

State of the Field: Belonging and Museums

Review of key studies, programs, and initiatives supporting our work

1. Executive Summary

This document shares our thinking of belonging from fall 2021. *Belonging* is a current area of focus for many museums, where staff are working to move beyond equal access and broad inclusion, to ensuring that all visitors feel that they belong when they visit. It's also an idea that has been examined by several academic disciplines, including history, anthropology, education, museum studies, and psychology, over recent decades.

We sought to better understand the academic vision of this concept by assessing belonging research and practice within institutional settings, including museums. Across these disciplines, sense of belonging is defined differently, but generally, the definitions describe an active and dynamic interaction between people and places.

Three Useful Approaches in Understanding Sense of Belonging

We focused on three emergent areas of prior research: *physical space*, *social support*, and *alignment with identity*. These are independent ways of approaching the idea of belonging, and may or may not work together with each other.

Physical space relates to how an environment communicates messages of who belongs:

- How the set up of the physical space confers belonging (including physical accessibility, language/cultural representation, arrangement of materials/objects, and more);
- How individuals navigate the space and see themselves and others represented;
- How society describes and reinforces who belongs in a specific geographic place or environment.

Social support describes ever-widening circles of social context in which people may or may not feel they belong. It includes:

- An individual's feelings of being valued and accepted by others, by institutions, by society;
- Give-and-take (reciprocal) relationships between individuals (and between individuals and organizations) that confer belonging;
- A complex interaction between an individual, a place, and a process of deciding what is valued in society (e.g. societal understandings of who belongs).

Alignment with identity(ies) considers how identities are marked as belonging in certain social contexts:

- How individuals perceive and enact their identity(ies) within a social context;
- How identities are represented as successful in a given context;
- How belonging is socially constructed and dynamic - always emergent.

Persistent Questions in Understanding Sense of Belonging in Museum Settings

Across the existing research, persistent questions about the construct of belonging emerged, some of which are specific to museums, and some of which were persistent challenges across several fields. By keeping these questions top of mind, we can ask better questions about belonging and know what to look for in our data.

- How is a sense of belonging relational? Some research describes belonging as a give-and-take (reciprocal) type of relationship; an individual feels they benefit an institution by being an integral part of its functioning, and also that they receive benefits from being in the institution. Without the presence of a reciprocal relationship, belonging is merely inclusion by a different name. Much of the research suggesting this idea happened in settings like classrooms or labs, where people might visit more frequently or develop longer-term person-to-person relationships (as between a teacher and a

student). It's not clear how this aspect of belonging might be present in a museum (or whether it will be present at all).

- How can a measure of belonging capture the nuances of individuals' multidimensional and intersected identities? Many measures of sense of belonging have focused on an individual's sense of belonging concerning singular aspects of their identity (e.g. race or class), in an attempt to understand how an individual who identifies with that group may personally feel a sense of belonging and/or whether they feel that their group's identity belongs. Individuals often have multiple groups with which they identify (e.g. ethnic/racial, geographic, gender, class and more), any number of which may or may not be socially supported as belonging. Additionally, for museums, where visitors often experience the space in groups representing many different identities, the challenge of ascertaining how an individual group member's sense of belonging is supported becomes more difficult.
- Is there any consistency in how sense of belonging is understood across a variety of age ranges? School-aged children have been asked about belonging primarily in formal school settings, with limited studies conducted in informal education programs. Adults have been surveyed about belonging across a wider array of contexts. To our knowledge no one has attempted to make a usable definition of belonging that would apply to the broad age range present in museums. It's possible that belonging is expressed differently across age ranges (i.e adults versus children), and developing a single definition will not be possible.

Sense of Belonging in Museums

Within the museum and informal education field, more recently, museums have included the idea of belonging with concepts such as inclusion and welcoming in general discussions (not research) about the experience they intend to provide. These discussions are focused on the *feeling* of belonging, rather than the academic definitions and studies described in this review of the research. Museums have also done much work on inclusion in terms of identity, the social context, and the physical context of museums, though this work has most often been project- or exhibit-specific, without focus across the whole museum experience. Previous research on belonging in museums, from the late 1990s-early 2000s, focused more narrowly on history museum spaces as representations of individual and collective memories of particular geographic places, and the inclusion or absence of perspectives from those who had been displaced from those places.

Next Steps

In this project, we want to begin with visitor definitions of belonging, which may or may not line up with the definitions that were developed through research in other settings. We will also pay attention to how definitions of belonging may vary based on visitors' identities and demographic characteristics. We will accomplish this by looking at:

- 1) How people bring up their individual or group identities when choosing and talking about moments that matter during their museum visit.
- 2) How feeling words are associated with a sense of belonging.
- 3) How sense of belonging varies or is the same across visitors' different identities and demographic categories.
- 4) Whether belonging in museums includes the sense of reciprocity that is seen in other settings (e.g. I can both contribute to and gain from my visit to the museum).

State of the Field: Belonging and Museums

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2. Review of the Research on *Sense of Belonging*

One thing becomes clear quickly in scanning the array of disciplines that have sought an understanding of belonging: sense of belonging is not one thing, it is multidimensional. To narrow the conceptual space to elements that might transfer to the science and natural history museum fields we focus on *three areas of prior research: physical space, social support, and alignment with identity.*

Understanding belonging in terms of physical space

Belongingness within the context of science and natural history museums through a lens of physical space considers:

- How the physical space is set up
- How an individual navigates the space
- How institutions reflect and respond societal understandings of the space

A key thread of this literature comes from history museums focused on exhibitions and representations of particular geographic places, and how these representations are designed from and for the perspectives of dominant cultures or peoples, drawing on and reinforcing their collective memories of geographic places. Eckersley (2017) argues that, in order to understand the museum's role in reinforcing who belongs in a certain geographic place, we need to conceptualize feelings of belonging as *a people-place-process complex of attachment...because it encapsulates a greater breadth of ideas that contribute towards these feelings.*

In conceptualizing belonging in terms of place, place attachment and place identity are related to, but not the same as, belonging. Place attachment, or feelings of connectedness to a geographic location or environment, could contribute to a sense of belonging but is not belonging by itself. Place identity, in which an individual or collective identity “maps” onto a geographic location or environment, could also contribute to a sense of belonging. However, it is the processes by which an individual or society takes up and uses place attachment or place identity that is the core to understanding how place and belonging intersect. There are: 1) the meanings ascribed to place by people (either individually or collectively), and 2) the ways in which meanings of place are utilized by society writ large, or by individuals in understanding themselves. This is the “complex of attachment” first described by Eckersley, and later elaborated on by Scannell & Gifford (2010).

Widening the view to the context of formal STEM educational institutions, studies of belonging have also focused on physical aspects of these environments (e.g. science classrooms). Cheryan and colleagues discuss the concept of ambient belonging which they define as, “*fit with the material (e.g., physical objects) and structural (e.g., layout) components of an environment along with a sense of fit with the people who are imagined to occupy that environment. Ambient belonging, we argue, can be ascertained rapidly, even from a cursory glance at a few objects.*” In this work, Cheryan and colleagues demonstrated that ambient belonging is relevant in STEM environments -- women were more likely to endorse items around interest in computer science when items in a classroom space were less stereotypically masculine.

Although Cheryan et al's definition of belonging emphasizes fit with the physical environment of STEM classrooms, others have argued against the concept of fit as core to belonging. For example, Strayhorn (2019) questions whether fit to the environment is central to belongingness, arguing that ‘fitting in’ is not belonging. Rather, being “authentically one's self” within a place is correlated with belongingness. The physical environment can communicate messages of who belongs and individuals (or groups) can have

perceptions of who belongs based on both the objects in the environment and the people imagined to be in such an environment; this reciprocal relationship brings us to social understandings of belonging.

Understanding belonging in terms of social support

In summary, belongingness within the context of science and natural history museums through the lens of social support should attend to:

- An individual's feelings of being valued and accepted
- Reciprocal interpersonal relationships and reciprocity that support belongingness, at individual and institutional levels
- How an individual or institution enacts on larger societal understandings of who is valued and accepted

In framing a sense of belonging in terms of social support it is helpful to operationalize social support. Though a full review on social support is outside the scope of the current project, the American Psychological Association (APA) provides a definition of social support as:

“The provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors. Support may arise from any interpersonal relationship in an individual's social network, involving family members, friends, neighbors, religious institutions, colleagues, caregivers, or support groups. It may take the form of practical help (e.g., doing chores, offering advice), tangible support that involves giving money or other direct material assistance, and emotional support that allows the individual to feel valued, accepted, and understood.”

It is generally understood that social support is correlated with, but different from, sense of belonging. Belonging, like social support, happens in the context of reciprocal interpersonal relationships. Critically, interpersonal relationships are the core of Baumeister & Leary's (1995) hypotheses around 'need to belong' -- a basic human motivation to seek out relationships in which the individual is valued and accepted. Much of the psychological literature on belonging is based on Maslow's hierarchy of needs which situates belonging as an innate motivational drive, sufficient to influence behavior.

The final phrase in the definition of social support is key in understanding how social support has been situated within belonging literatures stemming from the psychological sciences. That is, social support allows the individual to feel valued, accepted, and understood. Feeling valued and accepted is at times synonymous with belonging; thus, we could rephrase the APA's definition of social support as support that allows the individual to feel a sense of belonging. However, caution should be applied to this narrow view as it may oversimplify belonging and social support as something that happens to a person, versus the reciprocal construction of belonging through context that considers the individual, place, and process. These processes include societal norms or understandings about who normatively belongs in a given context.

Taking a wider lens, socially supportive relationships have been documented in relation to sense of belonging. For example, supportive relationships with teachers and peers have been documented to correlate with heightened sense of belonging in formal education settings. Moreover, the coaction between belonging and social skills may be bidirectional, with some suggesting that increased social skills allows one to better navigate social relationships and foster stronger feelings of belonging.

Social support is not necessarily limited to individual actors. Institutions -- including those in the science and natural history fields -- could act in relation to individuals or groups in ways that are more or less supportive. Some have argued that informal learning environments may be particularly important to youth who feel that they do not belong in formal education contexts. Belongingness within institutions

goes beyond communicating inclusion and should consider whether an institution is upholding or disrupting societal perceptions of who normatively belongs in science museums. Bissell (2019) notes “*cultural norms create their own spaces of belonging and expressions of belongingness that seep across boundaries that are seeking to maintain exclusion and dehumanization.*”

Much of the work around social support and belonging in institutions has been advanced in higher education. Latching on to the idea of campus climate as belonging, we can take a step further into the museum sphere in considering how a culture of belonging has been framed within museums. This literature has evolved largely outside of the psychological sciences’ or formal education’s conceptualizations of social support. From Bissell (2019) again: “*A culture of belonging must inhabit stories, symbols, and how we see ourselves and each other. It also must inhabit the systems, policies and practices of society that make up the substance of culture.*” The social nature of a culture of belonging as contributing to how we see ourselves and others, ties nicely into understanding belonging in terms of alignment with identity, discussed below.

Understanding belonging in terms of alignment with identity(ies)

Belongingness within the context of science and natural history museums through a lens of identity examines:

- How individuals perceive and enact their identity(ies) within a group context
- How identities are represented as successful in STEM disciplines and activities
- The impact of interactions/relationships on belonging
- How belonging is socially constructed, dynamic, and reciprocal

Across the belonging literatures in higher education, formal (K-12) education, and psychology that were surveyed, belonging is examined in terms of the intersection between individual and group identity(ies). While there is acknowledgement that individuals’ identities are intersected and multidimensional, often individuals feeling/not feeling a sense of belonging is described in terms of singular aspects of that identity (e.g. race/ethnicity, gender, etc.). Additionally, the measure of sense of belonging usually seems to occur at the level of individual responding to group contexts.

In general, belonging is described as experiences and places where an individual sees their identity reflected in a social group. In educational settings, belonging is felt where an individuals’ social identity is represented by individuals who have found success in a discipline/content area or learning context (this is especially true in studies that focus on engagement and retention in STEM disciplines).

Some studies in psychology and higher education have documented how individuals feel not only lack of belonging, but *social identity threat* when the social/physical environment they find themselves in reflects a negative or absent portrayal of their particular identities. Many of these studies show the positive and negative impacts of sense of belonging on engagement and interest in a field of study, in a given context/environment, or in relationships with other individuals, to name a few. Some studies focus on the social factors of being in relationships and interactions with people within a larger organizational space, such as teacher-student relationships in formal educational settings.

It is clear that sense of belonging operates both in terms of individual as well as collective (group) identity. The literature delves into nuances of the individual-social affirmation/denial of identity utilizing a few key frameworks: social capital, place-based contexts/creation of social spaces, and identities that are socially constructed as better ‘fit’ for a given activity or discipline within broader society.

a) Social capital/deciding who belongs

Social capital means there are overtly or assumed indicators, behaviors, markers, and/or dispositions that are 'right way' to behave, think, learn, etc. and that allow for full participation in a group. In belonging studies, where fixed growth mindsets influence the perception of which group identities are able to possess the necessary social capital to participate in a group, the possibilities of who belongs can be limited by individuals assessing their own social capital (*the person's perception that his characteristics articulate with or complement the system or environment*) or by groups signaling whether an individual demonstrates the necessary social capital (Hagerty, 2002). For an example of the latter in higher education: *Academic identity [often means] belonging to a community of practice [using] the "ability model" – a few are expected to succeed and others need to try harder – and the narrow conception of learning as acquisition of skills* (Good, Rattan, Dweck, 2012). Social capital is determined by dominant groups; however, non-dominant individuals may adopt characteristics of valued social capital to fit in, but this may/may not lead to a sense of belonging. However, contexts that allow for varying forms of social capital and multiple ways of knowing in order to participate, have *the transformative potential of a cultural strategy of belonging as an epistemological shift* (Bissell, 2019).

Thus, belonging is absolutely connected to larger sociocultural systems in which identity is a critical component, although what matters for belonging is different across cultural systems. For example, social support might activate thoughts of group identity cohesiveness more for participants in collectivist cultures compared with participants in individualistic cultures. Belonging attained through demonstrating the social capital of a group allows for the individual to *feel a part of a larger symbolic entity (e.g., group) that transcends the limitations of [one's] own body and expands the capacities and boundaries of [one's] own self* (Lambert, 2013). But in order for a sense of belonging to be transcendent, an organization or systemic *culture of belonging must inhabit stories, symbols, and ... the systems, policies and practices*, and must allow for multiple and intersected identities (Bissell, 2019).

In more recent studies, belonging is described as dynamic and relational: needing constant reaffirming and encouragement through cultural aspects such as ritual, history, and art, and most importantly, belonging is dynamic because it is reciprocal. Reciprocity in terms of social capital looks like relationships with other individuals (who may or may not share all or part of one's identities) within a given context, which contributes to one's sense of connectedness to a physical space, and social support (being cared about, valued and respected by others), while providing an opportunity for reciprocal acceptance, caring and valuing to others (see Strayhorn, 2019; Levett-Jones, 2007). In this way, an individual's personal experience of connection to a larger system becomes a reciprocal one in which they see how they are an integral part of/benefit that system, and how they benefit by being in that larger system. Without the presence of reciprocal relationships, belonging is merely inclusion by a different name: different from a sense of belonging, inclusion is not socially-produced by people within a space/context, but rather, it is up to the dominant group represented in the space, or the institution itself, to confer inclusion on non-dominant individuals or groups. From the literature: *A culture of belonging recognizes that we are always in a state of dynamic action and reaction. Belonging is never done and will constantly have to be remade. We're in the midst of constructing new ways to see and new ways to be* (Bissell, 2019).

b) STEM identity

In the literature on belonging in STEM, identity is picked up as a measure of motivation in STEM-related activities, subjects, and career aspirations, as well as a measure of aspects of diverse representation such as retention in STEM disciplines and satisfaction in scholarly studies and job environments. Studies in higher education have focused on belonging in distinct fields of STEM as unique communities of practice, where success is understood in terms of different levels of effort related to identity, where perceived effort towards "fitting in" becomes a cue for belonging. Belonging in STEM classes, which has been a particular focus of these studies, but also in afterschool and other informal science contexts, includes a socialization process whereby one might experience challenges/barriers to inclusion and pressure to be/act "normative" to the dominant (white, male) culture of STEM. Most often, this has been

examined through student perception of attitudes of professors and other academic ‘gatekeepers’, as well as in interactions with other students; thus, it’s been very relationship-focused. In one study, *students, through the ongoing cycle of engaging with mathematical tasks and teacher feedback, develop a sense of whether they are or can ever become members of the high-status and exclusive discipline* (Elin-Saintine, 2021). For ISEs such as museums, the focus on inclusion and STEM identity has focused on staff representation and interaction with underrepresented groups, aspects of the physical environment and content that are inclusive of an array of identities (see below).

c) Identity and place: welcoming/othering, inclusion/exclusion

There is much overlap between how an individual’s identity(ies) connect/disconnect them from an institution such as a museum or a college setting, and how individuals experience the physical environment as well as perceives the social support aspects of that space. In terms of the physical space, some of what is known to address inclusion of a multiplicity of group identities has been addressed by museums: the layout of the physical space that allows for an individual to utilize it fully, the objects in that space that are accessible to individuals, both in terms of content and process (e.g. universal design), and the presence of other individuals in the space, including staff and other visitors, who they perceive to be similar to their own identity (e.g. hiring diverse and representative staff).

In the literature, belonging is often juxtaposed with exclusion and othering, and yet belonging is more complex of a concept than inclusion. First, belonging is an emotional complex built on multiple experiences of others’ perceptions of one’s identity over time -- many of which occur outside the collective space in which one may experience belonging (or not). Belonging is governed by social norms, which are enacted by individuals within a physical space, where who belongs is actively defined and asserted. Inclusivity efforts, such as seeing others 'like' you are important, but not as important to belonging as the overt acknowledgement that identities are intersected, common interests and abilities occur across different identities, and all identities have a place in defining/creating meaning around a particularly subject, experience, or activity. This tension between inclusion and belonging based on identity is encompassed in how *cultural norms create their own spaces of belonging and expressions of belongingness that seep across boundaries that are seeking to maintain exclusion and dehumanization*.

Museums play a unique role in society as authoritative institutions that construct and reinforce collective identities, prompting socially situated identity development, *which is essential for a sense of belonging to a community of learners* (Escude 2020). The objectivity and neutrality of museums’ portrayals throughout history and into the present have been examined more thoughtfully in recent years: *The museum community is realizing that attention needs to be given to the relationship between how the public museum defines who does and does not belong through exhibitions portraying a collective past, and how the public writ large comes to understand the politics of this belonging* (Eckersley, 2017). In museum settings, connections that may bring about belonging occur both at the individual (as visitors to the museum) and the collective (as a group represented or not represented in a museum display) levels.

Identity is also connected to place through memory, which is itself a complex of identity, emotion, and social relationships. The social sciences (particularly anthropology, sociology, and design fields such as urban planning) have been particularly interested in the ways in which memory, and the emotions associated with memory, impact behavior within an environment. For museum spaces, how memory triggers behavior is crucial to the choices people make about what exhibits to pause at, which experiences to experience, and how to move around the space.

More recent attempts to adapt belonging in a museum context include the *Belonging Begins With Us* campaign, supported by AAM, in which belonging is associated with safety, feeling welcome, not being excluded or isolated, and being seen in content, authorship and participation.

Key issues to emerge during the literature review:

- a) What is the emotionality of belonging?
- b) How to deal with intersected identities?
- c) How to adapt/understand belonging from a child/teen perspective?

Museum/ISE approaches to inclusion and STEM identity, interest and engagement

Museums and ISEs have been working on efforts regarding inclusion for years, including developing and implementing specific strategies to engage, motivate, and support underrepresented groups, with the goal of impacting STEM identity, interest, and engagement. Since these concepts have laid the foundation for a shift to belonging, as well as to other areas of focus such as social impact and anti-racist frameworks for structuring and understanding museum experiences, we briefly outline/exemplify those approaches here.

Museum/ISE approaches to inclusion

Inclusion within the context of science and natural history museums considers:

- How the physical space is set up for navigation, understanding, and representation
- The role of language and culturally-relevant content and people
- Access and the sharing of authority for storytelling, design, and content
- The facilitation of participation through engagement, interaction, design, and the meeting of needs
- Institutional transformation in places, staff, structures, policies, and practices

Science/natural history museums have engaged deeply with questions of how to address disparities in STEM learning, engagement, and interest indicators. There have been many research and evaluation studies that have examined initiatives around inclusion, from developing and studying exhibits and programs designed for inclusion to examining the specific experiences of individuals from targeted identity groups. Only a few have looked at inclusion across an overall museum structure/experience. Here are some examples:

Exclusion and inclusion in everyday science learning (Dawson, 2019, see also Dawson 2014)

A landmark ethnographic study conducted by Emily Dawson examining the science museum experiences of underrepresented racial and ethnic groups in the UK. Dawson found that some science museum practices “othered those who were not ideal visitors” (2014:1003), by asserting the dominant group’s white privilege to decide: “whose knowledge was on display, whose practices were reified, whose food was sold in cafés, and whose languages formed the backbone of these institutions” (2019:143). This reinforced these visitors’ understanding that ISE and science museums were not designed for them.

Welcoming Guidelines for Museums (AAM, 2016)

In support for the development of LGBTQ-friendly policies and procedures at museums, an AAM-sponsored task force was launched in 2014 to compile the practices museums could use to better work with LGBTQ professionals and communities. The task force built out standards and ‘welcoming guidelines’ in each of 7 categories: Public Trust And Accountability, Mission And Planning, Leadership And Organizational Structure, Collections Stewardship, Education And Interpretation, Financial Stability, Facilities And Risk Management. The task force then applied the principles to functional areas, asserting: *cultivating inclusion in these functional areas can have immediate and long-lasting impacts on how a museum welcomes LGBTQ visitors and professionals.*

Exhibit Design for Girls’ Engagement (EDGE) (Garcia-Luis & Danestep, 2019)

Researchers working at the Exploratorium conducted a study examining design practices for girls/female-identifying individuals towards developing a framework for female-responsive design in exhibition and program spaces. The four key EDGE design strategies supported female learning by 1) enabling social interaction and collaboration, 2) creating a low-pressure setting, 3) providing meaningful connections, and 4) representing females and their interests.

Ability and Universal Design

Several museum and ISE-focused organizations/networks have focused on experience accessibility through the lens of (dis)ability and universal design (e.g. ASTC, 2019; CAISE, 2010; NISE Network, 2010). The CAISE example, following the social model of disability, reframes inclusion as: *more than simply gaining access into a physical structure—it is also about gaining equal access to the policies, practices, and systems that civil society affords*. It identifies three requirements of inclusion: 1) Physical interaction with/perception of the space; 2) Cognitive engagement with the materials; and 3) Social interaction with others.

Translation and bilingual museum offerings

Jensen et al (2020) as part of the NISE Network, released guidelines for bilingual design based on universal design principles, where the goal of inclusion is to make language, images, and interactive elements of educational experiences understandable to a broad public audience, including targeted bilingual audiences. Previous to this, several studies offered guidance on translation processes, seeking guidance from target community translators and cultural advisors, and approaching exhibit and program development from bilingual and multilingual frames.

Latinx audiences

Several influential projects have focused on the impact of innovative approaches to engaging with Latinx audiences. The *REVEAL* (Andanen et al., 2017) project was a design-based research project to develop a model of expert and culturally responsive staff facilitation, and then to rigorously test the impact of the facilitation model and strategies developed. The project highlighted the specific internal considerations necessary before engaging in work with community partners, particularly around facilitating informal science educational activities, such as paying attention to the organization's stance towards developing partnerships, and its internal capacity to develop cultural competence.

First a summit of educational and cultural researchers, practitioners, and leaders, the *GENIAL* (Exploratorium, 2017) project produced many recommendations about informal science program development and engagement with Latinx communities, including: 1) careful relationship building that includes the nuance of Latinx identities, attention to power dynamics, and engaging in reflective practice; 2) developing knowledge and building capacity, both internally in terms of cultural competence, and externally, with community organizations interested in being co-creators of museum-based initiatives; and 3) taking risks, allowing for experimentation, and iterating in designing for Latinx communities.

Native collaboration (Coats, Maryboy, & Begay, 2016)

The *Roots of Wisdom* exhibition, developed in partnership with tribal leaders from four indigenous cultures on the Northwest Coast, Hawaii, and North Carolina, was a project designed to foreground reciprocal relationship building and co-creation of exhibition narratives for both indigenous and non-indigenous audiences. Rather than an inclusion effort that foregrounded the expertise of the museum, the museum was an equal partner in the project collaboration, made visible and apparent to the public in the exhibition text and supplementary materials.

Making Connections (Bequette et al., 2018)

A research study on how *Making* activities (hands-on, craft, or tinkering activities) could be co-developed with community members to reflect the values of local communities. African and African-American, Hmong, Latinx, Dakota, and Ojibwe community members shared ideas about making activities and the importance of these practices to their families and communities, as well as gave feedback about their experiences at and with the museum. The project provided guidance for maker spaces as well as for museum-wide changes in terms of volunteer and staff recruitment, program development, as well as staff training concerning interactions with visitors of color.

Organizational transformation

These are efforts to change/restructure institutional policies, structures, positioning, and norms as a means to broadening inclusion and participation in informal science learning (Bevan, Calabrese Barton & Garibay, 2019). These efforts focus on how museum structures and systems have come to be centered around white supremacy, and they detail the forms of resistance to transformation that institutions enact, including: siloing equity work in specific departments/groups, under-resourcing equity initiatives or otherwise making them unsustainable, standing behind notions of expertise rather than sharing authority and promoting transparency, focusing on external and often superficial forms of inclusion of the visiting public, rather than embedding inclusion in the training, recruitment, and retention of staff and the frameworks and guidelines of museums programs, procedures, and relationships. Several toolkits have been produced to support ISE institutions in working towards transformative change in institutional policies, such as policies around collections, human resources/hiring practices, and program and experience development procedures - by the CAISE Broadening Participation in STEM Task Force (CAISE, 2019b), and the Museum as Site of Social (MASS) Action Collective (MASS Action, 2017).

Importance of STEM engagement, interest, and identity

We are focusing on engagement, interest, and identity as indicators of the impacts of feeling/lacking a sense of belong because they have been identified as the key impact areas of ISE experiences (CAISE, 2019a, 2019c, 2019d). We are defining these three STEM impact areas as follows:

Engagement. Engagement is often conceptualized as having three dimensions: affective, behavioral, and cognitive. Affective engagement can include *feeling emotional responses to activities, such as interest or frustration*, behavioral engagement can include how someone interacts with an exhibit and how long they stay there, and cognitive engagement can include *wrestling with ideas* (Bell et al., 2019: 3).

Interest. Interest is a complex concept describing a long term pattern of choices and pursuits; it has a multidimensional structure that includes affective, intellectual, and social components. ISE researchers in particular use Hidi and Renninger's Four-Phase Model of Interest Development (2010), in which initial *triggered situational interest*, with sufficient external support, becomes *maintained situational interest*, developing over time into an *emerging individual interest* and ultimately a *well-developed individual interest* where individuals are internally motivated to pursue activities related to their interest (CAISE, 2019d).

Identity. STEM Identity is defined as an individually and socially constructed sense of self, where individuals *think about themselves as science learners and develop an identity as someone who knows about, uses and sometimes contributes to science* (National Research Council, 2009: 4).

We assume that science/natural history museum visitors may bring prior engagements with STEM, interest in a STEM subject, and/or a STEM identity with them to their museum experience; we also assume that a *moment that matters* during a museum experience can positively or negatively impact someone's current and future STEM engagement, interest, and identity.

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