

Workshop Proposal:

***Tangible Interfaces for Playful Learning – past, present, and future***

Half-day session (3 hours)

Organizers: **Oren Zuckerman**, MIT Media Lab; **Glenda Revelle**, Sesame Workshop; **Yvonne Rogers**, Indiana university; **Mitch Resnick**, MIT Media Lab.

**Objectives:**

This Workshop is designed to bring together designers, educators, industry professionals, and researchers interested in playful learning and the design of tangible interfaces. We will review relevant Tangible User Interfaces (TUI) projects (past and present), discuss the concept of playful learning, review TUI classifications, and suggest questions for future research.

**Justification:**

In recent years, the decreasing cost of electronics gave momentum to the design of tangible interfaces, in research centers and industry alike. But there is no clear conceptual framework to guide designers in their work. IDC is the perfect community to change that by creating a forum for designers, researchers, and industry professionals. We hope this workshop would serve as a starting point for future work and discussion that will extend the body of work in the field.

**Backgrounds of Workshop Organizers:**

**Oren Zuckerman**, A PhD student working with Mitch Resnick at the MIT Media Lab, is developing new tangible interfaces for education that make abstract concepts visible and manipulable. Inspired by the wooden objects developed by Maria Montessori, used around the world to learn abstract concepts such as number and shape, Oren is creating computationally enhanced blocks that simulate advanced concepts such as accumulation, probabilistic behavior, feedback, and complex causality. Prior to MIT Oren was recognized as one of the World Economic Forum's "100 Technology Pioneers" for the year 2000, as the founder of an Internet startup that developed an asynchronous group collaboration layer over the Web.

**Dr. Glenda Revelle** (Ph.D. in Developmental Psychology, University of Michigan), has worked in both corporate and academic settings designing, researching and producing interactive products for children. She is currently a Research Scientist at both Sesame Workshop and the University of Arkansas, has led and collaborated on research in the University of Maryland's Human-Computer Interaction Lab, and has served as an interactive education consultant to a variety of educational media companies. Glenda's research interests include designing and evaluating interfaces for children and exploring the educational potential of new and emerging technologies.

**Yvonne Rogers** is a professor of information science and informatics at Indiana University. She also retains her chair in computer science and artificial intelligence at the University of Sussex, UK. She is internationally known for her work in the fields of Human-Computer Interaction and Computer-Supported Cooperative Work and has published widely in both. She is interested in new paradigms for computing, especially ubiquitous, pervasive and tangible interfaces. Her research focuses on augmenting everyday, learning and work activities with interactive technologies. In particular, she designs external representations, especially dynamic visualizations, to support more effectively 'external cognition'. She has also been a visiting scholar at UCSD and a visiting professor at Stanford University, at Apple Research Labs, and at the University of Queensland.

**Mitchel Resnick** explores how new technologies both necessitate and facilitate deep changes in the ways people think and learn. Resnick's Lifelong Kindergarten group, at the MIT Media Lab, has developed a variety of educational tools, including the "programmable bricks" that were the

basis for LEGO's award-winning MindStorms robotics construction kit. Resnick also led the development of StarLogo, a software toolkit for modeling decentralized systems. He is the co-founder of the Computer Clubhouse project, a network of after-school learning centers for youth from underserved communities.

### **Detailed Description of Topics to be Covered:**

We will discuss questions such as: Do tangibles really add anything to learning? What is wrong with WIMP interfaces? What are the different types of TUIs and what is their relevance to learning? What can we learn from the physical objects currently used in educational settings? Can TUIs help seamlessly blend learning with play?

In the workshop we will present and discuss the following topics:

- ***A short history of physical objects for education.*** Froebel gifts, Montessori materials, manipulatives at schools today.
- ***Early TUIs for education:*** Logo turtle, LEGO/Logo, Digital manipulatives.
- ***Current thoughts on Playful Learning***
- ***Examples of current projects:*** selected projects from workshop organizers and participants.
- ***TUIs classifications and design guidelines:*** Roger's transforms types, Ullmer & Ishii 1997, Marshall's "expressive" vs. "exploratory", Zuckerman's FiMs and MiMs.
- ***Relevant research on symbolic representation and physical manipulation:*** Uttal, DeLoache.

We plan to use these topics as discussion starters. Our goal is to lay the foundations for a new community of researchers/designers focusing on tangibles for playful learning.

### **Schedule of Events:**

- (5 minutes) Welcome message, agenda for the workshop
- (30 minutes) Short introduction of organizers as well as all participants (name, organization, research area)
- (15 minutes) history of artifacts for learning
- (15 minutes) early works in TUI for learning
- (25 minutes) discussion on playful learning
- ***30 minutes break***
- (30 minutes) selected projects from workshop organizers and participants (submitted prior to workshop)
- (20 minutes) review and discussion of current TUI frameworks and design guidelines
- (30 minutes) discussion about open research questions in the field
- (10 minutes) closing notes, sign up sheet for mailing list, web site announcement

### **Plans for Dissemination:**

We have set up an email list to continue the discussion online. We will post the issues identified and topics discussed on a dedicated web site, to serve as a hub on tangible interfaces for playful learning. In this way, we hope to extend the dialogue to involve a broader group of international industry professionals, researchers and educators and to extend the body of work in the field.