being youth-centered (in programming) connects to an adult need of training (to create a curriculum that fosters youth leadership).

Data from youth focus groups and adult staff interviews (which include track managers) have informed the findings in this brief. Through conversations and dialogue, young people and adults described their experiences and expressed thoughts from their various perspectives and roles as participant, educator, learner, and change maker. Data analysis used an inductive coding approach. Sensemaking was also informed by the project's focus and researcher backgrounds in youth development and equity/social justice. Initial themes were synthesized into the findings in this brief and italicized quotes from youth and adults highlight important examples. Findings for each section are not arranged in an order that suggests frequency, or prominence. Rather, this brief dives into what was overall shared about youth needs, adult needs, and joint needs (identified by both young people and adults) in the KAYSC. While this means that the sample size is small, this brief offers an opportunity to better understand the variety, and contexts, of youth and adult needs that exist within equity-oriented informal STEM education programming.

# HOW TO USE THIS BRIEF

We hope this brief will be useful for anyone who cares about young people, informal STEM education, and/or social justice. Whether youth to youth, adult to adult, or youth to adult (and vice versa), here are some ways to use this brief:

- **As a guide to create more holistic ways of engagement in informal STEM education.** Consider how both young people and adults can share an experience (e.g., exploring STEM content) but contribute to it in different ways. What might you pull from this brief to inform your program participation, goals, and outcomes?
- **As reflection on practice.** Whether you are youth or adult, do you have needs that are identified here? How have your needs been met? What worked well? What didn't work so well? What are other needs that have come up for you that you would add? If you have a different role but your work involves young people or adults, how would you answer these questions about their needs?
- **As topics to dialogue with colleagues about diversity, equity, accessibility, or inclusion.** How much of your current programming is meeting the needs of both youth and adults, especially when viewed through a social justice lens?
- **As a strategy to center young people.** How might you use this brief as a way to amplify youth voice? What are ways to ensure that more youth needs are met? How can you share this information with youth and include them in conversations? More so, how can young people be the ones to lead the conversation and provide solutions (that work best for them)?
- **As a prompt to identify areas of future research.** How might you build on what is in this brief? What other ways can these findings be used to better understand what is happening (or not) in your respective field or discipline?

# YOUTH NEEDS

At the end of a program year, we conducted focus groups with crews to learn about their experiences in the high school program. Characteristics of the young people who participated are illustrated in Figure 1. Adult staff were also asked to identify youth needs in the high school program or youth needs overall within the KAYSC. **Below are the *youth needs* identified by both young people and adults.**

| Gender | 58% female, 42% male |
|---|---|
| Race/Ethnicity | Almost all identified as BIPOC |
| Length of involvement in programming | More than half were in their first year |

Figure 1. Youth Characteristics

## Relationships

Youth appreciated how they were able to interact and build positive relationships with peers and adults. Some of these connections allowed them to form friendships. Adults also saw youth connected to others, using the word "community" to describe what was happening. Both youth and adults stated that young people experienced a sense of belonging and support from peers and adults.

- *Youth: It helps people feel comfortable, like, people that are really introverted or something.*
- *Youth: Positive influences….there are people [both youth and adults] just rooting for you and rooting for your excellence.*

## Professional Development

Youth talked about being able to have a job (since high school youth are paid for their participation), gain workforce skills and start networking, and generally be exposed to what they saw as opportunities for career exploration. Adults also mentioned young people developing other valuable life skills as part of their participation such as hard STEM skills and critical thinking.

- *Youth: I'll say it's a way to explore your options and to see what you want to do when you grow up…just a way for you to explore and just see multiple fields.*
- *Youth: There's a lot of really good networking opportunities. Like a lot of chances to meet organizations…and other people. Maybe like a person that is in a career path you're interested in. There's a lot of opportunities to meet these people.*
- *Youth: Opportunities to do stuff even if we miss out for one reason or another…we always get an opportunity to do something else.*

- *Youth: It's fun, and you're getting money. Like, that just sells it...and you get to do so many more things that you could never do at another job, I feel like, especially at our age.*
- *Youth: Oh, it's empowering the youth...we get to go on many trips that can also help you and yourself, like, it could help you in your personal life, and it could help you in your job.*
- *Adult: Cause I do hope that the success would mean that they would also be pursuing some sort of life after the KAYSC, whether that's in a job position, or in a college position. That they are able to ask those critical questions...I should say critically thinking to ask the questions that they need to.*

## Representation

Both youth and adults talked about the importance of having others who look like you and come from similar backgrounds and experiences. Youth often used the word "diverse" to describe what it was like for them in the KAYSC. This may sound contradictory (to have those who look like you and be a diverse setting), but as explained by adults who also identified this need for youth, it was key for young people, in particular those who don't usually see themselves in STEM, to see more representation in STEM of various and different people and identities.

- *Adult: To have this group of young Black youth coming to the museum in this institution, and as I'm coming up to them and walking through, they'll yell out, "hey, there's the science guy!" And that's their narrative; this Black guy with locs is the science guy. That's my view, my representation of science.*

## Youth-Centered

Youth described how they felt their voices were heard throughout their time in the KAYSC. Both youth and adults believed and saw that what young people cared about mattered in programming. One young person even used the word "trust" to describe their experience. Adults emphasized the significance of young people themselves defining what youth contributions were important, rather than adults doing so for them. When considering youth work best practices, this touches on principles of youth-adult partnerships (Norman, 2001) and asset-based approaches like youth voice (Zellerbach Family Foundation, 2011).

- *Youth: Being really youth-focused...not many organizations will trust you to do things that we do, yeah, and I think that's a big thing.*
- *Youth: Everyone gets to listen to each other and hear out everybody else's ideas...everybody gets to hear each other out like when they speak out their ideas.*
- *Youth: A space that allows you to speak about problems...[you're] passionate about, and actually get their word out there.*
- *Youth: The structure we have is very flexible and I like it when it's flexible like that. Like if we want to work more we can push our lunch further or if we've done a lot of work we push our lunch forward. I don't know. Just flexibility in the schedule's pretty – I like that part.*

- *Adult: A strong thing for me is making sure that yes, they're doing the work that they think is important, because if I'm deciding what it is, then it's my project. I want to be invested in it and excited about it, but I can't be the only one who's that invested and excited about it.*

## Ways of Learning

Youth shared examples of varied learning opportunities, such as going on educational field trips and learning new STEM content in their crews. Youth mentioned having engaging ways to learn and explore new interests and ideas. Adults described how they saw youth learning through STEM experiences. Unlike in school/formal education, young people were able to explore and experience STEM in relevant ways. This meant that youth learned about STEM content based on their interests and what they liked, which allowed young people to be passionate about and engaged in their own learning.

- *Youth: With KAYSC, we don't really have duties; we just talk about a topic or we do projects, and this and this and this. And actually, it's actually interesting, it actually engages us.*
- *Youth: Rather than lectures and teaching us, they give us time independently...you can choose what you wanna do.*
- *Adult: What's important for the youth is that knowing the STEM stuff is just as important as learning things that are exciting to you.*

## ADDITIONAL YOUTH NEEDS

Adults also identified the following youth needs. While not specifically called out by the young people in their focus groups, the below adds to what young people shared as their own needs. In addition, the following youth needs recognized by adults provide another example of how social justice is foundational in the KAYSC. Because of the diverse backgrounds and identities that young people bring with them to the space, the space is also about challenging and dismantling systems of oppression that exist for these young people and others like them, and identifying the youth needs that arise from that endeavor. In sharing their goals for the young people in their programs, adults also offered a glimpse of the kinds of pedagogies that guide their interactions with youth and inform their understanding of what youth might need from programming.

Adults often linked their own lived experiences to what they identified as youth needs, meaning that many of the youth needs they identified were needs they had when they were younger, too. This may not be as surprising seeing as most youth and adults come from an urban and multicultural context. A story shared by an adult about how they came to reclaim their STEM identity, and why this is important to do so now also with youth, illuminates this point:

*I think one of the biggest things...before I started, I wouldn't call myself a scientist; I would have called myself someone into science... I have way more appreciation and understanding of science...[as] more than just...my schooling experience...I think a lot of times we focus on the process; how are we empowering the...youth and things like that. So I think that was a big thing for me, and reshaping that narrative of coming from a young Black child that was seen as problematic, identified as class clown... My narrative, my view, was people put me in a box, people perceived me a certain way. So I might as well be that, right? It's easier that way than trying to explain to someone or show that I'm something that – I'm not something that you think I am just because of your own views within that. So I think that was powerful for me to really see, oh, science is something different...the idea – and you've been told from school that you're not at the level that you're supposed to be at, that there's this – it's problematic...so then coming in, re-shifting that narrative to be like, hey, you can fail and that's okay. Right? And who doesn't?*

This quote also highlights the complexity of the role held by adult staff. Committed to fostering a space that invites someone's whole self in, it is also their job, as they facilitate teaching and learning, to draw on their lived experiences in order for youth to integrate knowledges that they already have so as to come to their own new understandings about the world (Bonello, 2012).

## Reshaping Narratives

Adults wanted young people to also believe that they can actively participate in STEM through redefining and/or reclaiming societal expectations, perceptions, and stereotypes associated with the backgrounds and identities they embody. Adults understood reshaping narratives as also connected to youths' feelings and thoughts of self-confidence and self-worth. One adult staff shared a story of their interaction with a young person in redefining accepted notions of what counts as STEM:

*We had youth come in and we started to think about what is STEM? What do you think of when you think of STEM and things like that? And there's a youth that sat down and thought about the experience her family has had...doing a lot of personal farming...[and she] didn't see...the community that we're coming from, the experience that we have, there's this social justice aspect into it because we have to do that to survive...but then there's this STEM piece...because she was like, the stuff I'm learning at school about crop rotation or irrigation and stuff, my family is doing that. But they had to learn it through a different experience because of where they're at and because of who we are. Right? And then she was able to kind of see that connection between – and actually at that point she broke down and had to call her family. And she wanted to apologize because she was like, I've always looked down on them because society has seen us a certain way, society has looked down on them. I've seen us as lesser than or them as lesser than. But they're doing all the same work as I'm going out and paying for this experience for people to do. But I hold them to a higher value. For what?*

## Relevance

Adults supported youth in navigating and placing themselves within and relating what they learn about and do in the KAYSC to a broader social context. Incorporating time for reflection and meaning-making during programming allowed young people to construct meaning from their experiences and connect that to issues that were personally and socially relevant to them, their families, and to their communities.

- *Adult: [We] try to continuously connect their STEM content learning to real world applications, whether it be an experiment...[or] projects by getting them to just apply their learning...That is something they can touch or see...[that] let's them even start to dream about, okay, I can see how I can take that further and make this something that has a overall impact or a social impact...teaching them the ability to be able to...use their learning to do something and then try to apply that to solve a problem, whatever problem that is.*
- *Adult: That reflection in self-worth and people working on themselves. That was the investment on an individual, the actual youth and things like that I think is a big piece. Letting people kind of shift through. If it's not even just the STEM focus of stuff, but where are you at being a young Black person, being a queer individual within your community. So for you to really have that self-reflection of yourself as you're going through and what the intersectionality between your cultural experience and your education, how those actually tie in together and that those are actually affecting one another.*

## Agency

Adults were dedicated to increasing access for young people to different opportunities because it would also increase their agency in their lives beyond their time in the KAYSC. Adults realized that the skills and knowledge that young people gained through programming could play a part in shaping their future prospects.

- *Adult: We need our youth to be able to get jobs when they leave here...and I wouldn't even necessarily say a job but that they use their skills and have some specific set of skills that enables them to get living wage employment.*
- *Adult: And [youth] knowing how they can position themselves to do the work that they feel is most important for them to do to have the impact that they want to have.*
- *Adult: And that's something I talk about with [youth]...because that's a real thing...[where] I've been exploited [for my talents]...and I don't want you to start practicing being exploited. And it's easy to do it when you're 16, 17, 18...[but for me] there was a point where that stopped. And because I didn't have those boundaries in a good way. And so that's another thing I want them to leave with.*
- *Adult: The priority needs to be that we focus on their interpersonal skills, and no matter where they go they have those interpersonal skills to navigate anything in the world, even their personal relationships. Their family. Their friendships. Themselves.*

# ADULT NEEDS

At the beginning and end of the final year of the project, we conducted interviews with adult staff. Characteristics of the adults who participated are illustrated in Figure 2. Adult staff were asked to identify adult needs in the high school program or adult needs overall within the KAYSC. Young people were not asked to identify adult needs in programming; therefore, there are no findings about this. **Below are the _adult needs_ identified by adults.**

| | |
|---|---|
| Gender | 42% female, 58% male |
| Race/Ethnicity | All identified as BIPOC |
| Length of involvement In programming | About a third were in their first year |

Figure 2. Adult Characteristics

## Resources

Simply put, adults needed resources readily available to them, so as to accomplish what was expected of them. Resources help staff better comprehend and gain proficiency in their roles and responsibilities. Three areas where most adults mentioned they needed resources were staff onboarding (e.g., providing resources to know the vision for the work and have clarity in staff positions), training (e.g., providing resources for particular skills and competencies related to the job), and professional development (e.g., providing resources to support their career and continuing education).

- *[Having] an actual visual of all the different roles and responsibilities of the position. Seeing the visual and then...talk[ing] through each bullet point of the visual ...of the roles, the vision of it...helped my work make sense.*
- *[I need guidance on] Curriculum development and how do you develop curriculum activities that you can lead?*
- *[We] will be running workshops, and...could benefit from someone teaching....how to run those workshops.*
- *Because creating that network of professionals or whatever will help us really connect with people, try to build a community.*
- *Knowing what's happening in the Twin Cities, the context that surrounds the work/topics and impacts it.*
- *What are the key issues, what are the solutions, difficult conversations that I can bring to the team?*
- *Community needs is more abstract to me, and it's something that I need more professional development on. To be able to really be good at it, honestly which I'd like to be, I think there's a need for me to get better at that.*

## Apply Theory to Practice

Beyond resources, adults expressed a high need for ongoing professional learning that integrated theory and practice. Many informal STEM learning educators and professionals do not follow a set career path from formal education into their profession. Therefore, adults wanted not only to enhance their abilities by learning from literature and research in the fields/disciplines that connected to their work, which would let them pull content from key people, ideas, theories, frameworks, etc. to inform their engagement with young people and each other (in part, adding to their pedagogies that guide their ways of being in the world). They also wanted more tangible examples of and support in translating what they read/learned to practice in order to increase their capabilities to carry out their work. This need is significant as programming combines STEM and social justice; therefore, content from resources alone is not sufficient. Adults mentioned that they wanted to have more know-how related to STEM literature and program-specific STEM content, theories like science capital (used in the KAYSC) and other social justice-centered theories, and approaches/strategies in youth development to authentically engage youth as well as meet their own personal and professional goals.

- *Because there are different models for how involved an educator is in youth-led, project-based work. Are they on equal footing with the youth? A supervisor who is very hands off but helps guide? Are they anywhere from that end to the more top down tokenistic work with youth, where they don't really have a voice at all?*
- *[How can I] give twenty youth a similar experience but also [recognize] they have their own unique needs? I don't know how to do all that at the same time.*
- *I'm not coming in with that background knowledge, that network and I know I'm not going to be an expert by the time we start with our crews – but I'm trying to be!*
- *I think something that a lot of people have stated is maybe a gap is the fact that we do a lot of times hire people because of who they are, instead of their college background or educational background which is I think is good, but maybe we need more catching up to do when we want to have hard sciences or something like that. I feel like we've gotten judged by different people, like people coming into [name of] crew or people who were very science background education people and who worked for us, they had judgements I guess of our programming and how it needs to be more STEM. So I guess we need to bridge that gap a little bit.*

## Reflective Practice

Adults expressed the importance of intentional reflection in their practice. More than just reviewing program activities and day-to-day tasks connected to their roles and responsibilities, incorporating reflection as part of practice was something that could help them improve their practice. Examples provided by adults included journaling, group debriefs of topics relevant to programming, and engaging in introspection. This type of reflective practice could support adults in making meaning of their experiences, gaining more self-awareness and insights into how they do their work, and guiding decision-making (Finlay, 2008; Schön, 1987). One adult staff shared what reflective practice looked like for them:

> *This is reminding me of how much more time I wish I could spend thinking about this stuff. Rather than doing it. What are the things that people need to grow their own capacity in this work so they can continue doing work around STEM in the future, in a way that feels best for them? Like critical literacy, thinking about information they gain and where they get it from, and what are their sources, and how do they interpret it, and how to think about community differently and their role in community differently than they might be used to, coming from lots of different perspectives and having very different ideas of that coming into it, but being able to share each other's ideas.*

## Community of Practice

Adults expressed the need for colleagues to support them in their abilities to do their work. This could look many different ways. For example, a few adults talked about exchanging ideas through job shadowing or learning from others in the field who are doing similar work. Other adults described the support as sharing and receiving feedback for program design ideas.

- *Who are other people who are using a STEM justice model …but they might be using different words to explain it? And so how can we be in dialogue and conversations with them to kind of exchange ideas?*
- *[Adults] sharing different difficulties they're having. And all of us kind of – everybody just kind of coming together to try to troubleshoot those things…. Or trends – us continuously calling out trends we're noticing in the KAYSC amongst the youth…I think that questions us to ask why and figure out what potential reasons [there are] for that and kind of brainstorm around those kind of things. So I think it's maybe a culture of trying to continuously improve and make sure we are listening to the youth.*

## Language

Adults stressed the need for more shared language. While many had a felt and lived sense of the importance of STEM Justice, it didn't always mean that it was easy to explain this to others. Collectively defining words would allow them to articulate what it is they do with each other and how, altogether, they fit into the vision of the work. In addition, having opportunities to practice using this shared language

increased their abilities to effectively communicate with colleagues and others outside of their programming and vice versa. This need also highlights how words can and often do take on various meanings by those who use them and that it is worthwhile to ensure there is space to discuss language and come to common understandings (Gallion & Weber, 2019).

- *I think we've just been throwing it around and we didn't really know how to speak about it, so it gave us the opportunity to actually sit down and think about what does STEM Justice actually mean? How do we define it? How are we redefining it?*
- *And what do we mean by addressing systems of oppression? I think that was necessary for us to do, instead of just continually saying that we do something instead of actually knowing where that falls within our work, or what we mean by that.*
- *What does social justice mean to us and what are our priorities? And I think that's work we really need to do in the KAYSC, we've been talking about the need for that.*

## Agency

As they wanted for young people, adults felt the need to be able to make change, the feeling that you can/know how to do it, and the assurance of doing work that is relevant and important for personal and social change.

- *You have agency to create change in the world in the ways you see fit.*
- *In all of the ways, whether it's individual, community, industry, whatever, it's about culture shift, and it's about supporting individuals in empowering themselves to improve their own lives.*
- *This bridge between knowing there's something wrong, and thinking about how we use the tools and the assets and strengths that we have to be hopeful, and feel empowered to do something. Rather than just feel like there's nothing that I can do...So just that shift in thinking about that, but also the shift in thinking about and moving from someone who knows how to complain about something to someone who knows how to do something about something.*

## Solidarity

During their interviews, adults were candid in their hopes and aspirations for young people, themselves, and the radical, transformative changes they wanted to see in the world. Equity-oriented programming, especially for adults coming from lived experiences and intersectional identities often marginalized in dominant society, must recognize this in addition to the technical aspects of the job; the work must account for who they are and what has shaped them, acknowledge the emotional labor that they have to expend in navigating spaces that aren't inclusive, and be aware of the fatigue that comes with doing equity-centered work (Moore, 2020). These adults are aware of who and what they are in the spaces they occupy, the

burdens that are placed on them (intentionally or not), and the injustices/marginalizations they have to deal with, on a consistent basis (Weinberg, 2008). Not only do they "do" social justice (as part of their job), it is also what they embody (as part of their existence). Therefore, it is critical for these adults, and others like them, to feel that there are people who "get you" and are with you alongside efforts to bring about social progress (Pour-Khorshid, 2018; Sodhi, 2008; Wilcox, 2009).

- *It was crucial, thinking about what identities we bring to work, how does that influence a diverse setting? Our work culture, but also when we're engaging with youth who have different identities, how does that play out? All of us should be taking it seriously.*
- *I feel like how we're different from other places is that we're thinking how does this apply to myself as a personal entity? You know? How does it apply to my work entity? How does it apply to my relationships that are related to work, that are social? And et cetera. And so I think the KAYSC thinks about STEM Justice holistically, not just with youth, not just with our work, but literally as a human being, as a person, where I'm not used to that. Cause usually in academia, or STEM entities, it's like this is how it relates to our work, our models, versus how is this challenging you as you're growing, while you're challenging others to also adopt this principle which is STEM justice.*

# JOINT NEEDS

The previous sections in this brief identified youth and adult needs separately. **This section will briefly consider two _joint needs_ identified by both young people and adults, Collaboration and Social Justice (Table 1 below).** As stated before, while both engage in shared experiences through programming, their respective experiences are not necessarily the same. Yet, recognizing joint needs helps to draw the connection between what young people and adults experience as they engage in programming together.

| Need | Youth described this as... | Adults described this as... |
|---|---|---|
| **Collaboration** | **Opportunities to interact with more peers throughout programming. Examples of what collaboration could look like:**<br><br>*-Maybe we could talk with the other crews more to organize specific meet ups and projects to work together on.*<br>*-Yeah. Collaboration.*<br>*-This was the first year that we spent in our crews. And I feel like working on our own crews and building that connection between the people we're spending a lot of time with is important. But moving forward I feel it's a good idea to have two or more crews working together on same projects. Yeah.*<br><br>*-Mini-projects aside from big projects*<br>*-And I was thinking more like independent projects...so that if two people in the crew came up with something that they wanna do, they could work on it together*<br><br>*-It would be cool, like, once a week or something we meet up, everyone comes together or something.*<br>*-I wanna do, like, a crossover between the [name of] crew or the [name of] crew.* | **Knowing that you're part of a group and can depend on each other when needed.**<br>*How do you work with your teammates to accomplish a project or task?*<br><br>*[Having] one-on-ones with people in the museum who worked on similar topics….I kept thinking, this should've been earlier.* |
| **Social Justice** | **Working on projects and activities that address systemic inequities in addition to learning STEM content.**<br><br>*It's kind of like a paid education program to like learn about different STEM things and like do really cool social justice community work.*<br><br>*We're trying to, what's it called, redefine how you use STEM to solve these ...social problems.* | **Crafting programming that takes into consideration and tends to the lived experiences and identities of themselves, youth, and communities.**<br><br>*And there's this larger conversation… [about] how much can we be both ...working towards radical liberation which is inherently anti-capitalist, inherently anti-consumer[ist], and inherently equitable [and] . . . training people to thrive in the world that exists, so that they have power to change it? And both of those things are crucial to doing the work that we say that we're doing, and they cannot exactly co-exist, and so figuring out how we do both in different ways has been a real challenge, and I think...[all of us adults] fall in a different plane from each other, and we have conversations about it, as we have time to, and I mean, I kind of go back and forth. …I think we all probably go back and forth. Some people lean a little more one way or another way or for different aspects of our programming, right? But, yeah, and then we're also a youth program, and that's inherent with both of these things, but it's also like, youth should have a childhood, and that's actually a real thing.* |

Table 1. Joint needs of youth and adults

# CONCLUSION

This brief identified a variety of youth and adult needs that exist within equity-oriented informal STEM education programming. There are, of course, other needs, particularly specific to time and place. For instance, during follow-up conversations with KAYSC young people in 2021, they advocated for mental health resources, a need that has become even more salient in the last year. From this brief, it is apparent how youth needs are more than just about STEM content; they also touch on aspects of social-emotional development and gaining valuable workforce, college, and career readiness skills. Adult needs are more than just about program delivery; they also encompass what informs their understanding of the work and how they can continue to develop in their career. Joint needs of both young people and adults highlight the importance of teamwork and centering social justice.

Paying thoughtful attention to youth needs, adult needs, and joint needs identified in this brief and elsewhere can promote responsiveness throughout programming by truly meeting the needs of those who are involved, leading the way to meet the call for broadening participation within the informal science education field.

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