Unpacking Learners’ Engagement with Interactive Technological Exhibits in Museums

A growing number of museums are employing interactive technologies to support learning. Limited research has examined how museum visitors engage with and respond to the *design of technological exhibits* in socially driven informal learning contexts [7,9]. This paper asks: *How do visitors engage with interactive technological exhibits in museums, and what design features support diverse engagement types?*

We study engagement with technological exhibits by drawing on the construct of *genres of participation,* proposed by [5], that identifies ‘Hanging Out (HO)’, ‘Messing Around (MA)’, and ‘Geeking Out (GO)’ as three constellations of behaviors used by youth to engage with new media for learning. The framework offers a productive grounding to understand engagement with technological exhibits in museums as it (1) describes the quality of engagement in relation to learning content, (2) focuses specifically on engagement with new media technologies for learning, (3) highlights the fluid transitions between engagement behaviors in interest and peer driven environments, and (4) has proved central to the design of informal learning environments such as makerspaces in museums and libraries [6] but has not been used to explore free-choice [3], self-directed learning with exhibits.

In this paper, we report on initial results from a qualitative study to (1) conceptualize *hanging out, messing around, and geeking out* with technological exhibits at museums, and (2) identify design features that support these participation genres. Our study was conducted in summer 2025 at the ‘Adventures in AI’ exhibition at the Exploratorium, a science museum in San Francisco. The exhibition offered over 30 technological exhibits for learning AI concepts, including word embeddings, data and bias, neural networks, and more. Over 7 weeks, we invited visitor groups (N=17 groups, 52 individuals) to wear microphones as they explored the exhibition, and observed them at a distance. Visits lasted between 20 and 80 minutes. This resulted in approximately 20 hours of audio data. Additionally, we conducted 3 days of ethnographic field work where we observed visitors (N=28 groups) interacting with the exhibits and conducted unstructured interviews.

We analyzed this data using interaction analysis techniques adapted from prior work on museum interactions [8]. First, we identified significant events for analysis following procedures outlined by [1]. Then, we drew on key characteristics of participation genres as identified by [5], such as social conversation (HO), experimentation (MA), and breaking rules (GO) to categorize significant events as HO, MA, or GO. Second, we abductively coded engagement behaviors, making up visitor interaction with each other and the exhibits. The codes for engagement behaviors emerged both from existing work on engagement with exhibits (e.g., [2,4]) and our empirical work with the exhibits. Lastly, we worked with exhibit designers to identify what design features support engagement behaviors and HOMAGO activities.

Our analysis is still ongoing. In our findings, we will exemplify what hanging out, messing around, and geeking out at interactive technological museum exhibits looks like. Next, we will share a rubric that identifies engagement behaviors and their relationship to participation genres. So far, we have identified the following engagement behaviors: *questioning, consuming, creating, explaining, connecting, predicting, and evaluating information about learning content*. The subject and complexity of these behaviors determine how they may be categorized into participation genres. Lastly, we will identify diverse design features that affect engagement behaviors and resulting participation genres. Figure 1 and table 1 together showcase a sample of our expected findings .

This work offers the HCI community a framework to design and evaluate interactive technological exhibits in museums. When designing, this framework serves as a tool to (1) consider what participation genre(s) to design for, and (2) ideate design features to support relevant participation genres and related behaviors. When evaluating, it can help (3) identify and categorize the effect of a technological exhibit on engagement, and (2) provide an accessible language for sharing results across stakeholders. In future work, we will expand this framework to identify key moments of transitions from one participation genre to another, signifying deepening of interest and motivation to learn in technological contexts.

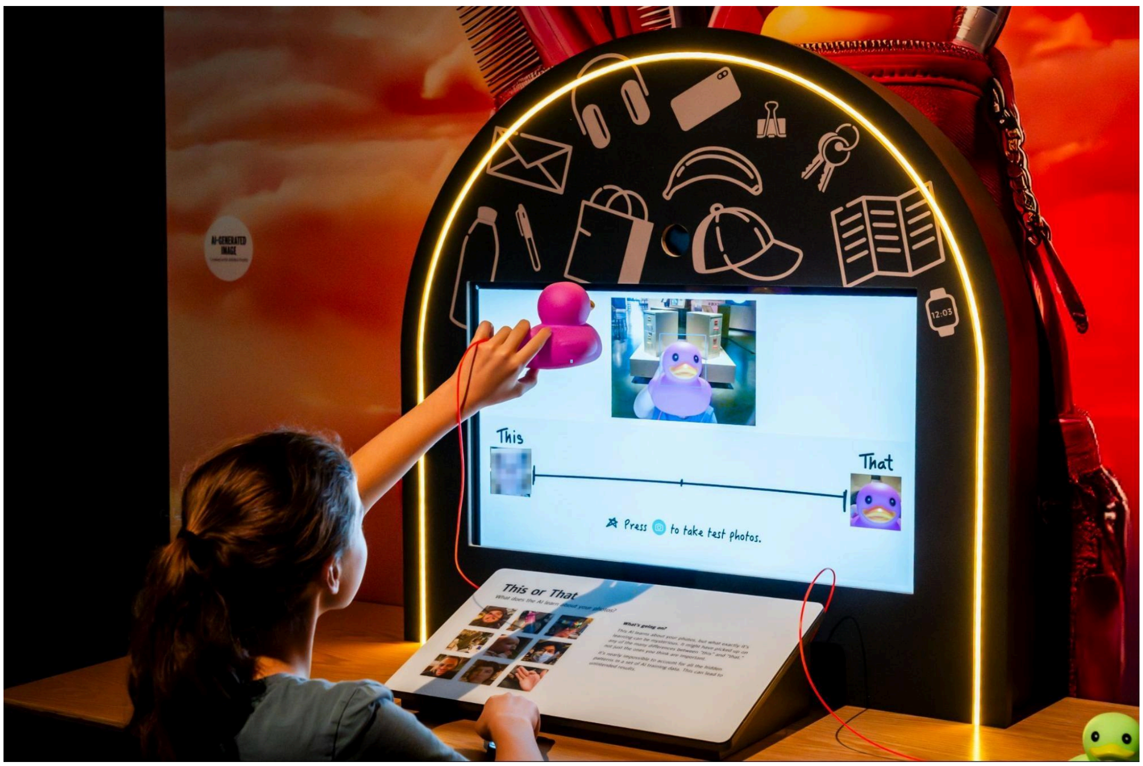

Image 1. 'This or That' trains an AI model on photos of two objects: "this" and "that." It then prompts visitors to take photos of other objects and shows where the AI thinks those photos lie on a spectrum between "this" and "that." Through experimentation, visitors explore the different image features the AI may be using to make its decision.

Table 1. Participation genres at 'This or That'

Participation Genres	**Example**	**Behaviors**	**Design features**
Hanging out	Clicking pictures, laughing	Consuming non-subject-matter information	Familiar activity: reduces barrier to entry
Messing around	Assessing where pictures fall between *this* or *that*	Consuming and Evaluating subject-matter information	Quick repetition and experimentation, feedback: allows easy testing
Geeking out	Testing hypotheses about what the AI is detecting	Predicting, Questioning, and Explaining information	Keeping log: allows identification of patterns

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