Magical Mirrors and I: Interweaving learning with mirror play

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INTRODUCTION
Self-recognition in mirrors is counted as a milestone in a child's cognitive development(Rochat 2003). Children love faces and observing themselves. From dancing before the mirror to making funny faces, mirrors aid them to create a lively pretend-play session independently(Nielsen and Dissanayake 2004). Mirrors contribute to their development as they learn more about themselves through reflections(Piaget, 1966) which also enhances their sense of attention. They practice names of body parts and grow more sensitive towards forms by observing themselves and their surroundings from a different perspective and imitating(Thanikkal 2019). Many teachers and parents also use mirrors to educate children about shapes and forms. Museums with funny mirrors that manipulate reflections also attract large crowds of children(Vergeront 2011). Upholding this potential that mirrors offer in child play and learning, we have built Magical Mirrors and I.

In this extended abstract, we will elaborate on Magical Mirrors and I - a mirror-based learning and gaming medium. It aims at propagating a sense of self-awareness (Rochat 2003) in toddlers and preschoolers through a mirror-play.

Mirrors have always been a common interactive modality. An everyday utility, mirrors seem to naturally grab attention from people of all ages. In the fields of interactive games and technologies, mirrors are being recognized as a useful medium of enhancing user experience. Mirrors are being used as a medium to introduce interactivity and personalization in many areas like emotion recognition through mirror reflections(Rajcic and McCormack 2020), haptic mirror therapy(Hallam 2015), using body reflection as an output modality(Hoang et al. 2018), AR anatomy for children(Kang et al. 2016), marketing of make-up products(Javornik et al. 2016), interactive advertising on hallways(Lösch, Alt, and Koch 2017), etc. Nonetheless, the possibilities mirrors offer are yet to be explored fundamentally. Through Magical Mirrors and I, we make an attempt to explore one of these possibilities.

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MAGICAL MIRRORS AND I

Magical Mirrors and I is a digital interactive game that aims to initiate self-awareness (Rochat 2003) through digital "laughing mirrors" among toddlers and preschoolers. The children pretend to be magicians and by saying a spell, they see their form and physical characteristics change in the mirror into something more amusing. These transitions are aimed to introduce and enhance the ability to recognize shapes among children. The available forms to explore are- fat, thin, tall, small, funny, doubling. The children are prompted by voiceovers of rhymes to perform a physical action and then say the spell-word 'PEEKABOO'. The application recognizes the voice input of the spell and changes the reflection of the child into the desired form as though magic happened. The rhymes and repetitions weave in the association of similar-sounding words that stimulate the readers to make predictions in the plot. The User Interface of the application is based on an exhaustive competitive analysis of various storybooks and digital games pre-schoolers engage with. It is based on a forest scene with rhyme-centric animations to gauge attention and introduce a familiarity blend with fascination. Every transition teaches an emotion or a physical form through activities and one's own reflections in the laughing mirrors.

The game is currently a web application. To obtain the manipulations of reflections in the mirror, Javascript library p5.js has been used. Voice inputs and audio exchange have also been implemented using Javascript.

Figure1: Screen 1 of the form chosen: A rhyme displayed with a voiceover narrating it, prompting the player to perform an action. Moving next, a new voiceover prompts the player to shout 'PEEKABOO', causing the transition to take place.

Figure2: Children playing the game on a laptop and engaging enthusiastically

EVALUATION

Procedure

A user evaluation was conducted to test the usability of the game initially with two children lying between the ages of 2 to 5 years. The game was played on a laptop in an open space where the children could move around. An adult supervisor to guide them through the game was always available. Casual conversations were made with them to assure their engagement and understanding.

Results

The following were the responses observed:

- All the children seemed very excited at the beginning of the game.
- The display of the plain mirror on the first screen of the game itself got them enthusiastic and they started moving around or making faces.
- As the game progressed, they quietly listened to the voiceovers. The actions they were asked to perform got them laughing and active.
- As soon as they were prompted to say the spell ‘PEEKABOO’, visible eagerness could be observed followed by loudly shouting ‘PEEKABOO’.
- As soon as their spell was recognized by the game, the mirror reflection changed as per the form they were on.
- The magic effect surprised them which could also be observed on their faces.
- They moved their bodies around to explore the effect better.
- They were observably paying attention to the form by recognizing the change and spelling it out multiple times. Some of the recorded comments were, “I look so fat!”, “My legs have become so tall!”, “I can’t believe my eyes”.
- They also paid close attention to other UI elements of the game, like the clouds, animals, flowers, etc. The session lasted for around 20 minutes.

DISCUSSION

The game offered an engaging experience for the children and they kept anticipating what would come next, as observed. The repetitive rhymes and spells helped them predict their next action. The mirrors introduced the concept of physical forms and emotions making them grow more familiar with themselves and that of others.

Through this evaluation, it can be noted that mirrors work as an interactive modality for children. By interweaving educational concepts with mirror-play, a very engaging learning experience can be created. To explore this further, we aim to introduce more forms and manipulations of reflections in the mirror that can help cater to the objective and enrich the learning process.

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