SCIENCE ON THE MOVE

Everyday Encounters with Science: Using design-based research to build and test contextual models while developing informal learning experiences in public spaces (DRL #1222659)

Project Objective

Public Audience: To create experiences which individuals can encounter during their day-to-day activities (i.e., at transit centers) and which spark excitement, interest, and fun regarding the prototype-specific science (or STEM) content related to a topic which is part of their everyday lives and experiences.

Professional Audience: To increase understanding of ways to effectively crate interactive, unfacilitated exhibit experiences and location-relevant STEM content that engage underserved adult audiences in public spaces.

Progressive Refinement Research Questions

- In general, how do audience members notice, use, and react to the exhibit prototype?
- To what extent does the exhibit prototype achieve the intended project impacts, including engagement with the prototype and excitement, interest, and enjoyment related to content?
- What elements of the prototype, as well as other social, physical, and personal context factors, contribute to or hinder the achievement of the intended project impacts?
- What barriers to audience engagement should be addressed during subsequent prototyping cycles to better achieve the intended project impacts?
- How might the theory of action be modified to better reflect the evaluation evidence?
- What does the evaluation evidence indicate about the participant appraisal process and the factors that influence these appraisals?
- What types of (conscious or unconscious) psychological decision-making are involved at each point in the engagement process?
- What heuristics exist to help visitors in public spaces connect their experiences with STEM content and messaging?

Study Design

- The project's target audience is **adults without college degrees.**
- Prototypes have been tested at two TriMet transit centers within the Portland Metro area.
- The project employs a design-based research (DBR) methodology, focusing on iterative cycles of research and design, investigations in authentic contexts, the development and testing of theories and conjectures, and collaboration with practitioners.
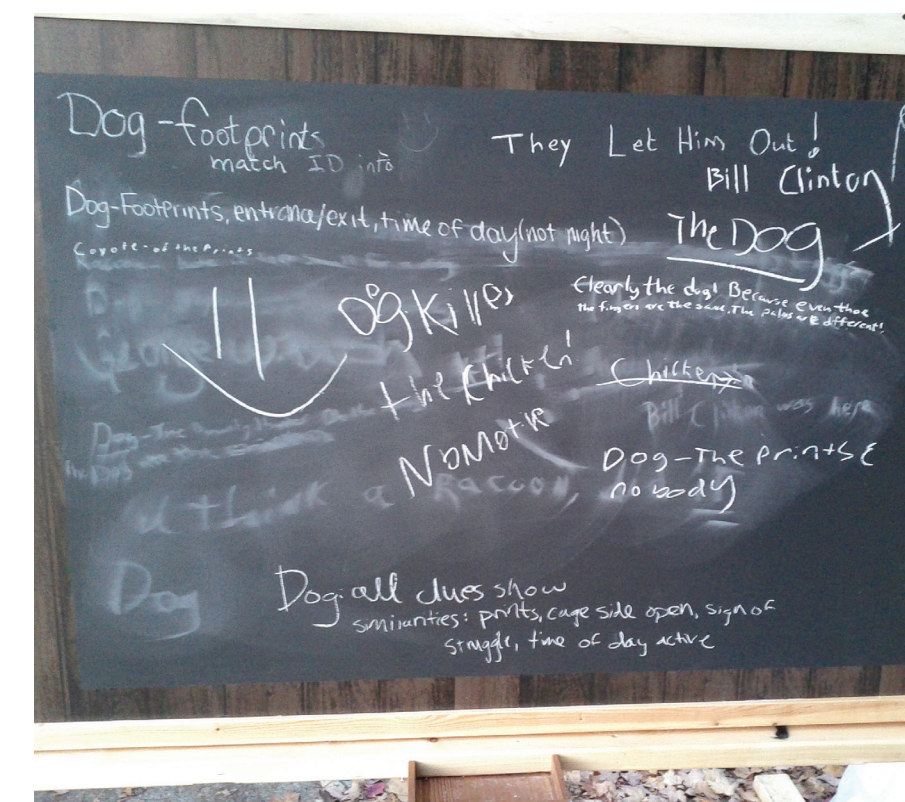
In Partnership with

TRIMET

LAMAR OUTDOOR ADVERTISING

URBAN FARM STORE

BENT

Research Activities at Bus Stops
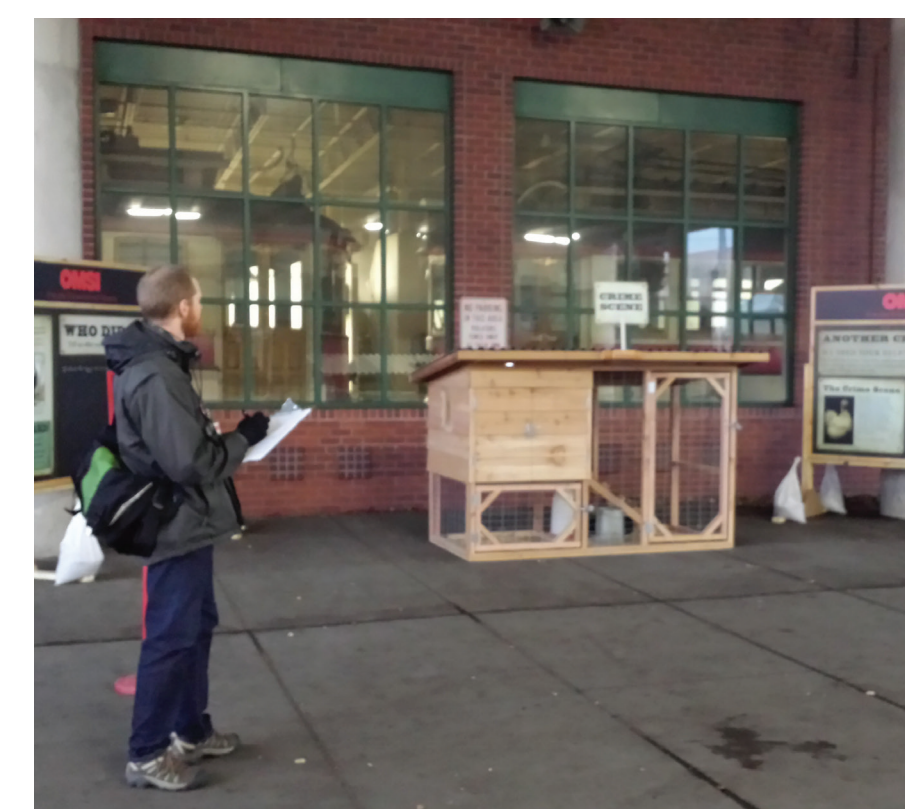
CHICKEN SCENCE INVESTIGATION
A multi-component diorama-style exhibit which invited audience members to explore a "crime scene" while learning about urban farming and predation

MAKE ME A MONSTER
An interactive touchscreen exhibit which allows audience members to wear a digital "monster mask" while learning about evolutionary biology and local STEM career options

Theoretical Concepts and Principles Under Refinement

Stage of Attention	Pedestrians will **NOTICE**	Pedestrians will **ATTEND**	Pedestrians will **ENGAGE**
	ON THE BASIS OF	ON THE BASIS OF	ON THE BASIS OF
Appraisal	Perceived immediate value or need	Novelty and comprehensibility	Preexisting interest, personal relevance, understandability
	DUE TO	DUE TO	DUE TO
Affordances	Surprise, novelty, clear aural/visual cues	Novelty, preexisting interest, interactivity, understandability	Clear entry point, alignment w/ social norms & task goals
	LEADING TO	LEADING TO	LEADING TO
Inferred Interest Level	**AWARENESS**	**TRIGGERED SITUATIONAL INTEREST**	**MAINTAINED SITUATIONAL INTEREST**

Data Collection and Analysis

- Data were collected through naturalistic observation, timing and tracking, post-use interviews, and cued "think-aloud" interviews, providing a robust and varied dataset to address study research questions.
- Data analysis incorporates a combination of qualitative and quantitative techniques, including inductive coding, basic inferential statistics, and exploration of frequencies and central tendencies.

Preliminary Findings

- Social norms and expectations play a powerful role in audience behavior, and these norms and expectations are different in public spaces than within museum walls.
- To minimize confusion, experiences in public settings must include a clear entry point, wayfinding markers, and orienting cues.
- Given that audience members in public spaces are often in transit, experiences should be structured to allow for brief but meaningful engagement.
- The novelty of informal learning experiences in public spaces is highly effective at eliciting attention and engagement; it is therefore beneficial to have the ability to add new content and maintain this novelty.

Reflections on DBR Process

- Given the fundamental interconnectedness of experience characteristics, in-context research data, and the theory of action, it is vital for multiple project team members (including designers, developers, and fabricators) to be involved in theoretical discussions throughout the process.
- It is helpful to emphasize the importance of constructing a localized theory through the process of iterative testing and refinement, particularly for those internal and external partners without prior experience in DBR.

Project Challenges

- The highly collaborative nature of DBR necessitates substantial commitments of time and energy from all team members over the entire course of the project.
- In any multi-year project, changes in team composition tend to be expected; due again to the collaborative nature of DBR, however, it is vital to ensure momentum is maintained throughout such changes.
- The development and maintenance of partnerships with local businesses to develop location-relevant content has required negotiation regarding paid versus unpaid Contribution of time and materials.

Project Team

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