
Menstrual Maze: A Toy Exploring Public Engagement in Menstrual Health Education

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Abstract

The purpose of this design is to both explore and address early body literacy education among communities of parents, children, and health educators. Both informed by and designed for community engagement, the Menstrual Maze is a digitally embedded educational toy that aims to engage these communities in menstrual health education. Through playful interaction, the toy steps through the menstrual process, triggering audio and visual feedback at each stage. Building off of early observations, the goal of the Menstrual Maze is to introduce children to concepts of menstruation at an early age and energize wider community support and engagement with such education. We present this project as a design-led effort to address menstrual taboo and explore early education as a public design space.

Author Keywords

Physical tangible interactions; educational toy; menstrual health; body literacy; joint media experience

ACM Classification Keywords

K.4.2 Social Issues; K.3.1 Computer Uses in Education; J.3 Life and Medical Sciences

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Figure 2 Low fidelity prototype from workshop in Atlanta, Georgia

"You can have conversations with your kid about what's going on with your body and be like, 'Yeah, and this might happen to your body one day.' The toy facilitates it but also it's just fun to play with that kind of toy because kids like that kind of thing" –Quint

"By starting the education really young and then building on it, it's less shocking. Instead of getting all the information when you're in 5th grade, you're exposed to it and it's not as something to make fun of because it's just another fact of life" –Santich

Figure 1 Comments from workshop

Introduction

Menstrual taboos continue to exist across cultures. The silence and shame often surrounding these taboos hold real life consequences for menstruating populations. One study conducted by Dr. Marni Sommer found that low-income teenage girl in the U.S. felt embarrassment surrounding their first periods, also known as menarche, and had a desire to know more about the menstrual process [1]. Another study conducted by UNESCO found that an estimated tenth of African girls stay home from school during their cycle "due to menstrual cramping, insufficient menstrual hygiene materials, inadequate water and sanitation facilities in schools, unsupportive environments, and fear of a menstrual accident" [2]. These factors prevent menstruating populations from asking questions and getting the necessary resources to effectively manage their menstrual health, which then becomes a self-perpetuating problem.

To encourage engagement with a taboo topic, this project aims to normalize public engagement with menstruation through supporting tangible, joint media experiences between parents and children ages 4–9. A joint media experience is when both parties are involved with the same content and are "prompted by what they are seeing to interact with each other" [3]. This gives parents the opportunity to start scaffolding and enter a dialogue with their children. Additionally, by embedding digital feedback into an analog object, we aim to extend interactivity beyond the traditional play experience [4]. Our focus on ages 4–9 years stems from community based initiatives that will be described in the methods section. This project builds off of previous work and explores the potential for earlier

exposure to menstrual health education through the lens of tangible, joint media experiences.

Related Work

Intervention efforts to combat menstrual taboo span across areas that include policy, activism, literature, education, and design. In India, the Menstrupedia Comic is an educational tool that uses storytelling to introduce puberty to young girls [5]. Trans artist and educator Cass Clemmer created Toni the Tampon, a coloring book made to shift conversations toward less gendered understandings of menstruation and introduce concepts of menstruation to a younger audience [6]. Menstrual taboo has also been addressed in the design community. As winner of the design competition Red Dot 2016, the Period Game strives to turn menstrual health management into a fun learning experience for those approaching menarche [7]. Help Pinky, a game based learning tool, empowers adolescent girls in rural Assam by tackling these issues through teen education [8].

A theme of engaging, playful education emerges across these examples. However, most are geared towards those who are approaching menarche– less work has been done addressing those before the age of 9. As suggested by Weiss-Wolf, introducing health concepts as early as possible helps reduce stigma [9]. Thus, this project builds off related work by providing a picture of what early exposure to menstrual health education using tangible interfaces and joint media experiences could look like.

Method

Our design process is informed by the Research Through Design methodology, which suggests using the

Menstrual Maze @ the pediatrician's waiting room



Figure 3 Storyboarding the scenario

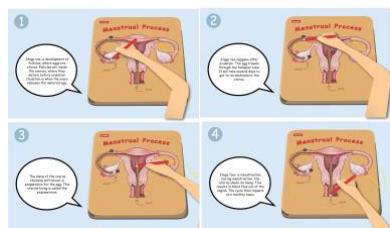


Figure 4 Storyboarding the design

design artefact as a means to explore, discover, and iterate [10]. This aligns with our goals to explore conversations between parents and children about menstrual health, an area without much previous literature or discussion in the HCI community. We wanted to understand 1) what introducing kids ages 4–9 to reproductive organs looks like and 2) what kind of interactions emerge from joint media experiences between parents and kids over menstrual health.

Collaborative Beginnings

This project uses a collaborative design process. The idea originated as a product of community engagement and then was refolded back into the community. We began by conducting four participatory design workshops in Seattle, Washington and Atlanta, Georgia, which 15-20 menstrual health activists, educators, and community members attended each, as part of PhD student Sarah Fox's research on access to menstrual health resources.

From these workshops emerged ideas concerning menstrual health access and education, ranging from policy proposals to digital technologies. The project described here builds on one such idea using research through design methods and physical prototyping. We then engaged the broader public, which includes health professionals, educators, parents, and children in conversations on the design—thus, continuing the exchange between the public and the design.

Menstrual Maze: Seeds of an Intervention

One participant group proposed a set of uterus toys targeted towards infants and toddlers. The group consisted of Chella Quint, Sinead Santich, Tatiana, Kathleen Gullion, Rachel Soudek, who are menstrual

activists in the Atlanta community. The low fidelity prototype of one toy can be seen in Figure. The group described the toy as a uterus model where the child could track the egg through the menstrual cycle, as shown in Figure 1. They envisioned the toy in waiting rooms at the health clinic and in preschool and elementary classrooms. The toy would exist as a facilitator for conversations between parents and children, as elaborated by Quint and Santich in Figure 2. This project builds upon this idea through consideration of extending play into the digital space.

Design Evolving from Cycles of Feedback

Our process involved visualizing the idea of using the toy as a conversation facilitator between parents and children from existing concerns, building a working prototype, then making changes based on community feedback. Our main design objective was to engage both children and parents in a tangible play experience about menstruation.

Initial Visualization and Storyboarding

As shown in Figures 3 and 4, storyboards were created to 1) visualize how users could physically interact with the object, 2) contextualize the toy in a community space and 3) help us develop towards a physical prototype. We visualized a wooden toy that depicts a uterus on the surface and imagined how a child could consume information about the menstrual process in a tangible, sensory way. First, pushing the egg along a track could trigger audio describing each stage of menstruation. For example, an egg located in the ovary would trigger "Stage one. This is the ovary where eggs grow". The track continues from the ovary, through the fallopian tube, into the uterus, and out of the vagina.



Figure 5 Physical prototype

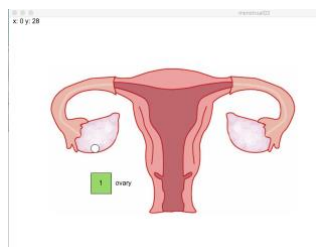


Figure 6 Accompanying visuals on separate screen



Figure 7 Affinity diagramming expert feedback

Second, we decided to pair the maze with a screen to show more detail and information as well as add flexibility for digital feedback. Thirdly, the maze completion triggers a menstrual health resource to be posted online. This feature was our effort to extend the experience beyond individual play. We imagined that this could provide parents with the initiative to engage with these resources with their children at home.

Making it work

Through a combination of laser cutting and electronic shown in Figure 5. Using sensors and actuators, the Menstrual Maze steps the user through the menstrual process and provides related resources upon completion. A magnetic sensor sits under each numeric label. The egg triggers visual feedback on a separate screen that displays more realistic depiction of the uterus, as shown in Figure. At each stage, the screen mirrors what is happening on the physical maze, shows the egg at each respective location throughout the menstrual process. At stage 4, a menstrual health resource is posted to the Menstrual Maze Twitter account. Resources include videos, games, and informational articles.

Gathering Expert (Design and Health) Feedback

We used this prototype as a tool to probe, ask questions, brainstorm, discuss, and gather feedback from other designers and members of the public. In particular, we shared the toy with a local middle school health educator, the head nurse at a women's health clinic, and a pediatric nurse. We sought to explore attitudes towards the reproductive health education space and gauge general reactions to our prototype.

Our prototype generated overall excitement and interest. However, some concerns did emerge. We affinity diagrammed feedback, as shown in Figure. First, feedback suggested to anticipate resistance or discomfort from parents. Parents may not be comfortable talking about reproductive health in a public setting, especially since it could lead to more intimate and uncomfortable topics. Second, parents could use more support and education in facilitating those conversations. The health educator noted about half of her 7th grade class has had these kinds of conversations with their parents. Thirdly, health resources should be static. Seamlessly incorporating a health resource with the toy may be too difficult for the scope of this project, especially since there is no go-to educational resource that health professionals or educators can point to. The Twitter feed is an interesting idea but it feels a little separate from the physical maze itself.

Incorporating Expert (Design and Health) Feedback

We responded to these concerns by brainstorming ways we could modify the design, as shown in Figure 8. In our next version, we left out the Twitter feed in order to reduce confusion and focused our efforts on tweaking other features. We added visual feedback using green LEDs, visualized the uterus relative to the human body, added labels to the uterus parts on the screen, and added more prompting in the audio script to encourage more interaction. We also added a button that triggers instructional audio for more accessible scaffolding.

Engaging with the Public

We observed 7 children and 6 parents interacting with the maze and lightly interviewed them afterwards. Our objectives were to explore 1) the kinds of interactions

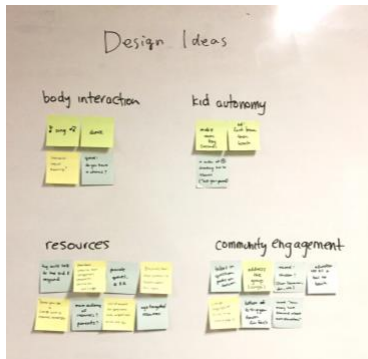


Figure 7 Brainstorming design ideas for next iteration

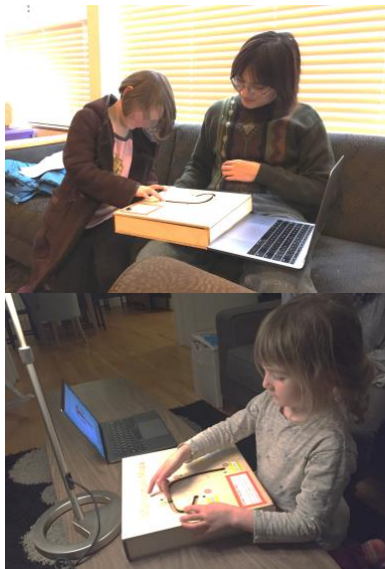


Figure 8 Participants interacting with the prototype

that arise from play and 2) child and parent attitudes surrounding the toy. After qualitatively coding our observations, we noticed the following themes emerge.

Parent and child positive engagement in physical form

All children participants repeatedly pushed the egg back and forth along the track despite only being one path. Most reported positive feedback on the levels of fun. After one session, one 4-year old played with the maze repeatedly on her own while we interviewed the mother. Most children participants recognized that their interactions caused audio and visual feedback. One father explained that this was a good way to “engage kids, especially since it’s tactile”. The physical form of the maze itself generates intrigue and interest for both groups, perhaps regardless of content.

Content may be too abstract or complex

All children participants were expectedly unfamiliar with the educational content due to little previous exposure. This resulted in an unclear level of engagement with the content. Asking “do you know what this is?” oftentimes resulted in shrugs and “I don’t know”. One 5-year old girl and 4-year old boy did recognize the uterus as a body part. Parent attitudes towards the educational content aligned with these observations. One mother of a 9-year old said that the content may be too complicated and that her daughter may be too young. One father of a 5-year old said that the content may be too abstract especially since children usually learn the outside of the body first– another father expressed a similar opinion. However, one father expressed that he could see this being very interesting for kids, especially as they got older.

Adult prompting may lead to more child engagement with the content

We noticed that scaffolding on the adult’s part resulted in more child engagement with the content. For example, we repeatedly asked one 6-year old “what is this called” while pointing at both the screen and maze. He actively repeated back terminology, identifying the parts of the uterus while using the maze and screen as a visual reference. One 6-year old girl asked questions such as “what is a uterus?” and “why is [the ball] an egg?”, which prompted the father to explain further.

Parents varied in levels of comfort and engagement

Parent opinions and attitudes towards the toy ranged from comfortable to ambivalent during the interaction. Upon asking parents to estimate the target age group, we received answers varying from 2 to 10 years old. We also noticed parents referring to everyday public or communal contexts they might encounter it. One father said he “would gravitate towards this in a doctor’s office”. Two fathers said he could see this in a more formally constructed educational environment, such as a museum. One mother actively asked questions while moving through the maze with her 4-year old daughter. The same mother connected a personal experience and asked, “remember when you asked me why there was blood in the bathroom?” This interaction most closely resembled the ideal joint media experience. Some parents were more hands-off and watched their child interact with the toy, asking or answering the occasional question. One father explained that “it will be a good trigger to have the conversation but I might ignore this toy if it’s not the right time”. Some voiced concerns over children using the terminology in inappropriate contexts. Therefore, it is important that the toy is placed in the right context.



Figure 9 More participants interacting with the prototype

Future Design

Based on our findings, we would like to further explore the following:

- **Increase game complexity.** Parent and child participants expressed interest in a maze game with more complex paths to maintain interest and increase interactivity. Adding the ability to change complexity of educational content depending on the user's age group could also be interesting.
- **Extend parent involvement.** Explore how the maze can better support parents in scaffolding the content and prompting more interaction.
- **Refine accuracy and robustness.** One father suggested more accurate representation of the biological process through interactive animation. One child participant expressed she would like it if there was immediate audio feedback at every stage (i.e. a buzzing noise).
- **Expand to puberty.** "How come there is blood in the trash, Mom?" could be an interesting narrative to inform another version. Storytelling may be a better tool to introduce children to concepts of puberty.
- **Provide additional resources.** Explore how to fluidly extend conversations beyond the play experience by providing additional. Health experts expressed a need for a static website where information is compiled for educators, parents, and kids.

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