

Soft Tangible Interaction Design with Tablets for Young Children

Janelle Arita
Texas A&M University
College Station, TX, USA
jarita07@neo.tamu.edu

Jinsil Hwaryoung Seo
Texas A&M University
College Station, TX, USA
hwaryoung@tamu.edu

Stephen Aldriedge
Texas A&M University
College Station, TX, USA
stevo25@neo.tamu.edu

1. Introduction

As touch screen devices grow in popularity among consumers, so do their exposure to young children. Although the American Academy of Pediatrics publicly recommends a screen-free zone for children under 2 years old and the potential negative effects such as impaired motor skill development and decreased outdoor socialization, the amount of exposure to young children will continue to increase.

This leads to the question of how can we improve this current situation? In our research, we propose the idea of integrating soft tangible toys with an iPad, a popular touch screen device among tablet users. Prior tangible interaction research suggests that tangible components help enhance children's spatial exploration, communication and collaboration, and strategy forming (Antle, 2012). The sensory experience for touch also plays an important role as the soft felt material of the object may help to influence the likability and emotional experience (Hornecker, 2011). Our research looks at how tablets when used with soft tangible objects could help learning development for toddlers and pre-kindergartners, as well as their engagement and enjoyment.

2. Our Approach

We developed soft tangible toys, Stampies that are placed atop the iPad's capacitive surface (Kratz, 2011). Each toy has a unique pattern on its underside made out of conductive fabric. Conductive thread connects this pattern to the upper area of the toy, the area to be grasped, allowing a connection between the screen and the conductive human body. When the toy is applied to the iPad screen the app will detect each pattern point. Custom pattern recognition built into the app can then discern each pattern, thus recognizing each toy. The soft tangible toys made out of wool felt, conductive thread, and conductive fabric are washable, durable, reusable and modifiable by parents.

Our prototype has been tested on nine participants, ages 2 to 6. Interaction patterns using soft tangible toys with an iPad varied between participants. Duration spent, speed of interaction, and touch gestures differed based upon gender and age. Boy participants tended to volunteer less of their time and used a more aggressive and quicker gesture when touching the iPad with the soft toy. Girl participants tended to use a more delicate touch: one participant added a twist to the object when making contact with the surface. Younger participants who were still in the stage of color development had a more difficult time matching the soft toys with the correct color.



Figure 1. Stampies interaction

Overall feedback from parents and participants were positive. Observed benefits included further collaboration from participant as well as increased mobile hand movement when using iPad.

The positive results of integrating soft tangible objects with an iPad show the potential for enhancing child interaction with touch screen devices. Our research specifically focused on color learning for toddlers and pre-kindergarten children but has the potential to be expanded to encompass other target ages and learning areas.

3. Future Plan

We will continue to develop more soft toys with different materials, shapes, and challenging levels. Further research will also be developed to see the benefits of use within education systems considering how this technology can enhance collaboration, creativity, motor skills development, educational attainment, and engagement.

References

- ANTLE, A.N. Exploring how children use their hands to think: An embodied interactional analysis, *Behaviour and Information Technology*, in *Behaviour & Information Technology* 32(9), Taylor&Francis, 2013.
- EVA HORNECKER. Let's Get Physical: The Role of Physicality in Tangible and Embodied Interactions. *ACM interactions magazine* vol. 18, iss.2 (March/April 2011), pp. 19-23.
- KRATZ, S., WESTERMANN, T., ROHS, M., ESSL, G. CapWidgets: Tangible widgets versus multi-touch controls on mobile devices.