

# Reframing Interaction: Designing for Disciplinary Participation

Lisa Brahms, University of Pittsburgh Center for Learning in Out of School Environments,  
Learning Research and Development Center, 3939 O'Hara Street, Pittsburgh, PA 15260,  
Email: ljb37@pitt.edu

## Abstract

A central issue of designing informal learning environments is balancing highly engaging experiences with deep disciplinary content. This study uses the construct of *framing* to examine one approach to balancing this inherent tension through a collaborative design process between a group of contemporary artists and a children's museum. By focusing on the ways in which participants frame and negotiate the shared experience of design, this study provides insight into designing interactive learning spaces that enable meaningful participation for all involved in their creation and use.

## Introduction

A central issue of designing interactive learning environments is balancing highly engaging experiences with deep disciplinary content. In this study, we examine one approach to balancing this tension through a collaborative design process between a group of contemporary artists and a children's museum.

Similar to the ongoing debate and industry-wide struggle for videogames to be considered spaces and mechanisms for authentic disciplinary learning (Barab et al., 2010), the notion of museums as places of learning is a very new concept in the long institutional history of museums.

As physical venues designed to offer their users first-hand, self-directed experiences with authentic disciplinary objects and practices, museums face an identity conflict: Do they exist as keepers and stewards of the world's material heritage and authoritative scholars of cultural history; or do they exist as interpreters of culture for a diverse visiting public? Of course, museums do both. But, as a result of this historical identity conflict, museums, by and large, are still wrestling with the question of how to support learning in meaningful ways. Such discontinuity presents challenges to the learning context, as the disciplinary objects and concepts on display become caught in a kind of tug-of-war between the professional desires of a field of experts, and the learning needs of a novice public. So, how do museums balance these competing tensions to design a meaningful learning experience? This study explores the work one museum is doing in their effort to find this balance.

The Children's Museum of Pittsburgh is committed to providing families a comfortable and safe space to experience creativity and curiosity through play, as well as to inspiring their community to think differently and innovatively about their world. This is done in two notable ways: through the in-house exhibit design philosophy, "play with real stuff," which promotes an organizational dedication to original contemporary design and material familiarity for visitors, and through commissioning, exhibiting, and cultivating established and emerging contemporary interactive artwork.

One avenue of cultivation is the Museum's annual *Tough Art* residency. Each summer, four emerging artists are invited to develop a work of art that preserves the artist's intention,

while becoming responsive to, and able to withstand the hands-on environment and audience of the Children's Museum. Artists do this through observation of visitors, critical dialogue with each other and museum professionals, prototyping their artworks on the Museum floor, and modifying their work in response to these experiences.

### **Study Design and Theoretical Foundation**

In this process, the question of meaningful participation emerges within the principal design tension, or tug of war, between the Museum's commitment to providing powerful interactive experiences through designed exhibits, and the artists' intention to make a personal contribution to the discipline of art.

This ethnographic case study included the participant groups of artists, museum staff, and visitors. Qualitative data, gathered through participant observation includes transcribed interviews with participants throughout the design process, as well as collected artifacts, naturalistic observations, field notes, and audio recordings of participants' activities.

We use the theoretical construct of *framing* to analyze this collaborative process. Framing is the theoretical construct used to determine how an individual or group begins to answer the often tacit question: What is it that's going on here? Framing has primarily been used within the context of science classrooms as a tool for understanding the ways in which students frame their activity with respect to knowledge and learning and how these framings can be more or less productive for advancing instructional goals (Hammer, et al., 2005; Hutchison & Hammer, 2009). In this case, we map this approach onto an artist's trajectory of experience through the Museum's residency as a way to help explain the inherent tension in designing interactive disciplinary learning experiences.

Framing is a dynamic cognitive process of aligning events and objects of prior experience into relationship in present experience (Tannen, 1993; Hammer, et al, 2005; Hutchison & Hammer, 2009, Scherr & Hammer, 2009). When learners approach any context of activity, they bring to that context bits of knowledge, or cognitive resources, and histories of participation in past experiences that combine to compose a "structure of expectations" (Tannen, 1993). As individuals and groups work to frame an experience, they may attend to different environmental affordances (Gibson, 1918/1979)—signals, signs and triggers of expectation—which activate certain cognitive resources and indicate the type of activity in which they are engaging. As a result, participants may alter the framing when it appears appropriate. In this way, aspects of framing may shift, while others remain rather "sticky" or impervious to change (Hammer, et al, 2005; Hutchison & Hammer, 2009). Over time, participants may progressively refine and reorganize their activated resources, accommodating new resources, and building up a more coherent or meaningful pattern of activations for use in the specific context of activity (Scherr & Close, 2010).

Analysis of artists' participation over the course of the residency revealed that artists were using two dominant framings to make sense of their practice-in-context, those of art and exhibit. These framings become explanatory lenses for the tension, or tug-of-war, between disciplinary content and learner engagement.

To locate these shifts in framing, segments of artists' interviews that related to the artists' process and pieces were lifted. Each segment was then coded and charted using a five-point scale on both art and exhibition. Degree of "artness" ratings were based on artists' self-defined notions

of art and their artistic process. A rating of 5 means that the artist's statement reflected a high degree of commitment to their concept of art and artistic practice, whereas a rating of 1 means that their statement did not. Degree of "exhibitness" ratings were based on the Museum's notions of successful exhibits and site-specific design. A high score on this dimension includes consideration of visitor perspective, simple intuitive visitor use, length of time visitors spend with a piece, methods of engagement for diverse audiences, the iterative process of design, and the robustness and reliability of a piece. Graphs were made for artists at each major interview time-point, allowing us to see artists' shifts in framing over time. The figure you see reflects the proportionate values of one artist's statements at each time-point across his trajectory of participation in the tough art residency (Figure 1). Here, we tell the story of an artist whose experience in the residency exemplifies this dominant tension between framings of art and exhibit.

### **Blaine's Concept:**

In anticipation of the Tough Art residency, Blaine proposed projects that would evolve a specific area of his recent practice that he termed "performative installations." These are inflatable sculptures made of found and recycled materials such as cardboard boxes and household plastic bags. The sculptures inflate in response to motion sensor signals from the movement of the sculpture's adjacent viewers. As such, his work is intentionally interactive in that it depends on visitor movement to inflate and animate the pieces. Yet once the works are inflated, Blaine explains that the viewer becomes "nothing more than the viewer, you know, just bringing a lens to the piece that already exists." In line with this comment, Blaine makes it clear that his work is never created for an intended audience. Rather, Blaine creates art for himself. However, he hopes that his art, like all good art, removes the viewer from their everyday experience: "...makes you see the world differently."

Through his initial interview, Blaine identified two salient interrelated practice-based resources that he brings to the creation of his work: material choices and relational aesthetics. Blaine's choice and use of materials are integral to the conveyance of his artistic intention. Through his previous use of familiar materials such as cardboard boxes and recycled plastic grocery bags, Blaine makes comments about the socioeconomic consequences of humanity's actions. Blaine sees his pieces as somewhat fragile "creatures" that, as a result of his material choices, "have a life span" in that they grow, through the inflation of air, and over the course of a few months, expire.

Blaine's resource of relational aesthetics is the practice of allowing the environment in which a work is exhibited to influence the creation of the work itself: "so I come in with a bunch of ideas...but until I find a room and how that room works, and for lack of a better term, the energy in that room...my piece is going to be pretty malleable to different things."

Blaine incorporated these practice-based resources into the structure of expectations with which he approached the residency. Before the residency began, Blaine saw the Tough Art experience as an opportunity to develop his practice in a new direction:

For like two or three years I've been working on inflatable installation and I have it down, pretty much. To the point where I'm kind of, well it just needs to evolve into something else. Because I've mastered what I can do with it, but now it's like okay we're going to make them extra durable and they're

going to change and [through] their durability their meaning is somewhat going to change (Figure 1, Concept, 4, 5).

In accordance with his practice of conveying meaning through material choices, Blaine recognized that in order for his work to become durable, the materials he chooses to use will have to change, and with this, the intention and conveyed message of his work will necessarily change. At this point in the process, Blaine welcomes and is encouraged by this possibility for change-in-practice. Since he is speaking about intentional changes in his art practice, this statement was given a *five* on the art dimension. And since robustness is a clear component of a successful exhibit, it was given a *four* on the exhibit dimension.

Similarly, he looks forward to the ways in which the context of the residency, which includes the affordances of the physical space of the Museum, as well as the people with whom he will interact, will influence the creation of his piece as he activates his resource of relational aesthetics:

It's [artwork's concept] just going to keep going through permutations in my mind until I actually get into the space and start working. Once I'm in the space and once I'm talking to people from the museum...that's going to get up the ability for me to make choices about things, limitations are going to occur, and the piece is going to be able to form naturally that way (Figure 1, Concept, 5, 5).

Blaine's structure of expectations includes the affordances of a dynamic, collegial environment for evolving an existing line of practice in a productive direction when combined with his own practice-based resources. At this point, before the residency begins, Blaine is clearly framing his experience as art making. The context in which he creates will influence his work in a similar manner to previous contexts of his creation. Rather than presenting a challenge to his practice, this influence is an opportunity for artistic growth.

### **Blaine's Plan:**

The week-long orientation to the Museum and residency introduced, what for Blaine, became the dominant practice-based tension of *designing exhibits for others* versus *creating art for oneself*.

"It's an ongoing conversation back and forth in my mind and it all kind of came out of orientation. I started off feeling like I needed to compromise what I wanted to do, and that I needed to make it this design element, tough thing. Do something that wasn't what I do, to make it fit into the museum." (Figure 1, Plan, 4, 1)

Consequently, Blaine began to notice unanticipated affordances of the Museum, and to draw upon a different set of practice-based resources to negotiate his framing of his own practice-in-context.

For example, Blaine recognized that the context of the Museum demanded that his work be made for the explicit audience of children. Being immersed in the Museum, prompted Blaine to reconsider his understanding of children; their view of the world, and their use of materials through play:

I was reminded of how children if you give them one thing with it's intended use and they will find five other uses for it. So the way they look at the world- the open-mindedness and the latitude with which they look at the world. I was reminded of that. And also reminded, you know, literally, how tough children can be on things. How destructive. But also at the time same, very creative. (Figure 1, Plan, 5, 2)

Initially, this realization presented a conflict between Blaine's traditional practice of making for himself, rather than for the viewer, and with that, his choice of materials:

"You know, I build—I make my work, and people experience it. But it's just having to have these other considerations, you know? Like it needs to be durable—especially with what I do. The thing that is difficult is the context with which children see inflatable things. It's bouncing jungle gyms...[but] if I use more durable materials, then it's not really my work, I'm changing too much. Um... and I want to stay true to the conceptual basis of how I work. (Figure 1, Plan, 4, 2)

Upon reflection, Blaine was able to use these perceived affordances as tools when viewing them in light of his own practice-based resources.

I'm coming to a nice compromise where I'm like okay, I can cater to kids somewhat, because I do think they have the best imaginations and through orientation I started watching how children interact here, I'm thinking how they've interacted with my pieces in my past. And so there's nothing wrong with creating specifically for them, and I can still do it in my manner. It's a realization of the line between what I do and working for someone else and how to make that balance. And orientation presented that issue and then helped me figure that out. (Figure 1, Plan, 3, 4)

Establishing this tension, Blaine has begun to call upon his own practice-based resources and histories of participation to help him negotiate his framing of experience-in-context.

### **Blaine's Prototyping:**

Mid-way through the residency, Blaine's conception of his work in thought and form had changed dramatically, due in large part to his commitment to finding the "balance," or what could be called *frame alignment* he had spoken of months earlier.

This fine line that you're walking. Being true to yourself as an artist and being able to satisfy the requirements of this program, um for an interactive art piece that has properties of being an exhibition...So that's been both a struggle and something that's very interesting and a unique challenge. It's a very different beast than just creating a piece. So that's kind of dominated my thinking. (Figure 1, Prototype, 3, 3)

In order to maintain the identity of his piece as a work of art, as opposed to exhibitory, Blaine further called his practice-based resources of relational aesthetics and material choices into action in ways both consistent with his traditional practice, as well as in ways highly influenced by the immediate affordances of the context.

Artists were allowed to choose any physical space within the Museum to position their work. This site-specificity enabled Blaine to employ his practice of relational aesthetics, or creating work in response to its physical environment. Blaine chose to create his piece in the Museum's art studio. This is a light and airy, historic room with a large dome ceiling. In response to the architecture and aesthetic of the room, Blaine altered the materials he chose to use in its composition, and with it, the appearance and intention of his piece.

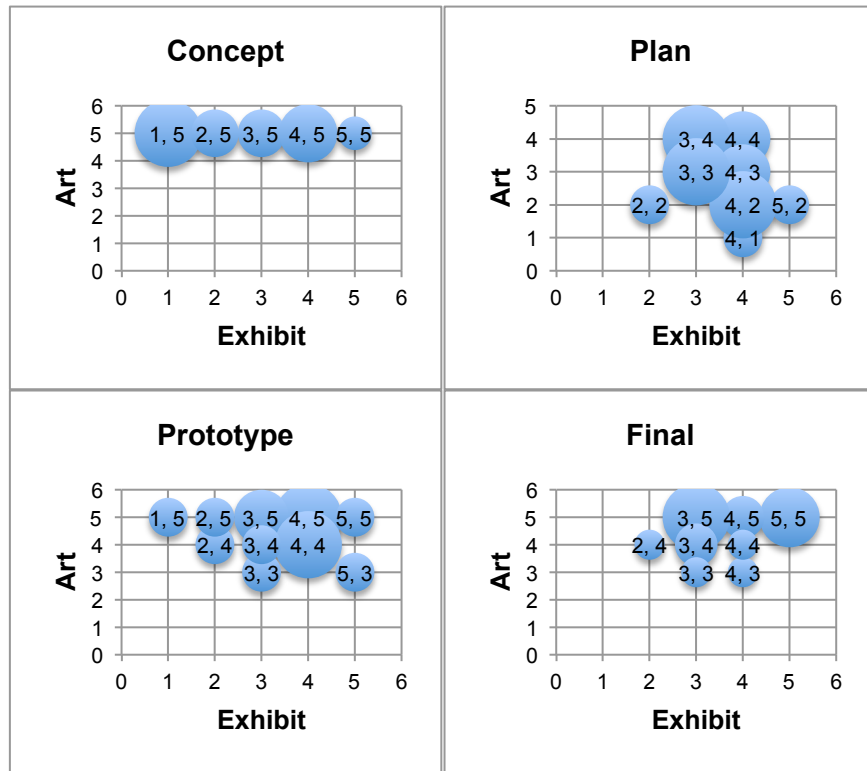
It's become much more streamlined in the use of materials. What I originally really wanted to do, it wouldn't match the room that I'm responding to so something that was more amorphous and very weighty has become something that's much more linear and lighter to match what happens with the room. So there's been a big change. But that's not uncommon when I work. You start with one idea and you just have to stay receptive to the work speaking back to you. And in this case there's a lot of things you need to pay attention to speaking back to you. The space, the work, again the nature of making this thing that children can interact with but still realize is a work of art...(Figure 1, Prototype, 4, 5)

Rather than continuing to think of the charge of creating explicitly for children as a discordant constraint, Blaine began to see this affordance through his resource-based lens of relational aesthetics—the physical environment expanded to include the relational context.

The program-based requirement of prototyping was very influential to Blaine's overall process of creating. As the physical space initially guided Blaine's understanding of the form his work should take, prototyping aspects of his work on the Museum floor with visitors furthered this line of thinking as it informed the kinds of visitor interactions his piece would elicit.

The first prototype, the kids took the hose and started blowing it around, so I thought about how wonderful and how beautiful it was...so it influenced the interaction, but it also started to influence the form the piece is going to take because then I started thinking about *moving* upward into the space, as opposed to just *looking* upward *at something*... (Figure 1, Prototype, 5, 5)

Visitor use of his prototypes helped Blaine to notice features of the context differently than he had previously, and allowed him to recognize how such features could become usable affordances when combined with his practice-based resources. Whereas before prototyping, he looked solely at the physical features of the space, now he was able to see how visitors' intuitive and unexpected use of environmental features, such as a child's natural inclination to put a tube in a hole, and the joy of blowing air in the face of a friend, could be purposefully utilized in the intention and animation of his art.



**Figure 1. Blaine's Trajectory of Participation, Framing Analysis**

**Concept:** 1 week before residency begins

**Plan:** 8 days into the residency

**Prototype:** approximately 50 days in the residency

**Final:** approximately 90 days in the residency

### Blaine's Final

Between Blaine's prototype interview and the opening of the tough art show, his piece further changed in numerous ways. What began as a primarily inflatable form became an installation of winding tubes and pipes through which air passed, filling the art studio with whistling sounds. Tubes, affixed with handles, encouraged visitors to experiment with connecting the loose ends of streaming air to different holes in the body of the structure, thus producing various tones, depending on the combination of tube, pipe, and hole. Blaine chose to include relics of his former practice, by capping the tops of some pipelines with a Mylar or plastic grocery bag.

Through his resource-based practice of responding to his context, Blaine was able to make material choices that were both satisfying to his art practice, as well as robust enough to withstand constant family use. Rather than sticking with his traditional, fairly fragile materials of cardboard boxes and reused plastic grocery bags, Blaine instead turned to other, more robust materials—plumbing and air duct tubing—that were familiar to visitors, and for Blaine communicated an intention consistent with his art practice.

Negotiating this shift in framing, Blaine activated and combined his most resonant cognitive resources of relational aesthetics and material choices in new ways, enabling the context to feed, rather than restrict his process. This progression, led Blaine to mine and discover a useable combination of affordance and resource that allowed him to fulfill his personal expectation of growing his art practice:

An intentional device to create sound, I've never done. So that was a good one for me. And honestly that was just through listening to materials, which I always try to do. Like what is it's basic nature? What is it used for? How can that be altered? So realizing that piping is more or less just a vehicle for air passing through, all of a sudden it's like, "oh that's exactly what a pipe organ is, or a recorder" so I was like, "okay, can I work with that?" So that was new, and that was fun (Figure 1, Final, 3, 5).

Although Blaine openly resisted the framing of exhibit to interpret his process and piece, in the end, he found true value in his audience's experience of his work. When asked what aspects of his piece were most successful, Blaine immediately replied:

Watching the kids, watching them put it together. I give them enough of an idea about the language of how to operate it that they see the holes, they see the pipes, and they kind of figure it out. So watching them do that, and then watching with their parents help, discover the rewards for their actions (Figure 1, Final, 4, 3).

This shift in framing, which recognized the exhibit-minded considerations of simple intuitive, collaborative visitor use, and diverse methods of engagement for different audience demographics, were balanced by Blaine's unwavering fidelity to his practice-based resources, as well as his commitment to conveying his artistic intention:

I liked that I was able to use everyday materials for a different purpose, that's big with what I do, and that was pretty successful. Sometimes you can use new materials and you're not using them in a very innovative way...But it was transformed enough because I used plumbing supplies to make music and to make inflatable sculpture...So more than anything I was just happy it did its job to change peoples mindset about the everyday. (Figure 1, Final, 5, 5)



Through the ongoing and, for him, rather explicit negotiation of framings of art and exhibit, Blaine was able to find a comfortable place of overlay. By progressively attending to the diverse and unexpected affordances of the context, and purposefully activating his own practice-based resources, Blaine participated in personally meaningful participation-in-context.

## Conclusion

I have used the theoretical construct of framing as a tool to unpack the inherent tension between audience engagement and disciplinary content when designing interactive learning experiences for children and families. The tension at play in this case is emblematic of those inherent to any disciplinary design: when intentions of the artist or designer mingle with the objectives and learning goals of the client or user. Shifting and aligning framings is no easy task, and the process of frame negotiation may be different for diverse participants depending on the resources they choose to activate and the affordances to which they attend. Locating these points of difference and tension, as well as those of overlap and balance between participants' framings of experience, we may better understand notions of meaningful disciplinary participation in spaces of informal learning, and ultimately design experiences that enable meaningful participation-in-context for all.

## References

- Barab, S. A., Gresalfi, M., Dodge, T., Ingram-Goble, A. (2010). Narratizing disciplines and disciplinizing narratives: Games as 21<sup>st</sup> century curriculum. *International Journal of Gaming and Computer-Mediated Simulation*, 2(1), 17-30.
- Gibson, J. J. (1986). *The ecological approach to visual perception*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc. (Original work published 1979).
- Hammer, D., Elby, A., Scherr, R. E., & Redish, E. F. (2005). Resources, framing and transfer. In J. Mestre (Ed.), *Transfer of learning from a modern multidisciplinary perspective* (pp. 89-120). Greenwich, CT: Information Age Publishing.
- Hutchison, P., & Hammer, D. (2009). Attending to student epistemological framing in a science classroom. *Science Education*. Wiley Periodicals.
- Scherr, R. & Close, H. (2010). Transformative professional development: Cultivating concern with others' thinking as the root of teacher identity. Proceedings from the 9<sup>th</sup> *International Conference of the Learning Sciences*, Chicago, IL.
- Scherr, R. E., & Hammer, D. (2009). Student behavior and epistemological framing: Examples from collaborative active-learning activities in physics. *Cognition and Instruction*, 27(2), 147-174.
- Tannen, D. (1993). *Framing in discourse*. New York: Oxford University Press.