

Case Study

Click! Urban Adventure Game

Click! is an adventure game intended to sustain and incorporate lifelong interest in STEM to the 11- to 14-year-old female demographic. Click! is an example of a designed adaptive learning space that evolved into a viable culture of its own. The fictional story and its parts live in a real city environment with its own rules, actions, and motivations. Identifiable game elements (props, clues, characters) are carefully and relationally positioned in the environment, striking a balance that keeps girls from being pulled out of the game.

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Click! Agents

I'll never tell

3

Suspects

#1 hit song

Roxy Robin

110%

Fun



Non-tangible identity of fictitious Click! Agency perception and believability of the Agency is customized by the participants' past knowledge and experiences.

Opportunity

The number of women in the USA entering math and science-related fields is disproportionately lower than that of men. Click! targets pre-teen and teen girls in response to research showing that girls often disengage from science and math at this age. They can do the work as well as boys can but often opt out of participating.

Research has demonstrated that engaging girls in out-of-classroom learning is key to increasing girls' interest in math and science and the

perceived acceptability of girls entering math and science fields. Our challenge was to create an experience that encouraged greater involvement in science, technology, engineering, and mathematics (STEM); increase diversity in the ever-growing STEM workforce, equip girls with STEM skills so they will be more self-sufficient; as a technology-driven economy increasingly demands a workforce competent in STEM. And last, change the cultural stereotype that STEM activities are intellectually out of reach for girls.

Approach

Click! Urban Adventure, an experience that asks middle school aged girls to solve a (fictional) mystery in and around the city of Pittsburgh. Participants role-play as Click! agents in the Click! agency. Participants visit various “crime scenes”, collecting clues along the way, and use their knowledge of science, math, engineering and technology (STEM) to ultimately build a case against one of seven suspects. The entire experience consists of both a training period (after-school and then a week later, the adventure itself, (and includes a sleepover at the Carnegie Science Center during the night in between). Teams are self-assembled and are sometimes groups of friends or classmates from the same science class, and other times girls who first met during training. Participants ranged in age from 10.5 to 14.5, grade levels 5 through 8, 89% public-schooled, and 53% minority. Each group has roughly four girls, and is led by a mentor, usually an undergraduate science major from a local university. In Click! 2006, the “mystery” centered on Pittsburgh’s rivers’ remotely controlled pollution as a means of political election influence by a candidate for mayor. Therefore, during training, participants received lessons on topics such as combined

sewage overflow (CSO), “toiletology” (how a toilet works), and simple machines in training weeks one through four. The fifth and last week of training was “technology training”, where girls learned about infrastructure and the specialized technology we would provide during the adventure weekend. The technology was given to each team in a messenger bag. Each bag contained a cellular phone, a digital camera, a GPS receiver, the laptop computer (~50% tablets) and a barcode scanner. Each of these components worked together to provide functionality we referred to as the “Click! Super Computer.” The adventure weekend provided the participants the opportunity to use what they’ve learned in training. At this time, the participants go around the city using the technology and the skills they’ve acquired to build a case against one of the seven suspects. The culmination of the two days’ work is to have participants make a strong case, and then present their results to the (fictional) “EPA board,” which is in town to make misguided policy decisions related to the river’s pollution levels.

Methods

We worked with 400 girls from diverse backgrounds at various stages of the design process for two years. We designed participatory design activities that helped us engage girls in exercising their voices, exploring issues of identity and self-perception. Many activities rich in empirical and quantitative knowledge, such as customized sticker sheets with various Pittsburgh destinations, tools, outfits to spend the day shadowing girls, drawing self-portraits, etc., helped the team gain a deeper insight into the girls' lives, passions, dreams, and fears. They also set the stage for further discussions of the value of a design framework as integral to understanding how girls solve problems and learn in informal settings.

It was essential to understand the ways girls perceived games, what play meant to girls, and what attributes (tools, rules, narrative) would need to be included in the game to sustain the girls' interest. Games like interaction design require an understanding of how the system works and how the participant will interact with the system from every possible viewpoint. Throw in words like fun, play, and girls, and you have a very complex problem. Exercises like mad-libs, role-playing, and adventure games were designed to understand these interactions better. In some cases, we supplied the story and asked the girls to fill in the blanks with stickers containing various outfits, places to visit around the city, and tools they might need to solve the mystery.



Girls drew their lead characters as superheroes before we introduced role-playing into the game.

MINI-MISSION The Starling Department is looking for agents who can get right down to the bottom of problems. This week we would like you to investigate a **mechanical device**, learn about how it works, and suggest ways to improve it.

1 Mechanical devices are things that make work easier! Look around your kitchen and you will probably find dozens of them. Some are simple! (Like bottle openers) some are complicated (like the refrigerator). Name a few mechanical devices that are in your kitchen.

- Refrigerator
- Bread Maker
- Freezer
- Microwave
- Measuring Cups
- Salad Spinner
- Electric Mixer
- Dishwasher
- Stove
- Lights/Fan

HERE'S AN EXAMPLE OF A MECHANICAL DEVICE!

DEVICES!

A toaster is kind of complex, but it is made up of several parts that are pretty easy to understand - there is a lever to push the toast down, wires that heat up to do the toasting, and a plug to supply electricity.

THE STARLING DEPARTMENT ANNOUNCES ITS AGENTS OF THE WEEK

When a coded message pops up, Benny jumps into action. Benny sees patterns that others don't and, most importantly, can figure out what they mean. Plus, Benny's great at making up her own codes if her team wants to communicate secretly.

Katie is the girl who holds it all together. Always on top of the game, Katie knows what everybody on her team is doing and how it fits into the big picture. Katie also makes sure all the information for the mission is entered into the Click! Computer database.

2 From step one, choose one device and name the parts that make it so. If you want to do some research, ask friends for help. You might want to have a look in the library, or on the Internet. (One of the girls' favorite websites is www.howstuffworks.com)

Salad Spinner

- bowl
- basket inside bowl
- crank on lid
- lid

3 Explain how these parts work together to get the job done.

- The crank on top turns a gear, which is connected to another gear that turns the basket.
- It spins really fast and the water on the lettuce is forced out (circular motion).

4 Tell us a little more about your device. What does it do? How does it make work easier? Can you think of a way to make it better? Use the space below to show us how you would improve it. (You might need to draw this one out!)

Improvement:

- The salad spinner dries the lettuce/salad after you washed it.
- It makes it much faster to dry salad.
- It would be nice if you didn't have to empty out the water while you are spinning it.

small opening so water can drain into sink while you are spinning it so you don't have to stop spinning to empty the water. You could have a little cap so you can close the hole.

Are you more like:

- Agree Benny
- Agree Katie
- None
- Both

Why?

I don't like info to get lost and I like making



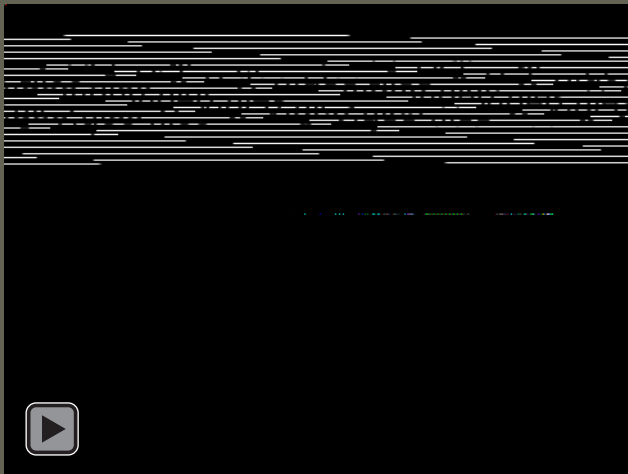
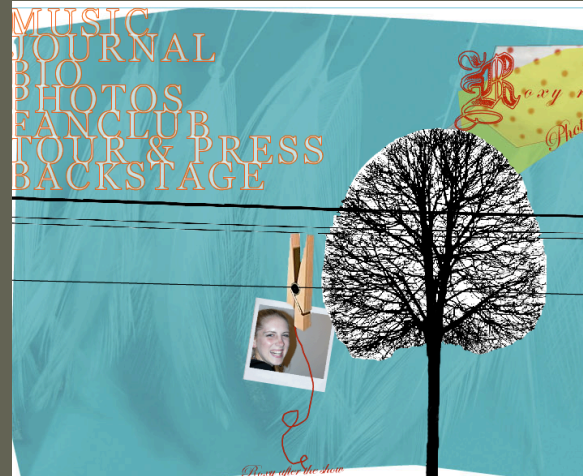
Left is an example of a take-home mini-mission. On the right shows girls at the Carnegie Science Center for our first playtest

After several playtests, we created the Click! Agency. Departments and jobs within the Agency created a structure for team development and roles. Girls played the game in teams of four, accompanied by a Senior Adult Agent (a female science, engineering, or math college student). New agents were encouraged to create their agent profiles. After the interview for a job within a department, they were given fun exercises to help immerse themselves in a role. All co-design activities were designed to work together to question or reinforce the girls' perceptions of themselves and their teammates. For example, mini-missions helped girls figure out compatible roles and fit within the Agency. Continual reinforcement with all aspects of the

adventure game (language, blogs, text messages, and personality quizzes) allowed the girls to assume future identities as scientists, technologists, crime scene investigators, etc., and see their newly acquired knowledge as valuable and relevant.

Outcome

Post-game, the lessons learned and qualities gained are intended to seep into the girls' real lives. Click! offers preventive support by focusing on girls during the middle-school years, a stage where cognitive, physical, and gender identity is in accelerated development. Click! encourages the active exploration of identity with gender and occupation as a subtext. Results showed that after participating in Click!, girls' interest in STEM increased, they



Roxy Robyn was our most famous Click Agent and pop star. She posted information and clues to her website where girls could read her blog, listen to her music, and see photos of her and her friends. Roxy and her band guided girls through the game by sending text messages or making phone calls to teams. She was also a physical presence during the game. Teams came into contact with her in the field to solicit her advice or help. Roxy (AKA Robyn) was a rising Carnegie Mellon math student.

recognized the importance of STEM to their education and future, and they were inspired to learn more about science and technology. In surveys administered at the conclusion of the Click! game, 93% of the participants had a high degree of confidence in their ability to use technology (vs. 37% prior

to the game). Girls incorporated scientific material during the game, with 63% reporting a scientific fact when asked if they had learned anything new about Pittsburgh. Another interesting result was that girls thought of themselves and their peers as successful at STEM skills.

Click! was successful in engaging conversations about science. Click! asks important questions, such as whether it is possible to design educational games that promote and sustain agency within a particular culture. Our research suggests that the program had positive impacts and uses appropriately designed tools that help shape and validate girls' curiosity.

In 2007, the Carnegie Science Center expanded the program and three interdependent modules have evolved: Click! One for rising 6th grade (biomedical mystery), Click! Two for rising 7th grade (environmental mystery), and Click! Three for rising 8th grade (technology mystery). Up until 2011, Click! had a loyal following, with a high rate of repetition in the program, including siblings, cousins, etc. The Summer 2009 season of Click! is the only STEM-oriented program identified by the Girl Scouts Leadership Institute, bringing 42 select girls from around the country to Pittsburgh to attend the program. For a number of years the Carnegie Science Center was selling the storyline for Click! One, making it the first product of this kind to be offered in the museum science industry. Creating design products that organizations like the Science Center can grow and disseminate is what I

feel is the end of a successful design process and collaboration.

Project Partners

Carnegie Mellon University
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