Learning through Inclusive Play with Interactive Technology

Abstract
As part of our research, we are studying how interactive technology might create more opportunities for children to engage in inclusive play, or play between children with and without disabilities. By maximizing these opportunities, children can benefit in a number of ways; for example, they can develop their social and emotional skills and learn empathy and acceptance for children with special needs. Based on our formative work, including design workshops with neurodiverse and neurotypical children, we are currently developing our own interactive tablet-based application that aims to support children with inclusive play. We will test this technology with children in a lab setting in the upcoming months. Later we plan to deploy the technology to study it and its learning effects in situ. We believe the Workshop on Innovations in Interaction Design & Learning will be an excellent venue to discuss our work and to learn how to study if and how children learn through inclusive play with our interactive technology.

Author Keywords
Inclusion; children; social and emotional learning; interactive technology; universal design.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.
Introduction

Inclusive play, or play between children with and without disabilities, benefits all children by providing learning opportunities that help children to develop empathy and acceptance, challenge stereotypes, build meaningful friendships, and practice important social and play skills [1][4]. Our research involves studying how interactive technology might create more opportunities for children to engage in inclusive play. We hope that by designing interactive technology that supports children and adults with inclusive play, we can maximize chances for children with and without disabilities to play together. In turn, we hope to increase the positive learning opportunities that come with inclusive play.

Research Questions & Approach

While there has been more HCI research into play among solely typically developing children and into play among only children with disabilities, there has been less focus on play among children with mixed abilities. We are focusing specifically on inclusive play among neurotypical and neurodiverse children, age four to eight. Children who are neurodiverse include those with cognitive, developmental, learning, and social, emotional, or behavioral disabilities [1].

In our research, we have been exploring what makes designing for play among neurotypical and neurodiverse children distinct from designing for play among children of only one type of group. We ask: using technology, how can we balance play interactions among children with drastically differing needs? How can we encourage children to communicate through and beyond technology to help build their relationships outside of this one particular type of play? How can interactive technologies encourage children to be more empathetic and accepting? Finally, what can interactive technologies do to lower barriers for adults, like teachers and parents, to set up, monitor, and follow up on inclusive play with their children?

Besides approaching these and other research questions using a human-centered design perspective, we also have drawn from inclusive education, early childhood special education, and developmental psychology. As such, to explore how to best support children with inclusive play, we used Bronfenbrenner’s ecological systems model, which generally states that the entire ecological system in which growth occurs influences human development [2]. The first subsystem with which the child has immediate, direct contact is the microsystem [2]. This includes structures and relationships like family and school [2]. Therefore, at this point in our research, we have considered both the child and those in the microsystem as individuals whose wants and needs impact children’s opportunities with inclusive play.

We use mixed methods to investigate the wants and needs of children, parents, and teachers who impact inclusive play. The lead researcher has done 70 hours of design ethnography in an inclusive kindergarten classroom as a teacher’s assistant. We have also run three design workshops with a mix of neurotypical and neurodiverse children. We have interviewed and surveyed educators from inclusive kindergarten and preschool classrooms. Additionally, we have interviewed and surveyed parents of children with and without disabilities whose children may or may not have engaged in inclusive play. By reviewing relevant literature and investigating the wants, needs, and
practices of these groups, we have been able to characterize the current state of inclusive play to inform technology design. Interactive technologies that harness facilitators to inclusive play (e.g., embedded instruction and transparency about special needs) and help overcome barriers to inclusive play (e.g., the effort required to facilitate play and parental inexperience) may maximize children’s opportunities with inclusive play. The paper we are presenting at IDC this year includes these considerations for designing interactive technology for inclusive play [5].

**Current & Future Work**

Now, we are developing an interactive cooperative tablet-based application based on our prior investigative work. As part of the application, children are prompted to carry out various picture-taking tasks together (See Figure 1). In the upcoming months, using this picture-taking task feature of the app, we will run a 2x2 within-subjects lab study to test if the incorporation of character-based prompting and/or technology-enforced player cooperation is effective at supporting the children with inclusive play.

We are also designing the lab study, including operationalizing our dependent measures to assess play skills and social and emotional learning. At this point, our measures are based on research in Early Childhood Special Education, Disability Studies, and Interaction Design & Children.

In the future, we plan on running an exploratory study to understand what types of interactions the full application facilitates and what and how the children learn, in terms of their understandings of each other and about children with differing needs. Later, we will run home and school deployment studies with a full version of the application to understand its use in situ and within the context of the children’s ecological systems.

![Figure 1. Sample of character* prompt for players to take a picture together. *Modification made to original image of child from sweetclipart.com.](Image)

**Expectations & Desires for Workshop**

We would appreciate the opportunity to participate in the Workshop on Innovations in Interaction Design & Learning because of its relevance to our current research from a new angle. While we have participated in workshops about children with disabilities and about play, examining our own research through a learning sciences lens will allow us to learn about alternate ways to study how learning happens with the technology we are developing. We hope to make connections with other researchers and designers whose work can inspire and teach us. We also believe we can share the
knowledge we have gained from our particular approaches to our research and our personal experiences in the field and in designing and developing our technology with other workshop attendees.

**Biographies**

*Kiley Sobel*

Kiley is a second-year Ph.D. student in the department of Human Centered Design & Engineering at the University of Washington, advised by Dr. Julie A. Kientz. She is also a National Science Foundation Graduate Research Fellow. Kiley received her B.S. at Harvey Mudd College with Honors in Computer Science. She has done assistive technology research with Microsoft Corporation, worked as a teacher’s assistant in early childhood education classrooms, and worked as a behavioral therapist for children with autism. She is now interested in universal design, Interaction Design and Children, Child-Computer Interaction, and Assistive Technology.

*Julie A. Kientz*

Julie A. Kientz is an Associate Professor in the department of Human Centered Design & Engineering at the University of Washington. Dr. Kientz's primary research areas are in the fields of Human-Computer Interaction, Ubiquitous Computing, and Health Informatics. Her research focuses on understanding and reducing the user burdens of interactive technologies for health and education through the design of future applications. She has designed, developed, and evaluated mobile, sensor, and social applications for helping individuals with sleep problems, parents of young children tracking developmental progress, individuals with visual impairments, people who want to quit smoking, and special education teachers working with children with autism. Her primary research methods involve human-centered design, technology development, and a mix of qualitative and quantitative methods. Dr. Kientz received her Ph.D. in Computer Science from the Georgia Institute of Technology in 2008.

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**References**