Designing for Diverse Museum Visitors’ Identity Exploration Around Inventiveness

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Designing for Diverse Museum Visitors’ Identity Exploration around Inventiveness

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Abstract

This paper describes the conceptual framework, methodology, and findings from an initial phase of research to inform the design of an exhibition at the Smithsonian National Museum of American History (NMAH) on the history of invention and innovation in sports. Organized by the Smithsonian’s Lemelson Center for the Study of Invention and Innovation, the goal of the exhibition is to promote inventiveness among visitors, with a particular emphasis on those from groups underrepresented in the NMAH visitor population and in the invention ecosystem: adolescent girls, African American Boys, and people with disabilities. The research is framed by the Dynamic Systems Model of Role Identity (DSMRI)—an integrative, complex dynamic system model of identity, motivation, and action—and by a set of design principles for promoting people’s agentic identity exploration. The paper describes the conceptual challenges posed by a situative identity perspective for research that aims to inform environmental design of a context that is not yet in existence and that will become relatively fixed. The paper also describes the conceptual rationale, methodology, and first phase findings from experiential focus groups and interviews with participants from the target audiences, and their implications for the exhibition’s design.
Designing for Diverse Museum Visitors’ Identity Exploration around Inventiveness

Inventiveness—the capacity to generate creative solutions to complex problems—has been highlighted as central for personal and societal success in the 21st century (OECD, 2008). However, promoting people’s inventiveness is challenging (Sawyer, 2015). The Smithsonian Institution’s Lemelson Center for the Study of Invention and Innovation (LC; https://invention.si.edu/) is currently designing a museum exhibition for the Smithsonian National Museum of American History (NMAH) aiming to promote visitors’ inventiveness. The design prioritizes promoting inventiveness among visitors from groups that are currently underrepresented among visitors to the NMAH as well as in the innovation ecosystem: adolescent girls, African American youth, and people with disabilities. In order to garner broad appeal, the LC has chosen to focus the exhibition on the history of inventions and innovations in sports, and has labeled the exhibition “Game Changers.”

The LC views inventiveness as an aspect of a person’s identity—an inventive identity. Correspondingly, it views the promotion of inventiveness as a process of identity change. Yet, there are multiple perspectives on identity that differ on assumptions regarding its stability, dimensionality, and locus (e.g., individual, activity, group, society), and regarding the role of contexts and situations in identity expression and change (Schwartz et al., 2011; Kaplan et al., 2021). To design an environment that can facilitate identity change among visitors who are likely to spend but a short amount of time in the context, the LC has partnered with applied identity scholars that approach identity from a Complex Dynamic Systems perspective (Kaplan & Garner, 2017). Together with a museum evaluation company1 and a museum exhibition design

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1 https://rka-learnwithus.com/
firm², the team has secured funds from the National Science Foundation³ to support research that informs the design so that it is successful in facilitating the desired identity change among diverse visitors, with a particular focus on the target audiences. The current paper describes the theoretical framework, methodological procedures, and findings from the initial phase of this research.

“Game Changers:” A Sports Exhibition to Encourage Inventive Identity Development

The “Game Changers” exhibition, which aims to open during the Fall of 2023, will be housed in a 3500 square foot hall in the Smithsonian National Museum of American History. The exhibition will include six areas: a Starting Line that introduces the exhibition, four Invention Motivation zones, each highlighting a core motivation for invention in sports—achieving a competitive edge, promoting health and safety, facilitating fairness and accuracy, and enhancing fun and accessibility of sports to diverse participants—and, finally, an End Zone in which visitors reflect on their visit and further explore their inventive identity.

Bilingual (English and Spanish) multimedia presentations in the Starting Line will present to visitors the focus of the exhibition on Game Changers—inventors and innovators in sports—and invite them to explore how they can be inventive in their life. Exhibits and bilingual stories of inventors and of inventions in the four Motivation Zones were selected to highlight inventors of different genders, ethnicities, and physical abilities, and inventions spanning professional and popular sports from different historical periods that involve innovations in technology as well as in norms and rules of games. The exhibits and stories in the Motivation Zones will highlight the core motivations for inventing, describe different invention processes,

² https://roto.com/
³ NSF Award #2005404: Game Changers exhibition: A sports exhibition and research study to encourage inventive identity development and broaden participation in STEM innovation
and highlight different inventive strategies. Each Zone will also include an interactive exhibit in which visitors would be able to exercise their inventive motivations and skills in a fun, game-like activity. The End Zone will involve interactive activities that encourage visitors to reflect on their experiences during the visit, view themselves as inventive in different areas of their lives, and consider an inventive project they would like to pursue. Figure 1 presents a schematic of the exhibition area. Figure 2 presents draft animated renditions of the Starting Line and the Fairness and Accuracy Motivation Zone. (For an introduction to the exhibition, view “Game Changers’—A Behind the Scenes Introduction.”)

![Figure 1: The Game Changers exhibition layout](image1)

![Figure 2: Animated renditions of the exhibition’s Starting Line and Motivation Zone](image2)
Theoretical Framework: Inventiveness as Based in Situated Identities

In this design project, the collaborative team is using the Dynamic Systems Model of Role Identity (DSMRI; Kaplan & Garner, 2017) to define inventiveness as actions that involve generating, developing, and implementing new or original ideas in response to a perceived need. The DSMRI conceptualizes actions as emerging within the person’s situated role identity: the person’s interpretation of the social-cultural role that they occupy in a particular situation and activity (e.g., student in a science class, teacher in a science class, visitor in a museum exhibition, research participant in a focus group study). The DSMRI defines role identity as a complex dynamic system (CDS) comprising a continuously emerging network of role-related perceptions, beliefs, and associated emotions that give rise to action. A basic premise of the DSMRI is that a person’s action in any situation is selected (most often implicitly) among those actions that the person perceives in the moment to be available for them for pursuing their salient goals in light of their interpretation of the situation and of their positionality in that situation. Accordingly, the DSMRI identifies the role identity CDS as comprising elements from four role-related components: ontological and epistemological beliefs (i.e., a working model of reality and the nature of knowledge about that reality), self-perceptions and self-definitions, purpose and goals, and perceived action possibilities. Elements from these role identity components, and the emotions that are associated with them and with their connections with each other, interplay in interdependent and non-linear ways to give rise to action. In turn, the internal and external feedback to the action triggers change to these components and the role identity system. Thus, the role identity continuously emerges, ebbs, and flows as the situation unfolds through the person’s participation in the cultural activity. This emergence is framed by the contextual integration of four parameters: cultural meanings and mediating tools, social positioning and
interactions, the subject domain, and the person’s unconscious dispositions. Figure 3 presents a schematic of the DSMRI.

Figure 3: The Dynamic Systems Model of Role Identity (DSMRI; Kaplan & Garner, 2017)

From this perspective, inventive actions emerge from situated beliefs, goals, self-perceptions, emotions, and perceived action possibilities oriented towards identifying creative solutions for complex problems within a person’s role identity. In turn, inventiveness (or, inventive identity) refers to those beliefs, goals, self-perceptions, emotions, and perceived action possibilities that constitute the person’s role identity and give rise to inventive action.

Correspondingly, the exhibition’s goal is to engage people who are occupying the role identity of “visitors in the Game Changers exhibition” in reformulating elements of that role identity as well as of other role identities in their life (e.g., student, parent, professional, citizen) in ways that might promote more inventive actions in situations where they occupy those role identities.

Figure 4 presents a conceptual representation of the exhibition’s goal in framing visitors’ engagement.
Design Principles for Facilitating Inventive Identity Exploration

Whereas role identities change through numerous mechanisms, the collaborative research team targeted an agentic form of identity formation: identity exploration. Identity exploration refers to the person’s deliberate internal and/or external actions of seeking and processing information and experiences in relation to the self for the purpose of self-knowledge and growth (Flum & Kaplan, 2006). In the current project, the design of the exhibition aims to scaffold visitors’ identity exploration around being inventive. This may manifest in various intra-personal and inter-personal reflection, deliberation, questioning, and experimentation concerning inventiveness in different role identities in life. From the DSMRI’s perspective, such identity exploration would involve exploring elements in the four role identity components and their relations with each other, including inventive beliefs about problems that require solution; purpose and goals of generating inventive ideas and pursuing their implementation; self-perceptions and self-definitions as creative, efficacious, value-oriented, and collaborative in inventing; and perceived inventive action possibilities such as transferring ideas across domains,
tinkering, testing-adjusting-and-retesting, and recruiting collaborators with complementary expertise for collective inventing.

To guide the exhibition design, the team is applying a set of four conceptual design principles for environments that promote people’s identity exploration that we have applied in other formal and informal education settings: (1) promoting perceived self-relevance of main inventive content (e.g., identification with an inventor; perceived self-relevance of an invention, a motivation for inventing, or an inventive strategy), (2) triggering identity exploration by creating a constructive identity tension (e.g., an experience that challenges one’s self-perception as not inventive), (3) facilitating sense of safety to explore one’s inventive identity (e.g., highlighting that mistakes are inevitable, the ubiquity of inventiveness, and the diversity of inventors; providing various spaces and different types of activities for exploring one’s inventive role identity), and (4) scaffolding identity exploration actions (e.g., prompts for intrapersonal reflection and inter-personal deliberations, interactives for experimentation, activities for identity commitment making) (Garner et al., 2016; Kaplan et al., 2014). We have labeled this set of principles PRESS (an acronym of Promoting Relevance, Exploration, Safety, Scaffolding). To inform the design of the exhibition, the goal of the research is to investigate the nature of identity exploration engagement by visitors from the target audiences in PRESS-informed activities centering on sport inventive content.

**Situative Research to Inform Environmental Design**

The situative paradigm is grounded in the assumptions that identity, motivation, learning, and their change are situated (Nolen et al., 2012). This rejection of the traditional assumptions about the cross-contextual generalizability of engagement and learning challenges the direct transfer of findings from research in a particular context and with certain participants to the
design of another context with other participants. Instead, a situative paradigm calls for research that takes place with the particular participants who are inhabiting the particular situation and that involves iterative changes to the environment while investigating the effects until the design is successful (e.g., Nolen et al., 2012; Fishman et al., 2013; Penuel & Potvin, 2021; Tierney et al., 2020). The outcomes of this research include both improved design in the particular context and more elaborated theories of the focal phenomenon and of the environmental design principles for promoting desirable processes in that phenomenon. As new contexts will always be unique, the transfer of knowledge from a particular case to the design of a new environment must be mediated by the theory and involves using the enriched design principles as a starting point in another iterative process of contextualized design-investigation cycles.

Yet, two central features in the current design project made applying design-based research untenable. First, the context of the exhibition does not yet exist. Second, once designed, the exhibition is going to be mostly fixed, with little affordances for iterative changes. Contending with these constraints framed the current study’s goal and methodology. Specifically, following assumptions of the CDS approach, while concrete manifestations of a person’s identity processes and action are situated and unique, these phenomena do manifest patterns across cases that may reflect general principles underlying the complex and dynamic system’s behavior (e.g., each pedestrian on each street is unique, yet the behavior of different pedestrians across different streets is framed by similar principles; Dachner et al., 2022). Thus, whereas each exhibition visitor’s role identity is unique, and whereas the research context is different from the exhibition context, research that simulates visitors’ experience in a context that shares characteristics with the intended environment might shed light on conceptual principles of
the visitor role identity system and engagement that could inform the design of the exhibition—a humbler epistemological goal than design-based research, yet nevertheless informative.

Correspondingly, the current study aimed to identify concrete and conceptual features of participants’ role identities, and conceptual patterns of their engagement, in a research context that simulated features of the exhibition and involved application of the PRESS principles with participants from the target audiences. Specifically, the research used the available rendition of the exhibition at the time (similar to the images in Figure 2) in an initial investigation of participants’ experiences within a research participant role identity of (a) assuming a visitor role identity in the exhibition, (b) constructing self-relevance connections between central ideas concerning sports inventiveness in the exhibition’s content and aspects of their identity, (c) engaging in identity exploration of their visitor role identity and of other role identities in the domain of sport and in other life domains, (d) feeling safe to engage in such identity exploration, and (e) engaging in different exploratory actions in ways that provide data as evidence. At the early stage of Alpha Prototyping of the exhibition, the research question was: *What are the manifestations of participants’ inventive identity and identity exploration, within the visitor role and other life roles, in the context of a PRESS-informed and facilitated visit in an early rendition of the exhibition?*

**Researchers’ Positionality**

The five-member research team that has engaged in conceptualizing the study, data collection, and data analysis and interpretation includes educational psychology scholars with expertise in conceptual and applied identity work in diverse formal and informal educational settings, an educational psychology doctoral student with experience in informal education settings, and the project directors of the Game Changers exhibition at the Smithsonian’s
Lemelson Center who are historians of inventions and museum curators, with expertise in informal education design. The team reflects diversity in age, gender, ethnicity, and immigration status; however, none of the team members shares the focal characteristics of the target audiences: adolescent girls, African American youth, or people with disabilities. Thus, the researchers adopted an epistemologically humble frame when interpreting the participants’ engagement and data—being particularly mindful about staying close to the meanings expressed in participants’ expressions.

The researchers’ inquiry worldview is anchored in the CDS perspective, with its paradigmatic assumptions about phenomena as contextually emergent, non-linear, and complex, and its practices of combining a deductive systems lens (here, that of the DSMRI and PRESS guided conceptual categories) with an inductive lens that anchors in participants’ role identities content, structure, and processes as unique and situated. We expected participants’ role identity manifestations to be varied and dependent on each visitor’s idiosyncratic life experiences and initial orientation to inventiveness. We also anticipated the designed activities to result with role identity manifestations that reflect perceived self-relevance, recognizing sport as linked to processes of invention and innovation beyond sports, and perceiving oneself as innovative in different domains in life. Based on the DSMRI, we anticipated participants’ exploration of inventiveness to involve expressions of role identity components: purpose and goals, beliefs, self-perceptions, emotions, and perceived possibilities for action, both within the visitor role and in one or more other life roles and domains.
Method

Participants

We conducted four focus groups and one interview. Two focus groups included, each, four ethnically diverse adolescent girls ranging in age from 13-17 years old. These girls were recruited through a local Girls Scouts community partner organization. In addition, two focus groups, each with two participants, and one interview with a single participant, included collectively five ethnically diverse adults with disabilities. These participants were recruited through the Access Smithsonian partner. To recruit the adolescents, we sent an interest survey with an information sheet for guardians and a scheduling form. Over twenty participants completed the interest survey, and we selected a random subsample of participants. Recruitment of the Access participants was conducted through the coordinator of the group who used the information sheet to solicit participants from its members. Participants were informed that their participation is sought to support the design of the exhibition, that the researchers seek their honest perspectives and attitudes, and that they will receive a $25 gift card in thanks for their hour of participation.

Procedure

Due to COVID conditions, the data were collected using a virtual meeting platform, which created an additional dimension of difference between the research context and the eventual context of the exhibition. Each focus group and interview lasted about one hour and was conducted virtually over Zoom. One researcher served as the facilitator and two other researchers served as off-camera notetakers, with one monitoring an automated transcription by Google.

4 Logistical challenges have hindered, so far, data collection with African American boys.
Docs\textsuperscript{5} and the other taking verbatim notes. The facilitator followed a protocol that included an introduction, prompts to guide participants to assume a visitor role identity in a virtual tour of Game Changers, descriptions of the exhibition objects, and prompts based on the PRESS principles that aimed to promote participants’ engagement in identity exploration of their visitor role identity and other life roles. Participants’ engagement included posting notes on a Google Jamboard and describing orally their perceptions, preferences, emotions, and thinking.

The Protocol

The facilitator welcomed the participants as they joined the virtual meeting and explained the purpose and procedure of the focus group. With the adolescents, Google Jamboard was used for a warm-up activity to ensure that the participants could access and use the tool. With the Access participants, the protocol was similar but did not include the Jamboard. Before the virtual tour began, participants were shown a picture of the Smithsonian National Museum of American History and were asked to imagine that they are visiting the museum. They were then presented with an image of the Starting Line of the Game Changers exhibition.

The facilitator asked the participants several questions about the self-relevance of sports and invention, including: “How interested would you be in visiting an exhibition in sports and why?”, “When you think about inventions in sports, what comes to mind?”, and “How is sport connected to your life as a player or a fan or a viewer?” Then, the facilitator asked the participants to share their definition of a Game Changer. After the facilitator read aloud a brief description of the Game Changers exhibition, the participants were asked to describe how they are game changers in sports or in other areas of their lives.

\textsuperscript{5} The Smithsonian IRB prohibits video and audio recording of participants. Unlike other transcription files, Google Docs transcription does not record and store an audio file.
Then, participants were taken through a sequence of images of three areas of the exhibition: the Competitive Edge Motivation Zone, the Health and Safety Motivation Zone, and the wearable technology and innovations in home-exercise resources. When showing the image of each area, the facilitator read a brief description of the objects in the area. The adolescent participants then used Jamboard posts to indicate the object they would like to visit first and why it interested them. Access participants responded orally (or through an ASL interpreter). Then, participants were asked to orally elaborate on their preferences, share their thoughts about the inventors and artifacts represented in the exhibition, and consider whether and how they had ever done something similar to those inventors in their own lives.

After visiting the three areas, the adolescent participants were asked to write a Jamboard note, and adult participants to describe orally or through the ASL interpreter, an area in their life where they could be inventive and how. They were then asked to explain their responses. At the end of the virtual tour, the facilitator asked the participants to provide feedback to the team about the exhibition and about their experience as participants in the focus group.

Data Analysis

Data from the automated transcription and note-taking were integrated to create a transcript of each focus group/interview. Two researchers analyzed independently each transcript of the focus groups, and Jamboard entries when available, using the DSMRI analysis guide and codebook (Kaplan & Garner, 2020). Analyses were then compared, integrate through discussion, and synthesized into emerging themes. The third researcher served as an auditor of the analysis process. The analysis interpreted participants’ actions as emerging within the role identity of participant in a virtual focus group imagining being a visitor in a virtual exhibition. The analysis then focused on generating concrete and conceptual themes pertaining to the content, structure,
and process of participants’ visitor role identity and their identity exploration of inventiveness in
different life role identities.

**Findings and Discussion**

Generally, most participants appeared comfortable about integrating the “virtual focus
group/interview participant” role identity with the imagined “visitor in the virtual Game
Changers exhibition” role identity they were asked to construe. While level of participation
varied, all participants responded to the prompts as intended, and most participants in the focus
groups reacted to, or built on each other’s words. The analysis generated four general themes
pertaining to participants’ role identities as virtual visitors and their engagement in identity
exploration around inventiveness.

**Theme 1: Initial visitor role identities were based in prior experiences characterized by
normative passivity and anchored by the exhibition’s sports content.**

Participants’ initial imagined visitor role identities were expressed in beliefs, goals, self-
perceptions, and action possibilities that reflected the normative passive visitor in a museum.
Across participants, these initial role identities involved the ontological beliefs that the exhibition
will present information about inventors and inventions in sports, and the purpose and goals of
visiting as learning this knowledge. In framing participants’ initial engagement, these beliefs and
goals were intertwined with participants’ self-perceptions and self-definitions that were based on
sports-related role identities triggered by the exhibition’s content (e.g., an athlete, a sports fan, a
viewer) and, more generally, the self-definitions as a “sport” or a “non-sport” person. This
manifested in participants’ response to the question about their interest in visiting the exhibition.
One adolescent girl participant described her interest by stating: “I think I’ll be pretty interested
because I like playing sports and being outside, so I think it’d be pretty cool to learn about, you
know, the things that made up the sports and how they came to be.” A different adolescent girl reflected the same role identity formation process when she stated: “I'm not really a big sports person. I used to do cheer but I do like sports but I'm not, I don't play sports, but I like to understand, to learn about the history.” Access adult participants reflected similar initial visitor role identities. For example, one participant said: “…when I go to any like large museum and you go, you aim to go to a couple of sections…and walk past the section that doesn't..didn't..that might not interest you. And you're like, well, on my way, like, I'll see it. But personally, I'm not as interested in sports.” One Access participant was very clear that her visitor role identity would involve interest and engagement only if it was clear that the exhibition content was concerned with diverse abilities:

> Well, I'm going to be I mean, I'm going to be honest, I don't know. It wouldn't be on the top of my list. I think there'd have to be something to really grab me. So it's interesting when [...] was speaking about adaptive sports...is that going to be integrated into this exhibition? So you're looking at sports, across all abilities? I think if it were framed that way, that would be super interesting to me, .... If it wasn't clear to me that that was part of the story, I would probably be less interested. You know, simply because I'm not a huge follower of sports.

Additionally, most participants’ visitor role identity focused on the content of sports, their history, and how the sports have changed. However, one or two participants did respond to the idea in the exhibition that sports involve inventions. As one adolescent girl said: “I think I would find it interesting 'cause like you don't really think about all the different inventions and stuff and sports.”

**Implications for design:** These findings highlight the need to incorporate into the design of the Starting Line, and of advertising materials about the exhibition, explicit scaffolds for
audience formation of expectations and formation of visitor role identities that is active, rather than passive, and that involves the purpose of the visit as engaging in identity exploration around inventiveness in life roles beyond the domain of sports.

Theme 2: Initial visitor role identities involved beliefs about oneself as not, or as minorly, inventive relative to inventors and game changers.

Initially, most of the participants expressed self-perceptions as not inventive. Almost all the participants responded to the early prompt “how is invention related to your life?” by describing themselves as consumers of inventions rather than as being inventive themselves. Notably, the prompt did generate participants to consider their life roles of invention consumers beyond sports. For example, an adolescent girl said: “I feel like invention’s connected to everything in my life, ‘cause like again like we use electricity...and I bake sometimes so just I mean basically everything’s an intervention [sic].” Similarly, an Access participant said: “I use a wheelchair. I think invention is very connected to my life, in terms of just with using a mobility device. Like without the invention of a wheelchair I wouldn't get to a lot of places.” Another Access participant stated: “I have zero talent, and creativity for this stuff... But what I, what I do like, is seeing how, over the years, and this is a little bit related to blindness, because there are certain things that we never would have thought of ten years ago. And the fact is that things that are created and developed for the blind typically make their way far more into general use than people realize.”

Some participants did describe initial self-perceptions as inventive, but almost apologetically, speaking about their inventiveness as small, and different from the inventions that define inventors. For example, one Access participant described being
inventive by mentioning her creative writing: “So I’m a writer. And so it’s not like invention, like I’m sitting here, you know, like creating the next pen and like putting stuff, but you know, it’s still a creative endeavor. And so you’re inventing new stories, you’re inventing new characters, etc.” These initial self-perceptions as being inventive but in a small way seemed to be aligned with initial ontological beliefs about inventions as grand endeavors with broad impact. As one adolescent girl stated: “I was saying that the invention is like a very big thing of expressing yourself and learning new things and creating a different mindset that others can agree with.”

Along the same line, participants initial ontological beliefs about the term Game Changers were almost grandiose, were mostly in the domain of sports, and used language that suggested relatively little self-relevance. For example, in response to the question “what do you imagine it means to be a game changer?”, one adolescent girl said “I feel like the word would have to be someone who is able to adapt to certain situations and be able to make an impact within whatever sport it is that they have and be able to make things more proactive or positive within their own sport or team.” Participants viewed Game Changers as inspirational role models, people who notice and solve problems, who are passionate, determined, and change how sport, and life beyond sport, are done. For example, another adolescent girl stated: “To be a game changer, it means that you change the current manner of doing or even thinking about something and not just in sports but everything.” Access participants viewed game changers in similar ways. One described her ontological beliefs about Game Changers as “People who have a passion, their shine, but when they want to improve sports, it's more for everyone.” Another was even more explicit: “…game changing to me is something reasonably monumental, it is a significant
new direction in something or something that is so significant that it, it has permanent permanency. That it it will have an effect for a very, very, very long time, perhaps forever. But certainly, Game Changing to me is is something quite extraordinary.” Such ontological beliefs appeared to be a hindrance to the participants’ reformulation of their self-perceptions as Game Changers or as inventors, and of aligned goals and action possibilities when asked if they did something similar to the inventors in the exhibition, constraining the reformulation of inventive experiences in life roles.

Implications for design: These findings suggests that, in addition to presenting recognized inventors who invented technologies that transformed sports, the exhibition also should incorporate inventions, inventors, inventive processes, and prompts that present inventiveness as an everyday and popular activity to promote visitors’ formation of ontological beliefs, self-perceptions, goals, and action possibilities about inventiveness as accessible and self-relevant.

Theme 3: Imagining and exploring inventiveness in sports-related and other existing life role identities (current and future) were triggered by the perceived self-relevance of the exhibition’s content to those role identities.

Participants gravitated towards exhibition content that they perceived as self-relevant to their sports-related and life-related role identities. For example, one adolescent girl noted her interest in an innovative swimsuit exhibit by expressing the self-relevance to her swimming-athletic role identity: “I wanted to look at the swimsuit because I swim competitively and I think it would be cool to look at how something in a sport that I’m interested in changed so much.” Another adolescent girl constructed self-relevance of an exhibit describing a prosthesis to her future-imagined role identity in the medical field: “I have a strong desire to become something
within the medical field and hearing about the invention with prosthetics, it really intrigued me because I’m really into STEM and that, you know, consists of physics, like anatomy etcetera.” An Access participant described constructing self-relevance of these two different exhibits in the Zone to two self-perceptions and self-definitions in her visitor role identity of having a disability and being committed to social justice: “I think the Para-athlete, because you never see disabilities exhibited in a museum. It’s so inspiring for me to see that. Now, that’s on one part. The second part, I’m more interested in the swimsuit… Because I think it's very controversial...because... not all athletes could afford that. So that became an unfair advantage to those who, who had the means... and that makes me think, also of the social issues.... I think I like that best because of the social justice issue, but I gotta say, I'm going to go back to my first choice, which was the, the para-athlete with the foot. I think both really. I'm torn.” Participants across groups also commented on being drawn to the exhibit presenting wearable fitness inventions that they perceived to be self-relevant as well as relevant to “everyday people.” As one adolescent girl noted: “I would want to look at other wearable technology because it’s cool that people have invented things to help everyday people who maybe are sick and have to go to a doctor often and manage their health the way you could in a doctor’s office.”

**Implications for design:** The findings suggest that the exhibition is doing well in incorporating diverse primary content that provides opportunities for constructing self-relevance by visitors with diverse backgrounds, interests, ages, and abilities, with an emphasis, perhaps, on the visibility of popular-interest activities. The findings also suggest that the exhibition should include prompts that scaffold visitors’ self-relevance of exhibition content to which they might not do so readily—for example, by asking visitors to consider how a certain inventor story, a
particular invention, or a certain process of innovating could be related to their life (cf. Hulleman & Harackiewicz, 2009).

Theme 4. Promoting identity exploration around inventiveness in life required different types of scaffolds for different participants.

Participants differed in their readiness to explore inventiveness in their sports and other life role identities. Two participants responded elaborately to prompts that asked them to consider the role of inventiveness in their life, and whether they have engaged in something similar to what the inventors in the exhibition have done. These participants, who seemed “exploration-ready,” elaborated on inventive role identities they have already enacted. For example, an adolescent girl described aligned inventive ontological beliefs, goals, and actions related to immigrants’ language challenges that she enacted in her role identity as Girl Scout completing her Gold Award activity. Notably, she seemed apologetic that it was unrelated to sports:

Me personally, I don’t think it relates to sports, but I would have to say my Gold award did help adhere to the goals I wanted to do and, for me, I feel like I was able to invent something to be more efficient for others. I based my Gold award on education for minorities and how immigrants have a really hard time, you know, learning English and coming to a new country and adapting to the new lifestyle they have here. So, I create a free online tutoring center and partnered with a book company to provide them with free books in Spanish and English so that they could be tutored and have their transition to America become less stressful, especially during these times. So, I think that’s innovative in my head.

Most other participants required more scaffolding to engage in exploring their inventiveness in life. For example, the Access participant in the single interview initially responded to the question whether they did something even a little similar to the
inventors in the exhibition by saying: “No, nothing that I can recall.” Yet, later on, after hearing more examples of inventors at the exhibition and prompted further, the participant described an administrative professional role identity in which they engage with others in inventive problem-solving: “we have tried to improve our services with the academic side of the [institution]. We have a lot of deaf-blind visitors, so we have been collaborating with the academic departments trying to be inventive and creative to meet their needs.” Still, the participant continued to express self-perceptions as not inventive even later in the interview.

The experience seemed somewhat different in the focus groups, where scaffolding occurred both by the facilitator and by peers. It was when prompted, that one Access participant noted that, having a disability requires them to be inventive: “Yeah, all the time. As a wheelchair user, you're always having to [be inventive], you know, in a world that is is not always wheelchair friendly. You're always having to, to adapt and find solutions. So it's, yeah, it's very much a part of my life.” It was then that the other participant in the focus group elaborated on an inventive action within her role identity as a wheelchair user, beginning by indicating the role of the peer in scaffolding their recollection and identity exploration of this incident as being inventive, and as just one instance of many in her life:

“Yeah, I would agree. When you answered the questions, one of the first things that came to mind for me was, recently, I mentioned being a chair user, and this challenge with my feet when I'm pushing, that they don't stay in the right position, but I couldn't find the right, I guess the right strap for my feet that would work comfortably. So I ended up looking at different items that were not exactly a strap, were not created to be straps for feet. And I found like this [thing], looking like a belt, that is not a
traditional belt, it’s just like a different looking belt I, I found, and I like
quartered it to see if that would work for what I needed, and it turned out
great. And I used it as like my, my foot strap; but it’s not really a foot
strap. It’s like an untraditional belt. But yeah, those those things, just,
yeah, there’s a lot of inventions. And sometimes they just don’t work.”

Some of the adolescent girl participants manifested a similar process in which the
combination of the facilitator prompts and peer responses served as scaffolds for their
inventive identity exploration. These were commonly initial explorations of certain role
identity components in a particular life role. But the instances demonstrated the potential
of contextual scaffolding to promote such identity exploration. For example, towards the
end of one focus group, after hearing a peer describing an inventive project and prompted
by the facilitator to consider where in their life they could be inventive, one participant
described ontological beliefs regarding a problem she identified in her role identity as a
gymnast, and an aligned general inventive goal, again, apologizing for the smallness of
her idea: “I’m sorry this is so specific. I do rhythmic gymnastics and I know personally
and a lot of my friends as well when we compete we get a lot of rug burns and so I think it
[would] be nice to invent something that could prevent that while also keeping the same
look of our leotards that we have...” A peer followed immediately with an inventive
example, while also apologizing for the specificity of her idea in her role identity as a
Girl Scout: “Mine is also very specific. I said I could invent things to help with crochet
because there aren’t really a lot of ergonomic tools so that people who have arthritis and
other joint problems may have to give up.” These initial exploratory examples, which
were followed by a third participant’s statement about inventing different study habits to
help students in school, demonstrated how some participants were able, with scaffolding,
to go beyond the sports content that was presented in the exhibition to explore being inventive in other life roles.

Still, some of the younger participants seemed to have less developmental readiness for identity exploration and may have required more extensive scaffolding than what the focus group context provided. These participants’ expressions about being inventive when prompted at the end of the focus group were general, vague, and distal.

For example, one participant said: *I would love to be able to help and advocate for the creation of mental health programs throughout the nation...*” And another referred to a goal within her Girl Scout role by saying: “*My idea for my Gold Award is basically about helping my generation and they are more about having good food but in a healthier and fresh way... so I would like to teach people that they can grow their own food...*”

**Implications for design:** Each visitor’s extent and nature of inventive role identity exploration in the exhibition would vary depending on the contextual integration of their developmental readiness, background and prior inventive experiences, and the contextual mediating tools and scaffolds by the exhibition’s and by other visitors and how these unfold throughout that visitor’s visit. In addition to including diverse examples of accessible inventiveness to diverse audiences, the exhibition should incorporate scaffolds that involve exposure of visitors to other visitors’ identity exploration about their inventiveness, as well as scaffolds for intrapersonal and inter-personal interaction around being inventive.

**Conclusion**

The DSMRI emphasizes the separation between the role identities that the participants’ occupied during the data collection in the current research and the role identities of visitors in the
Game Changers exhibition, those that the exhibition aims to impact. This raises questions regarding the relevance of the research findings to inform the exhibit’s design. Yet, the DSMRI also provides a conceptual framework for designing a methodology that integrates such role identities as much as possible. In the current research, this integration was between the Research Participant Role Identity and the Imagined Virtual Visitor to Game Changers Role Identity. Whereas the latter role identity is different from the Visitor in Game Changers role identity on many dimensions, it was the closest under the circumstances, and the principles derived from participants’ experiences and expressions as they enacted it provided important insights to inform the exhibition’s design as well as into an emerging theory of inventive identity and its exploration among people with diverse characteristics.
References


