

Kid Space: Evolving mixed methods over the life of a project

Sinem Aslan, Rebecca Chierichetti, John Sherry, Intel Corporation

We propose to discuss “Kid Space” a mixed reality project involving a projected, animated character. Though not a robotics project *per se*, many of the technologies we employ (including underlying ML algorithms and their integration in ROS nodes) are used in robotics. More importantly, this project emphasizes physical and natural language interactions with an agent that directly responds to multiple children’s positions, postures, actions and utterances in ways that give the impression of physical presence in a room-sized environment. We thus believe lessons learned from this project apply more generally to HRI research.

The success of this endeavor depended heavily on a multidisciplinary approach throughout its life cycle. We will discuss how we brought together ethnography, design, educational research, game design, machine learning algorithm research, and other skills, as well as how this combination of disciplines meshed and evolved over several phases of work, including:

- I. Ethnographic research. At the outset of this project our mandate was to identify uses of multimodal sense-making in home environments. After a period of wide ranging investigations, one theme that emerged as potentially interesting was the ambivalence of parents with young children about the role of computing technologies – appreciating their potential educational uses but wary of too much “screen time”. This served as a foundational insight.
- II. Concepting. The design team began actively prototyping and exploring concepts that were used to gauge end user response and help build consensus among our colleagues. This phase resulted in the original “Kid Space” concept, as well as the original formulation of a set of design guidelines that shaped all of our subsequent research
- III. Refinement. In this phase we worked with educators to narrow our focus to a specific educational domain and gathered the insights that would help us understand where and how this experience might fit into the real world.
- IV. Iterative design and testing. Over a roughly 18 month period we tested numerous design ideas with children in a usability lab setting, progressively focusing in on a set of interactions that balanced desirability and viability, which in turn informed the types of multimodal algorithms that would be necessary to make this experience possible.
- V. Deployment and evaluation. When our prototype reached a mature enough level, we were able to deploy in an actual school setting. Here our emphasis shifted to both qualitative and quantitative evaluation.

Throughout these phases some key lessons emerged:

1. Understanding the character of the agent or robot is essential to designing the experience, and this needed to be *discovered* (through testing) as much as *invented*.
2. Each phase had distinct goals, and leadership at each phase depended on the expertise of the individuals involved.
3. Despite lasting multiple years, this project’s ambitious scope required a compression of research and deployment phases, which introduced tensions into the work. We will discuss how we managed those tensions.