Employing Narratives to Trigger Interest in Computational Activities with Inner-city Girls

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Introduction

There has been a well-documented and persistent drop in the number of women in computer science and engineering courses (Corbett & Hill, 2015). While more women are using technology to mediate all aspects of their professional and personal lives, only a narrow slice of women are actively involved in the design and creation processes. Young peoples' decisions about participation often start early and have been linked to particular experiences (Renninger, Nieswandt, & Hidi, 2015). For some young people, these experiences are less than encouraging. In the US, high school computer science courses are overwhelmingly male dominated (College Board, 2014). Schools serving minority students and those from lower socioeconomic backgrounds struggle to even offer such classes (Goode 2007; Margolis, 2008). Even when opportunities for learning do exist, many girls and underrepresented populations face barriers such as negative stereotypes and dearth of role models and community (Margolis and Fisher, 2002). The Digital Divas program was created to address these issues through the intentional design of environments, materials, and practices for urban girls in Chicago, especially those unengaged with STEM learning.

Triggering interest and engagement

Hidi and Renninger (2006) define interest as both the state of heightened affect for a subject and the predisposition to re-engage the subject again, which is based upon one's knowledge, value, and feelings about a subject. The trigger or "spark" of interest can be a result of one or multiple factors, oftentimes environmental such as location, people, or activity structure. The Digital Divas program is developed to trigger situational interest in girls through a combination of community, project-based instruction, on- and offline learning spaces, and narrative stories. Triggered situational interest is critical as an opening to move on to subsequent phases that are more independent of environmental factors. Understanding potential effective triggers for girls, minorities, and youth from lower socioeconomic backgrounds is critical to engaging such populations in STEM learning.

In this poster, we describe the Digital Divas program and highlight the use of narratives to engage girls in computational making and the process of developing the narratives through codesign with girls.

Community of learners

Adult mentors are not engineers, but share cultural connections with the girls and have gone through curriculum and pedagogical training. These young women support and work alongside girls, attending to specific practices of encouraging completion and participation, helping to troubleshoot, and developing community.

Middle school girls interested in fashion and design are recruited from different areas of the city, especially those that have traditionally been underserved. Girls work independently and collaboratively, share stories and experiences, and learn from and teach each other.

Project-based curriculum

The program combines **principles of fashion, design, and dance with the power and possibilities of electronic circuits and programming** to develop interactive e-fashion projects and virtual programmed choreographies. Circuitry and programming concepts are reinforced by allowing girls time to experiment, design, and create.

Scaffolded challenges lead girls through stages of design and computational thinking, including paper prototyping, implementation, feedback, and revision.

Shaundra Daily
http://venvi.org
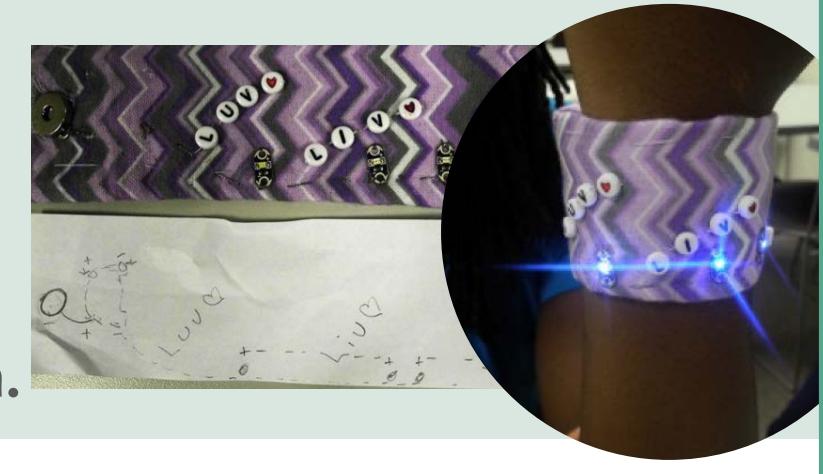
Integrated spaces

Face-to-face time is scheduled in a central location. Girls work through projects in a shared physical space using supplied materials. Extrinsic motivators act as shared experiences, including lunches, snacks, and field trips when the group reaches project milestones.
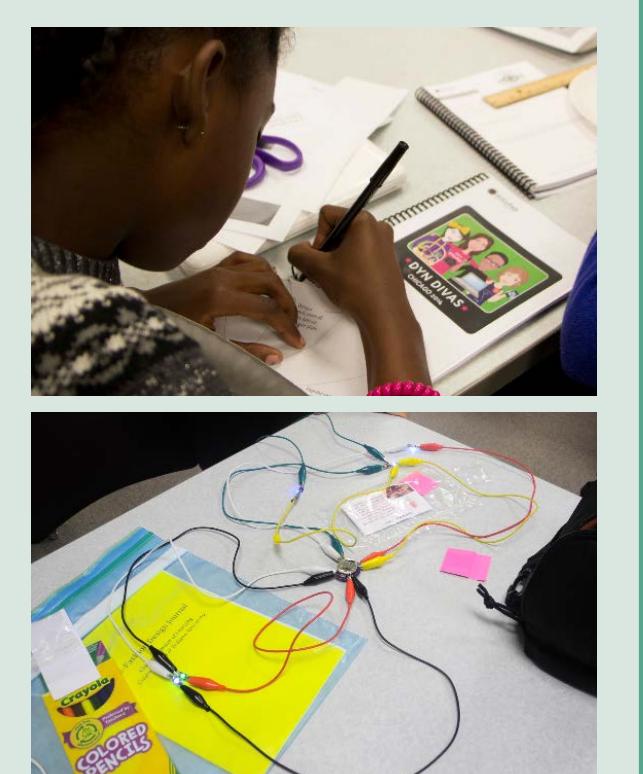
An online system, iRemix, is the mechanism for independent work outside of face-to-face programming, submitting work, leveling up, and communicating with others around projects. The iRemix platform uses social networking to connect face-to-face and online learning opportunities.
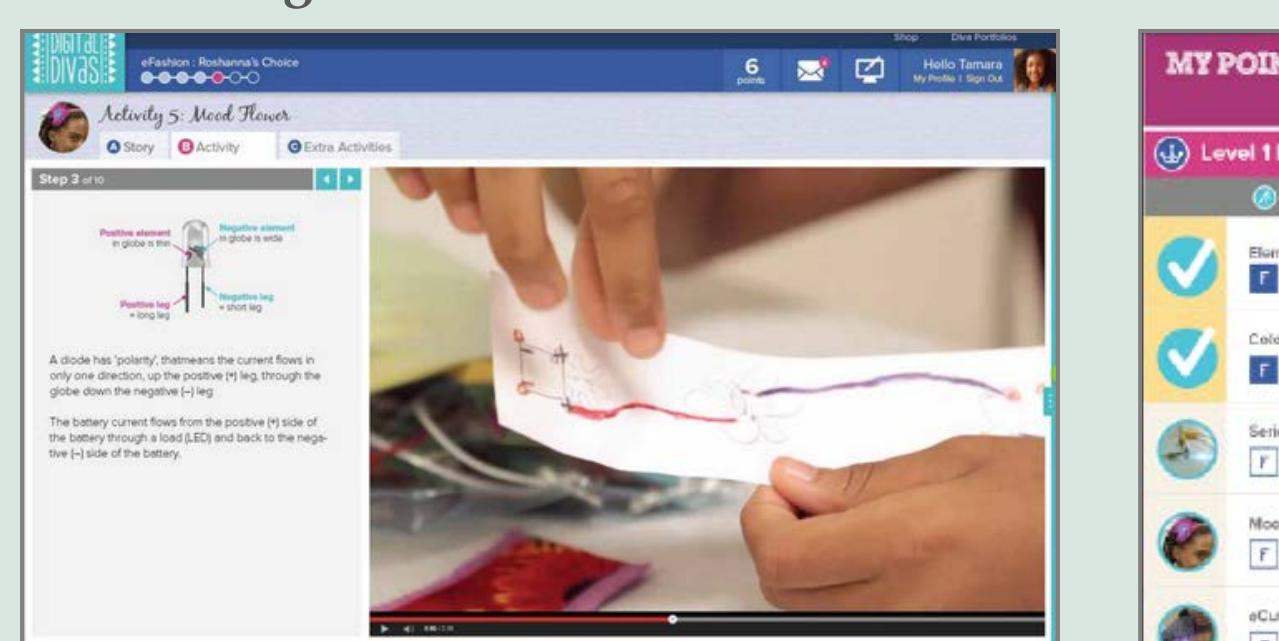
iRemix Divas interface: Divas have access to content, learning resources, and their project portfolio anywhere they have Internet access. Mentors and peers are virtually connected.
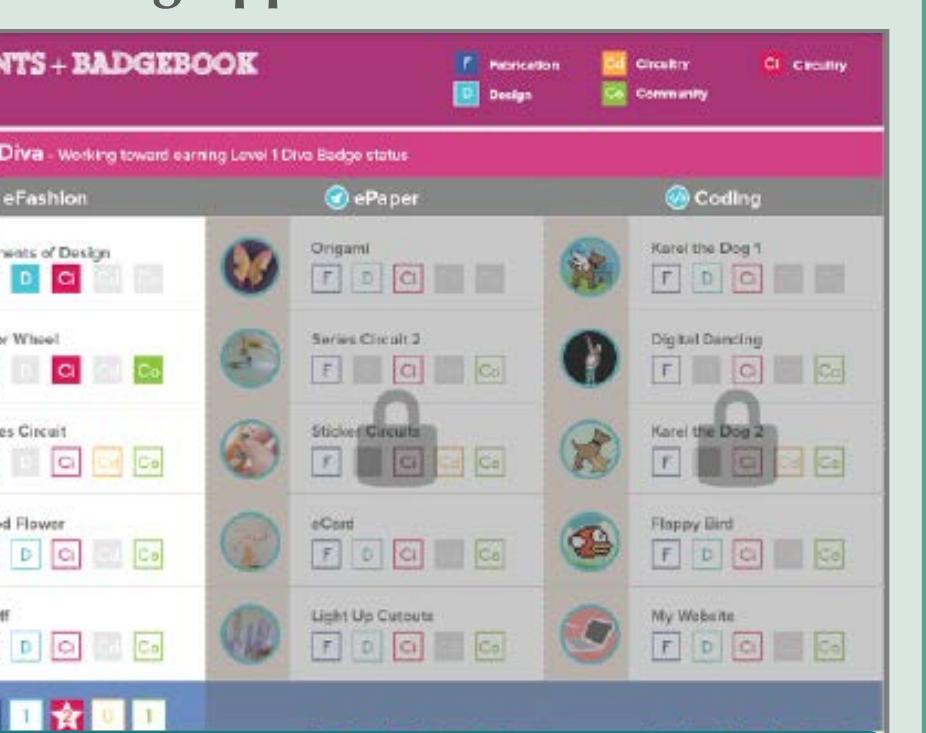
Girls are able to track progress and completion of projects and activities. New opportunities are unlocked accordingly.

Digital Divas

An informal program during unstructured time—summer, after-school, spring break—using overlapping strategies for learning and interest development.

Interactive narrative stories

Rationale. Narratives can provide context that helps relate abstract concepts to real-world issues (Hazari et al, 2010), increase motivation and positively contribute to girls' science identity (Baker & Leary, 1995), and provide focus for design by communicating tasks, specifically when readers can identify with the stories (Putnam, 2010).

Compelling stories conveyed in text and multimedia (video, audio, images) are employed to engage middle school girls in activities involving computational thinking. The stories center on a group of middle school girls involved in the Digital Divas program, and combines aspects of contemporary young adult fiction (mystery, social and emotional issues) with content, topics, and project work from the e-textiles and programming curricula.
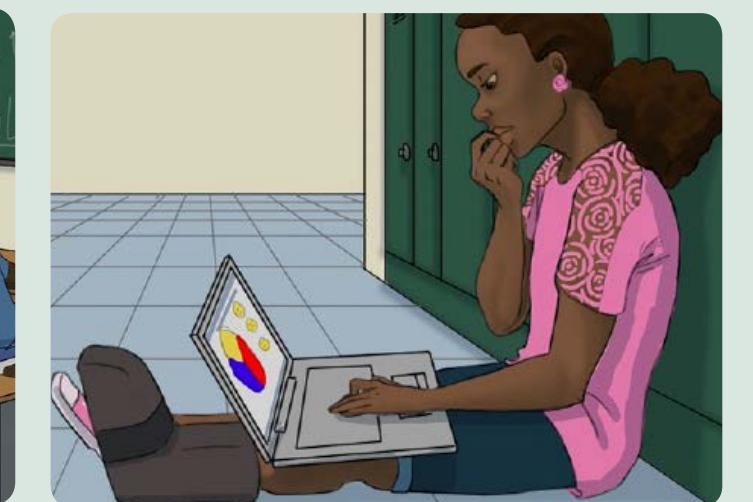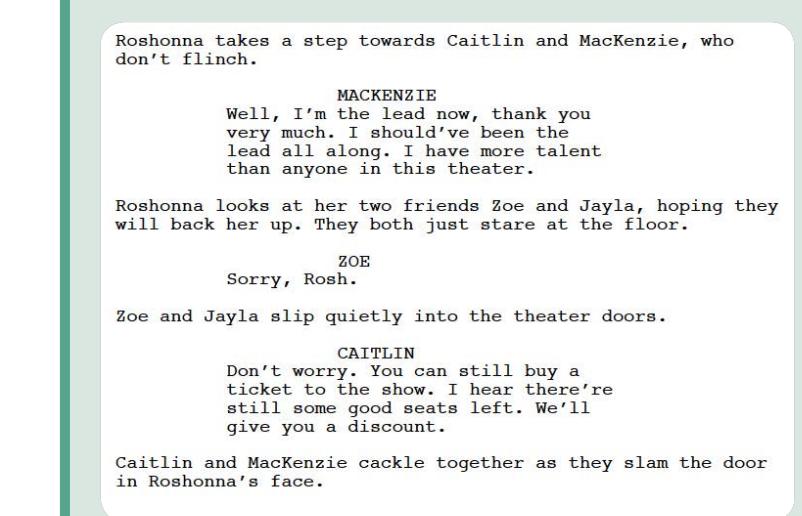
The interactive narratives unfold through the Divas iRemix platform: girls launch narratives and at intervals are prompted to engage in project-based work. The girls solve challenges by submitting work online, and receive and respond to messages from characters.

Co-design insights. We engaged 17 middle school girls as co-designers in a 6-month pilot program to ensure that the narratives resonated with our unique target population.

Methods. Girls were from schools in underserved communities; 71% self-identified as African American and 29% as Latina. Data collection included observational field notes, semi-formal conversations with the girls, and artifact collection. We used an inductive process (Strauss & Corbin, 1998) to summarize the extensive qualitative field notes and connect data to the theoretical ideas of narratives and interest development, which led us to narrative iteration.

Video narratives are placed within the online environment, with activity prompts embedded at different points in the story. Often the activity requests a submission within the site.

1. Narratives prompted discussions of identity
Girls looked for and found connections to themselves and people they knew in the stories and engaged in discussions about ethnicity of characters.

". . . You should add some of us into the story, like us in this room."

"[The character is] a teenager; I see her as myself."

"I think she looks like a teacher that used to work here, Mama April. She was my complexion."

"[The character] might have been mixed, because sometimes she acts black and sometimes she's white."

2. Girls had strong opinions about character design
"I really liked it, but I thought it would be more than just sketches. I think a way we can make it better is to add color and so we can see the people. It looked like all the same people."

3. Narratives contributed to interest and motivation
"I did like where you got to message Roshonna because it felt almost like she was real."

When asked about the narratives at the end of the program, even girls who thought the stories were boring found them to be a source of motivation.

(Chart legend: strongly disagree, disagree, neutral, agree, strongly agree)

- The stories we heard in this class make me want to do the activities
- The stories make the program better
- The stories told in this class are boring

The interactive narrative panels (comic/script excerpts) show the story of Roshonna, MacKenzie, Zoe, Jayla, and Caitlin.

"Now it's your turn:"
- Stitch using a connect the dot worksheet. Be sure to choose a thread color that is complimentary to the worksheet.
- Next send a message to Roshonna – Tell her what you would do if you were in her place? Would you take MacKenzie's offer? Why or Why not?

(Script excerpt)
Roshonna takes a step towards Caitlin and MacKenzie, who don't flinch.

MACKENZIE
Well, I'm the lead now, thank you very much. I should've been the lead all along. I have more talent than anyone in this theater.

Roshonna looks at her two friends Zoe and Jayla, hoping they will back her up. They both just stare at the floor.

ZOE
Sorry, Rosh.

Zoe and Jayla slip quietly into the theater doors.

CAITLIN
Don't worry. You can still buy a ticket to the show. I hear there're still some good seats left. We'll give you a discount.

Caitlin and MacKenzie cackle together as they slam the door in Roshonna's face.

SOFT CIRCUITS

iRemix screens

Activity 5 – Stitch Flower

MY POINTS + BADGEBOOK
Level 1 Diva - Working toward earning Level 1 Diva Badge status

Acknowledgements / References

Acknowledgements. Thanks to the DYN staff and the girls and families of Digital Divas. This work and research is funded by a grant from the National Science Foundation (REC# 1433838). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funding organization.

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