# Digital Design And Creative Explorations: An Interest-Driven, Informal Digital Learning Environment For Children

## INTRODUCTION

Young children can make sense of the world around them by engaging in learning activities that interest them. More than ever today, children engage in personally meaningful digital learning environments during their personal time away from school (Blanchard and Moore, 2010). However, this out-of-school learning is often taken for granted and to some extent learning is expected only to happen at school, in the meantime dismissing that children are active constructors of knowledge out of school. Examining interest-driven, informal digital learning environments promises insights as how to foster children's curiosities, interests, and passions through their personal experiences. This paper describes young children (ages 6-8 years old) participating in learning contexts outside of school and offers implications such a context has on self-guided, interest-driven digital art projects. It examines the design and creation of an artifact and how young children delve into interest-driven digital art projects. Although there is a focus of research on youth (ages 9+ years old), there is little research regarding children ages 6-8 years old. Resnick (2006) suggests children may not have opportunities to be immersed in topics of interest while at school (aka formal learning environments), and Peppler (2010) stated schools are structured so children learn a "breadth of required knowledge" conceivably never reaching past the surface of several topics (personal communication, December 2010). Nevertheless, today's children are spending much less time on projects and topics of interest due to the notorious nationwide standards movement, which deprives time from delving deeply into personally meaningful or interest-driven projects at any grade-level.

## PURPOSE

This study aims to contribute to the works of constructionists Papert (1991), Resnick (2006), Bers (2007), and Peppler and Kafai (2007) by drawing on their prior work to plan and implement a unique digital arts learning environment in a Midwestern community where no other digital arts program for younger children existed. The purpose of this study was to examine how younger children designed and created interest-driven digital art projects in an informal learning environment (Sefton-Green, 2004). What behaviors do children practice when making an interest-driven, digital project in an informal learning environment? How do these behaviors contribute to the process of making digital artifact in an informal learning environment?

## THEORETICAL FRAMEWORK

*Constructionism*

Papert (1991) provided a brief overview and definition regarding Constructionism by describing it as a multifaceted theory, which argues knowledge is constructed when it happens in a context where the learner is actively building and engaged in the activity. For the purposes of this paper, I break the theory into four components, emphasizing knowledge construction is found when making a personally meaningful artifact: (1) "objects to think with" (2) bricolage (3) sharing and (4) reflection (Kafai and Resnick's 1996).

*"Objects-to-think-with"*

Many times children express themselves externally – they sing, dance, bounce, they 'play' with whatever is front of them, while talking about what they are doing. Children engage in these practices often times spontaneously – while they are using a "toy" or an "object" (ie: legos, blocks, or a pencil). Both Papert (1996) and Kafai (2006) define the use of "objects" as a way to think through an abstract 'problem' - making it more concrete and conceptual to the learner. To Papert (1980) "objects-to-think-with" was meant as a representation utilized to help learners understand and transform ideas. Papert argues computers *are* "objects-to-think-with" and when used as a medium for learning, complex ideas such as understanding the processes and practices involved in computational programming may result.

*Bricolage*
Within a learning culture Papert (1991) argued learning involves a planning period: 1) through bricolage – an act of tinkering, playing around, or testing the materials 2) written or drawn plans to complete. He posited learners typically choose one way to conceptualize their plans – that some are 'wired' to plan out a systematic way of completing a project – changing the plan as they build the artifact; while others prefer planning while tinkering. What is happening during these phases or processes? Understanding how learners are tinkering (bricolage) may make clearer the importance for cultivating classroom practices that encourage talking and playing.

*Sharing & Reflection*
Papert (1991) claims the personally meaningful artifact is a shareable "object-to-think-with" prompting sharing and reflection with the community with a focus on the expansion and/or transformation of ideas. For example, children often shared their creations with one another at Saturday Studio or in online galleries. As a result, sometimes children would receive feedback that would prompt them to change their artifact. Understanding how young children share and reflect in a digital media and design environment is imperative to further conceptualize how young children learn in these complex, multi-faceted environments.

## Methodology

Research took place between February and April 2012. This research seeks to understand how younger children designed and created interest-driven digital art projects in an informal learning environment. Specifically, I ask:

1. What behaviors do children practice when making an interest-driven, digital project in an informal learning environment?
2. How do these behaviors contribute to the process of making digital artifact in an informal learning environment?

*Participants*
Participants were asked to join the study from a Saturday Studio workshop that took place in a Midwestern city in the United States (n = 8). Of the eight children, 50% were boys and 50% were girls. However, only six children were captured on video and audio - three boys and three girls. Participants ranged in age from 6 to 9 years old. The Saturday Studio space was equipped with laptops, cameras, and access to multiple digital software programs – either available online or already preloaded to the laptops.

*Instruments & Practices*
Video cameras were used to record individual students, the workshop space, and to record audio of those surrounding the vicinity of the camera. Field notes were written by hand and later transcribed and reflection was drawn on to add to the clarity of the field notes. Participants were told video cameras were being used, but to please not touch or interfere with them. In addition, I collected, analyzed, and saved copies of their final artifacts.

*Pedagogical Practices*
Children randomly sat where they felt most comfortable and where they could work on the project they designed and started to make in previous weeks. The workshop started with the researcher (also the facilitator) facilitating a design activity with children in pairs. The children were given ten minutes to complete a design & prototyping activity and then ten minutes to share

the results with the group. Afterwards, the group was shown different digital arts projects for inspiration related to one of the three different interests being explored at the workshop. Finally, the children were released to work on their interest-driven projects. Facilitators (4 women, ages 25-36 years old) were available to help children when needed. However, children were encouraged to ask one another for help rather than waiting for an adult to arrive to come to their aid.

## ANALYSIS

*Ground Theory and Interaction Analysis*

Drawing on Charmaz's (2006) grounded theory approach, I analyzed the corpus of data to identify the emerging phenomena. The emergent themes were of children talking to one another, self-talking, and playfully engaging with either the technologies or with one another. Then I analyzed the data further by narrowing the data to (3) thirty minute chunks and applied techniques from Interaction Analysis (Jordan and Henderson, 1995). For the purposes of this paper, I will present four case studies to illustrate the findings.

## FINDINGS

In order to better illustrate the above results, I present a glimpse (shortened due to word limit) of the case study of child named "Jack". Jack was a 7-year-old boy from the United States whom had some exposure to computers prior to attending Saturday Studio. Jack designed a game called "Scribbleman" on the first day attending Saturday Studio, yet once he started to try and make the videogame, he realized the complexity of the programming might keep him from making a working game. He decided to find a game from an online gallery within Scratch (a computer programming platform for children). He played the game often times for many minutes, then he started to tinker with the code to change the background of the game or actions of the characters. Eventually, Jack decided to change the entire character in the game to his character, Scribbleman. Jack (see Table 2) moves from playing around (without direction from anyone else) to engaging in making significant changes to his project.

| Grounded Code | Definition | Interaction Analysis | Researcher comments – |
|---|---|---|---|
| ST/ON | ST = talking to self<br>ON = On Topic Talk (talking about the level of difficulty in project) | Taking turns: Looking at screen – Silent<br><br>Taking turn: says "This is going to be really hard" | Jack is trying to get his character to jump without changing back to the original character, Mario. |
| ST/OFF/NT | ST = talking to self<br>OFF = Off Topic Talk (humming to self – not recording or adding this sound to the project)<br>NT=non-technical talk | Turn: Looking at screen while bouncing and sings: "memememememe" | While Jack is painting another costume for Scribbleman's "jump" he begins to sing and bounce in his seat. |
| ST/ON/TJ | ST = talking to self<br>ON = On Topic Talk (talking about the action of 'painting' digitally in program)<br>TJ = using words to describe a technical process in the program (*painting* and *automatically*) | Turn: Looking at screen<br>Turn: then looking around room<br>Turn: and then back at screen<br>Turn: says, "it's painting automatically – it's painting automatically!" | Jack has stumbled on a problem – his program is painting without him controlling it– he looks up for a moment– he goes straight back to the screen and begins to troubleshoot – fixing the problem by closing the paint program and starting over again. |

*Table 2-Jack's behaviors and researcher comments*

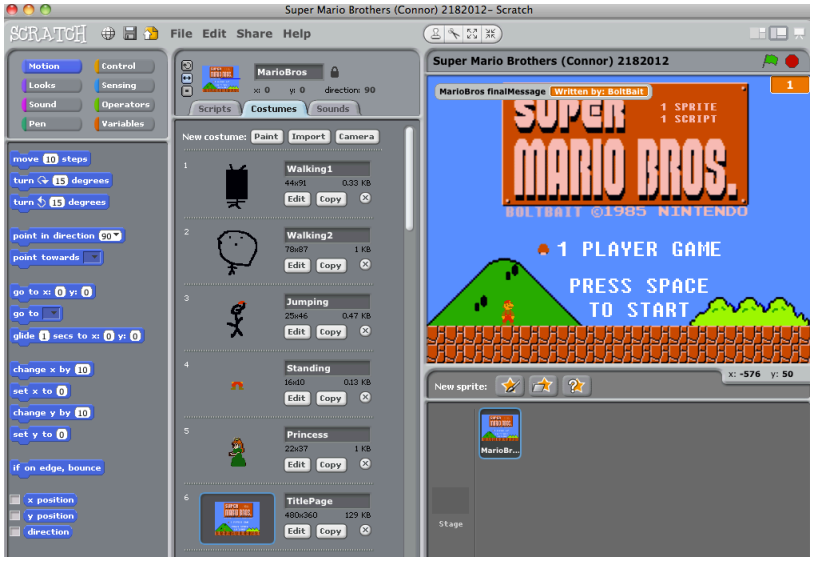


Figure 1: To give the reader an idea of one example of the digital artmaking - This child (boy, age 7) remixed a videogame using Scratch – He changed the videogame by digitally drawing three different figures to replace Mario (see 1, 2, 3 above) – he then changed the code throughout the game to be sure that Mario was now remixed as his character, known as "Scribbleman"

## DISCUSSION

*Scholarly Significance*

The purpose of this study was to examine how children behaved while engaged in an informal learning environment while making a personally meaningful digital art project. Regarding the first research question, the behaviors children practice include the various forms of talk (self-talk, technical talk, non-technical talk, joking, and talking to others – to share, reflect, or to seek help) and playful behaviors (bouncing, singing, humming, and tinkering). The second question asked how these behaviors contribute to making a digital artifact. It is seen throughout that children draw on various forms of talk and playing to either answer questions to their problems or to reduce frustration, to name just a couple contributions. This suggests younger children are capable of creating stop motion animations, videogames, and video animations with complex technologies. Children may appear to be "just playing" or talking "off-topic", but I argue these behaviors were needed to move their projects forward.

## IMPLICATIONS

Significantly, these findings bear weight to encourage research for more collaborative, flexible, and playful environments where young children can explore what is personally meaningful. Quite possibly pairing digital art technologies with the practice of talking and playing might prove to be a powerful combination to encourage and support children to become interested in the arts and sciences and begin to build a foundation for further creative self-explorations. More research is especially needed as new digital domains emerge and are readily accessible to children at earlier ages. Researchers might ask: What might we find if we continued to design and implement constructionist environments that encourage this combination of talking and playing with interest-driven projects? How might educators assess learning in an interest-driven digital learning environment? While this is only a small sample, it begs further investigation to understand what children are benefiting from their interests in these digital art-learning environments.

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