



Designing Space for Participation: Insights from The Tech Museum of Innovation and the Stanford d.school

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Our culture, as mirrored back to us through our cultural products—media, technologies, and institutions—is becoming increasingly participatory (e.g., Jenkins, 2006; Simon, 2010). Museums are not excluded from this shift (e.g., Greenberg, 2012; Simon, 2010). No longer are museum visitors passive consumers of information; visitors now adopt active roles, co-create their experience, and engage their own creativity. How do we signal to the visitor that these different, and perhaps unexpected, behaviors are appropriate? How might we embed *invitations to participate* as elements of our space design?

In this paper, we share an approach for designing spaces for participation. We present case studies of space design from the Hasso Plattner Institute of Design at Stanford University [the d.school] and The Tech Museum of Innovation, borrowing a prototyping methodology and space design framework developed at the d.school. The d.school was particularly suited to share insights with The Tech as both institutions ask participants to set aside expectations associated with the type of institution (university or museum, respectively) and dive into collaborative, hands-on design activities. Through an intensive iterative process of designing its own space as it moved four times in its first five years, the d.school Environments Collaborative has built expertise applicable to any institution concerned with how space affords varieties of participant engagement (Doorley and Witthoft, 2012). Below we share insights from the d.school and from The Tech's experiments with space design that were part of an ongoing full museum redesign effort.

Invitations to Participate

“Researchers believe that scripts are the basic building blocks for people’s structured knowledge, a basic means through which they organize, interpret, and predict their world” (Falk and Dierking, 2000, p. 48). Upon entering a specific context or venue for the first time, we understand what behaviors are appropriate by drawing on our internalized *social scripts* (Schank and Abelson, 1977). We learn these context-dependent ways of behaving primarily through social means (Bandura, 1971). However, we might also think of behavioral scripts as embedded in the design of a space; they can be explicit, such as signage directing foot traffic in an airport, or implicit, such as displaying a precious object in a glass case. In a museum setting, designers often rely on signage (explicit scripts) to direct how individuals interact with and understand an exhibit. However, subtle design elements (implicit scripts) can be even more effective at guiding behaviors by virtue of their affordances and cultural associations (Norman, 1988). Embedding *invitations to participate* as implicit scripts in a space requires taking into account a combination of interrelated variables. At the d.school and at The Tech, in order to parse the complexities of interaction in space, we adopt a rapid prototyping process for testing ideas at scale and utilize a framework for the properties of space design, as described below.

Prototyping to Learn

No matter how well supported by theory or prior experience, designers’ assumptions about how visitors will engage with exhibits, programs, and events often fall short once the final

product is activated by visitors. For this reason, it is useful to create quick, low budget prototypes to test with visitors prior to making implementation decisions. (Simple materials, such as cardboard, masking tape, and boxes, are enough to get started.) Prototypes are useful to answer specific questions about the physical, aesthetic, and interactional properties of a design, and they also uncover unforeseen opportunities for design. Prototyping early in the design process and building prototypes that are at scale and *in situ* allows designers to observe interactions within the space at an experiential level and evaluate ideas with a spectrum of variables at play.

Properties of Space Design

As the d.school Environments Collaborative redesigned the d.school space over multiple years and across several buildings on campus, their observations resulted in a framework for understanding properties of space that afford different types of participation. Three properties (posture, orientation, and density) deal with aspects of the people who populate the space. Three more properties (surfaces, ambience, and storage) address features of the infrastructure itself. With regard to space design, we can intentionally design for:

1) the types of **postures** the space affords, 2) the **orientation** of assets and people within the space, 3) the **density**, or the size of the space in relation to activities and assets within it, 4) the **surfaces** that support activities that take place there, 5) the ways that lighting, sounds, color, and other aesthetic elements can shape the **ambience**, and 6) the **storage** or open access to usable assets within the space. (For a full description of these properties,



The d.school Studios are not traditional classroom spaces. Students and teachers have access to a variety of assets and seating options so that they might design the space with intent. Photo courtesy of Noah Webb.

see Doorley and Witthoft (2012), pp. 43-46). These properties are meant to provide a discernable set of tools for anyone—designers, teachers, students, curators—to modify for designing with intent towards envisioned participant engagement. Below we describe space design projects at the d.school and at The Tech that apply this framework of properties of space design as we prototyped *invitations to participate*.

Supporting Varieties of Participation

Objects within a space shape how individuals embody the space and where individuals direct their attention. For instance, in concert halls, audience members sit back in seats that are oriented toward the stage; there is no question where the primary action will happen. In traditional classrooms, there is a similar orientation with an audience (the students) facing the performer (the teacher). Learning spaces at the d.school disrupt that familiar classroom arrangement. The Studios, which house most classes at the d.school, are populated with a core set of props (moveable tables, seats, foam cubes, and whiteboards) and infrastructure to support a wide range of activities. A tool as simple as a table can affect team posture and orientation—and, ultimately, team dynamics. For example, the standard

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The default setting of a d.school Studio is a “blank slate” with assets stored at the edges of the room. This design allows participants to quickly set up of a wide range of room configurations to match their needs. Photo courtesy of Scott Doorley.

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Studio table at the d.school, the “Periodic Table,” is tall and square (see Doorley and Witthoft, 2012, pp.28-29). The shape of the table is intended to promote equality of participation (there is no “head” of the table) and momentum *up*, so that team members are oriented towards each other and any member of the team can rise quickly to position themselves actively in front of the group. A variety of seating options at the d.school also pair posture



Full-sized cardboard prototypes of the Social Robots exhibition at The Tech allowed space designers to test visitor interactions before the final implementation. Photo courtesy of The Tech.

and orientation with intent. For instance, small foam cubes work for activities where movement, such as bouncing and fidgeting, is appropriate, and mobile couches support casual and intimate activities, such as a team debrief.

With the d.school Environments Collaborative, the Exhibits Team at The Tech prototyped spaces for visitors to engage in collaborative idea generation. With surfaces, seating, and walls quickly made from cardboard, boxes, masking tape, and simple tables and stools, we prototyped three spaces that varied in terms of visitors’ posture and orientation: sitting on low stools, sitting on tall stools behind a table, and standing. The three spaces supported different types of visitor behavior: visitors in the low stool arrangement were easily distracted, and a few exited the activity space prior to the end of the brainstorm activity; the table and stool arrangement afforded two simultaneous visitor behaviors: visitors in repose with arms and/or knees resting on the table and visitors actively participating alongside the facilitator; the standing arrangement allowed for the most evenly distributed participation across visitors, who simultaneously contributed their ideas on the vertical writing surface. Observing how the seating and surfaces afforded different types of participation, we were equipped to select the arrangements that were most appropriate for the behaviors we sought to support.

Participants as Owners of the Space

The objects, artifacts, and furniture in museums and university buildings are typically arranged, managed, and fixed in place by the institutions; however, the d.school and The Tech both seek to hand over ownership of assets in the space to everyday participants. The d.school Environments Collaborative designed learning environments that can transition from one configuration to another in order to dynamically match the varying needs of student activities with the affordances of the space. The spaces



After the exhibition opening, designers continued to observe visitors interacting with the Social Robots exhibit at The Tech in order to continue iterating on the layout of the space. Photo courtesy of Emil So.

are reset after each use into “default” arrangements, illustrated through signage, and the assets are put away in easily accessible storage spaces. Prior to any activity, teachers and students must adjust the space with intent. Conventional amphitheater-style seating is an excellent orientation for witnessing a single source, but for a class activity that requires collaborations and conversation among five teammates, a variegated arrangement of tables, stools, and white boards might be more appropriate. This effort to support a range of orientations was a dramatic step in giving individuals permission to take ownership over the space at the d.school.

The Tech redesign also aims to offer invitations for visitors to take ownership of the space. In the new *Social Robots* exhibition, visitors manipulate and maneuver exhibit components as they build their own human-sized robots. Visitors retrieve a rolling robot “base,” assemble input and output blocks (sensors, motors, etc.), document their creations with photo and video, and, on their way out, visitors return the robot parts to their respective stations. Similar to the d.school’s Periodic Table, the mobility,

size, and multi-sided design of the robot bases invites participants to designate their own workspaces and huddle around to collaborate. The Exhibits Team was conscious of the need to embed scripts into the space design that would suggest ways to navigate this complex interaction and help visitors feel responsible for resetting the exhibit components. Early in the exhibition development, the Exhibits Team created full-scale cardboard prototypes to test how it feels to interact with the exhibit components, navigate around them, and gaze over them. In addition, the team designed the exhibit components (and the team’s schedule) such that they might test several iterations of the floor plan even after the opening. Building in flexibility to experiment was essential to the ultimate success of the exhibition because it allowed for multiple iterations of the explicit scripts, such as signage, and implicit scripts, including the orientation of assets and storage spaces for moveable exhibit components.

Meaningful Objects as Implicit Scripts

Invitations to participate can sometimes be as simple as a single object. At The Tech, we recently tested an exhibit prototype that invites visitors to stand

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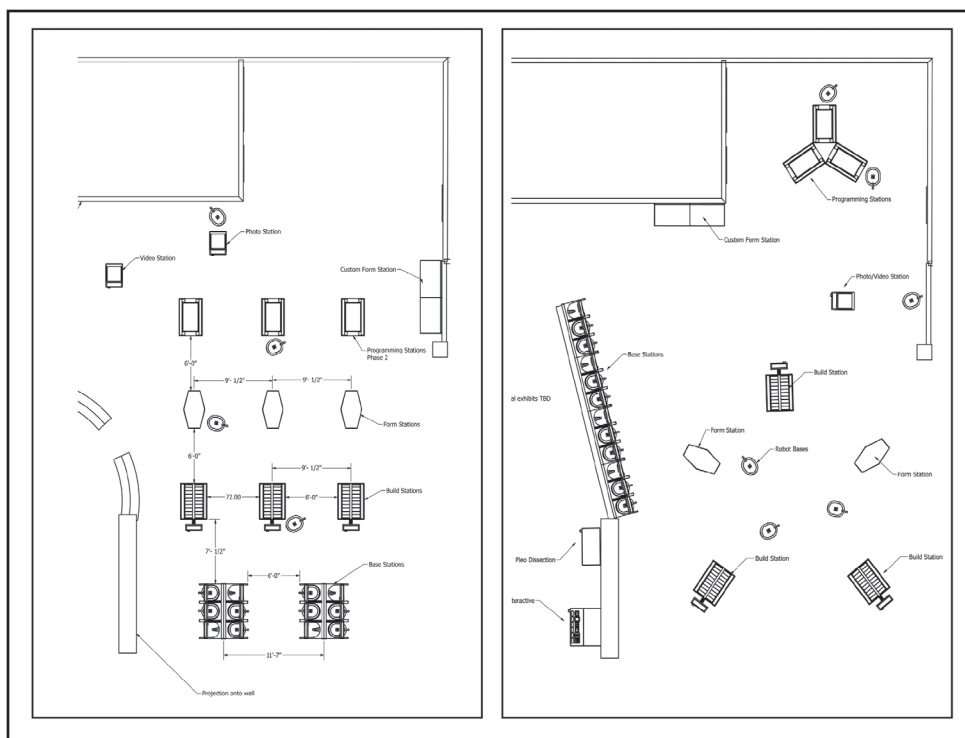
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Moveable components allowed the Exhibits Team to iterate on the space design of the Social Robots exhibition on the museum floor after the opening. Photo courtesy of The Tech.

on stage to perform, present speeches, interview each other, and pitch ideas. We tested three variations of the stage design (bare, with a microphone, and with a podium). Each prototype invited different types of participation: the bare stage elicited physical movement, the microphone encouraged vocal and comedic contributions (words, sounds, jokes, and songs), and the podium prompted role-playing of “presidential” speeches. Rather than follow the prompts provided on a sign next to the stage, visitors contributed their own content: they created games and competitions, converted the stage into a karaoke venue with the use of their own mobile devices, and presented each other with challenges. Perhaps the most striking finding was the microphone effect. The bare stage was all but ignored, but with the mere addition of a microphone on a stand, visitors raced to participate and waited impatiently for their turn. More than any signage could convey, the microphone communicated an invitation to participate.

Conclusion

Designing spaces for participation involves negotiating a number of variables, especially in the museum setting, where individuals’ behaviors are self-directed and artifacts, exhibits, and signage simultaneously vie for visitors’ attention. The cases presented here illustrate how space design can support a variety of behaviors: minor design elements, such as stool height and table size, afford different postures and orientations that can affect how groups interact; providing access to assets and flexible configurations can invite participants to own the space; and simple objects with strong cultural meanings can be subtle but powerful invitations to participate. Considering the various properties of space and the use of full-scale prototypes, designers are able to test a range of possible visitor interactions and discover unforeseen opportunities for design. These insights can inform how designers might intentionally embed scripts in the space that explicitly or implicitly communicate to visitors the ways they might participate. In effect, we design the space, and the space designs the experience. ✨