

Betsy DiSalvo: Summary of Research

Abstract: In my research I use cultural values as lens to understand everyday technology practices and their implication on learning. Using ethnographic and design research methods I conduct in-depth formative work and create interventions to better understand motivations to learn and motivations to actively not learn. My work focuses on disadvantaged and underrepresented youth who are frequently difficult to reach with traditional learning. Digital media and technology offer unique opportunities to leverage identity and computation to encourage learning within these groups.

Introduction

Using *situated learning* (Lave and Wenger 1991) as a lens for understanding children's and young adults' out of school learning environments I explore how *cultural values* (Schwartz 1999) shape access and acceptance of technology learning. If technology is constructed by social and cultural influences (Bijker 1995) we need to examine who is given the access and ability to produce new technology. The lack of diversity in computational production serves as a discipline specific example. With computing, situated practices around using and learning computers impact both who is producing new technologies and the types of technologies being produced. I strive to create both opportunities for equitable employment among marginalized groups such as African Americans, Latino/as, and women, and bring the values and perspectives of groups that are marginalized into the design and production of more inclusive technologies. Using a mixed methods approach to my work enables me to develop research agendas that blend the needs of communities with research questions that will serve the learning sciences and human-centered computing fields. Formative work is conducted with qualitative interviews and observation and design research methods from the fields of design (Nieusma 2004, Ehn 2008) and learning sciences (Barab and Squire 2004). Quantitative work is used as a supplement to formative findings, evaluation of the effectiveness, and as additional lens of analysis of qualitative findings.

Background

In my previous work at the University of Pittsburgh Learning Research and Development Center with Dr. Kevin Crowley I led the development of the Click! Urban Adventure Game (DiSalvo, Parikh et al. 2006, Hughes 2007). This work was informed by Dr. Crowley's work with informal learning and *islands of expertise* (Crowley and Jacobs 2002) and initiated my research into leveraging children's passions for games into learning opportunities.

As a graduate student at Georgia Tech, I worked with Dr. Amy Bruckman to find ways to leverage young African American males' digital game play into an interest in computing. Using design research methods, young African American males and I co-designed the Glitch Game Testers (DiSalvo, Guzdial et al. 2013). In this program African American male high school students worked full-time in the summer and part-time in the school year, testing pre-released games for real companies. They were paid for their work and one hour each day was spent in computer science workshops. We opened in 2009 and our success rates for engagement with computer science are remarkable. Of the 25 students who have graduated from high school, 21 went on to college or trade school, with 16 as computer science or digital media majors. Glitch offered three levels of research: formative work on cultural and social technical practices, design research on the development and iterations of a learning intervention, and a research environment for theoretical work on motivation to learn (DiSalvo, Bruckman et al. in press).

Current Research

Currently, I am launching two initiatives to explore the broad ecology around technology and learning. These initiatives are the Parent STEM Portals and the Computer Service Youth Cooperative.

Parent STEM Portals

The Parent STEM Portal program is set of studies to first, gather and analyze data on parents' use of digital media for informal learning, and then to conduct design research, creating prototype portals to facilitate access to Science Technology Engineering and Math (STEM) learning. Recently, there has been an explosion of educational courses and informal learning tools and activities offered online. While these learning resources are frequently free and flexible, there is a question if these free educational resources actually widen the digital divide (Reich, Murnane et al. 2012) because of issues of access. In a study of parents acting as learning partners in the development of technological fluency, Barron and colleagues (2009) found that parents can play a critical role in creating learning opportunities for their children. Two parenting roles identified in the study, *Learning Broker*, when parents seek learning opportunities for the child; and *Resource Provider*, when parents supply

resources to the child beyond the family computer, are tied to the parent's ability to effectively seek online resources and information.

These research findings highlight the need to address differential access and presentation of online learning. Digital *access* goes beyond who can find a network connection. We consider what people do and what they are able to do online. DiMaggio et al. (2004) suggests that digital access can be explored through five aspects; (1) means to hardware, software and the internet, (2) autonomy of use, (3) skill to use and troubleshoot, (4) social support to get help and encouragement, (5) purpose for using technology. Variations in the presentation of informal learning experiences have demonstrated that parents will select learning opportunities that they feel are culturally and gender appropriate for their children. For example, in work with the Power Girl exhibit at the Children's Discovery Museum in San Jose researchers initially observed that girls were choosing to go to an exhibit on electricity, but their parents were steering them away. After the exhibit added the character Elena, or "Power Girl", parents began engaging girls at equal rates as boys with the exhibit (Lobel and Crowley 2001). This raises the question of how cultural indicators attached to online tools and websites can shape parents' selection of informal STEM learning opportunities.

To explore these issues of technology access to and presentation of informal learning we have begun conducting initial interviews and surveys with parents. We are focusing on four groups: low-income African American families, Latino families, parents participating in technology outreach programs, parents of deaf children. Based upon these initial studies and using participatory design practices we will design and develop Parent STEM Portal prototypes. The goal is to create a framework that can then be customized according to communities' needs and values. By understanding and designing for parents' technology use and cultural values we can increase access to the rich array of free and inexpensive informal STEM learning among young people who are often overlooked.

Tech Support Youth Co-operative (TSY Co-op)

The CSY Co-op seeks to leverage the importance of paid work among African American high school students that we observed in the Glitch Game Testers program. However, Glitch has been difficult to grow into a self-sustaining company and lacks a community connection. With the CSY Co-op we are seeking to establish a sustainable business model that actively serves the community and offers ongoing computer science (CS) education programs. We observed in Glitch that participants enjoyed building and refurbishing computers. Using that interest, we will be co-designing with high school students a co-operative in The Bluffs neighborhoods of Atlanta. We anticipate similar outcomes to the Glitch program including increasing interest in studying CS among African American students. We also see TSY Co-op as an opportunity to expand on open research questions regarding learning motivations and sustaining interest in the face of adversity and cultural conflict.

The Bluffs are a collection of low-income African American neighborhoods that have faced significant displacement and access issues due to development of Georgia Tech and the 1996 Olympics. The resulting physical and social infrastructure in these neighborhoods has contributed to create one of the most impoverished educational landscapes in the U.S. Research initiatives in the TSY program will focus on learning motivations in context of the community and their values. In these neighborhoods, trying at school is frequently considered uncool and students choose to not-learn for this and other reasons. How can we purposively design for multiple narratives for participating in learning activities that allow for navigating around motivations to not learn?

The co-op will take donations of used computers from local organizations, refurbish them and sell and service them for the community. We are negotiating storefront space with local developers as part of the Westside Community Alliance and seek to leverage a donation of free broadband to the neighborhood as a motivation for community members to purchase computers from the co-op. The students working at the TSY Co-op would be trained to refurbish and service computers and would participate in CS educational workshops. This model, based upon the Glitch program, was successful in engaging young people with CS and demonstrating the value of higher education while still providing a face saving excuse for spending so much time on a learning activity. For students in these neighborhoods we suspect it is socially more acceptable to say, "It is my job, they pay me." or "I am helping out Ms. Edwards with her computer." than "I like to learn." Or "I want to learn about computers."

The TSY Co-op will also serve as an ongoing *living lab* to study computer science education, learning motivation and the ecology of learning to produce technology. We anticipate that multiple researchers will run programs through this co-op and the nature of the program will change as community members, participants, and researchers work together to define research goals and outreach needs.

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