
The Conference of the Birds: A Collaborative Storytelling Environment for Literacy Development

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Abstract

Sociocultural theories of learning regard oral storytelling as a fundamental step towards literacy development. Collaborative play can lead to richer and sustained stories among children of young age.

We describe an interactive learning environment called The Conference of the Birds (CoB). By allowing two users to interact with the interface at the same time, the CoB allows children separated by physical or cultural distances to collaborate by creating narratives together. Through the CoB, children connect, cooperate and create joint stories, fostering the development of literacy, as well as collaboration and authorship skills.

In this paper we describe the principles, theories and design decisions that supported the creation of the CoB, and briefly discuss how kids can collaboratively create stories in a digital environment.

Author Keywords

Digital Storytelling; Literacy Development; Tangible Interaction; Collaborative Narratives;

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces—Input devices and strategies, interaction styles;

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Figure 1: Pakistani kids playing with paper puppets.

Introduction

Stories have the power to embody our social and cultural contexts, and toys have the power to embody and augment those stories. Boys and girls from around the world imbue toys with personalities and create stories that combine imagination with aspects of their lives. What if children separated by distance could create stories together by sharing the same imaginary realm? How long, deep and rich would those stories be, and how much agency would users have compared to traditional storytelling media? Would this approach afford different outcomes if compared to physically playing together?

Aimed at children aged 4 to 7 – an age of intense make-believe play [7] – the CoB is an interactive narrative world that helps children develop negotiated stories. We named the platform after a homonymous Persian poem [1] in which a bird guides his colleagues on a journey of self-discovery.

The CoB was developed as a tangible user interface in which children manipulate physical props that are translated into digital birds. Each child visualizes their own bird as well as the other child's character, in a real time, interactive way. A meta-narrator introduces the poem's storyline and children develop their own chapters of the narrative using their tangible/digital objects and through joint storytelling and play. Aided by the constant interaction between the characters, we aim for longer and richer interactions between young learners.

This work is a first step to investigate the elements that are vital to allow children separated by distance or cultures to co-create sustained and richer narratives through digital storytelling systems.

Related Work

The CoB is designed to foster collaborative play and storytelling. In sociocultural research, oral storytelling

and play are intrinsic to "outside-in" literacy skills which relate to the function and form of narratives. Decontextualized storytelling is a precursor to written literacy [8] and through our platform we seek to capitalize on children's' innate desire to tell stories.

Co-creating narratives and collaborating is a complex skill for young children. Toys augmented with interactive audiovisual capabilities have been shown to double the length of narratives. Yuill et. al [9] observed how children played as if "they were tied to a string" in such environments – a sign of cooperation in play.

Kurcikova [5] highlights the importance of personalization of elements as an enabler of greater agency, customized aesthetics and reciprocity in digital authorship and storytelling. Cassell's [3] work about Story Listening Systems lay four fundamental principles that allow these systems to be socio-culturally situated:

- (a) **Playful Language** - Storytelling systems need to evoke playful language and use children's propensity to tell stories to bootstrap literacy. Playfulness is linked to creativity as it promotes divergent thinking [6].
- (b) **Peer Play** - Storytelling systems need to encourage peer play and, most importantly, embody peers as playmates in the system [9], "*like an imaginary playmate with an active imagination*". [3]
- (c) **Embodied Play** - Successful systems invite the kind of embodied play that children naturally engage in.
- (d) **Meaningful Content** - Systems need to engage children in constructing meaningful content rather than constraining their stories. Aesthetics and personalization allow a closer relation with objects of play, increasing motivation and engagement. [5]

Other digital storytelling tools have paved the way for our work. StoryMat [3] supports collaborative storytelling among children who are not present at the same time or

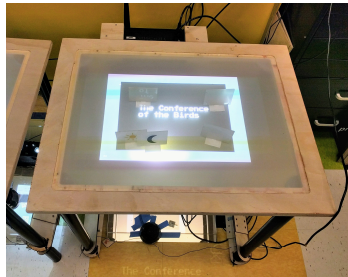


Figure 2: One of the two interactive low-cost tabletops.

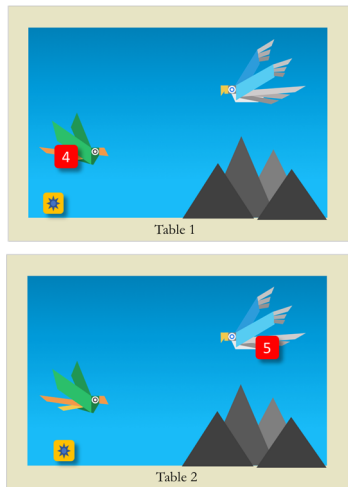


Figure 3: Optical fiducial codes are mapped into digital birds that move in real time. Fiducial #4 controls the parrot on both tables, and #5 controls the hawk. The sun piece changes the scene to daytime.

space. Research on Pagecraft [2] highlights the role of contextualized stories to support narrative development. The design for our project capitalizes on the frameworks developed in this body of research by providing an environment that combines personalization, collaboration and oral storytelling.

Design Elements

To define the current version of our storytelling environment, we conducted initial user testing over Skype with Pakistani children aged 5 to 7. To generate engagement through a shared object in the same attentional space, interviewers and children used paper bird puppets [Fig 1].

We drew several conclusions from this analogical prototype of the CoB. We found that to facilitate prolonged and rich storytelling, a narrative framework is needed: there needs to be a powerful and engaging context in which the story develops. We also observed that the personalization of story elements (i.e. naming a puppet and creating a background for it) was a fundamental element to generate greater engagement.

Based on these initial conclusions, and drawing from related theory and frameworks, we defined the main design features of the digital version of the CoB. The platform was designed using two low-cost, bottom-projected, custom made interactive tabletops. [Fig. 2] A system was developed to connect the two tabletops in real-time. The result was robust but designed with low-cost elements such as IKEA tables, acrylic mirrors, infrared LEDs and security cameras. Children manipulate tangible props with optical fiducial codes [Fig. 3] that are translated into birds by the system. Below we detail our most important design decisions and principles:

1. Narrative framework: We provided a story canvas, based on the original “The Conference of the Birds” poem,

without limiting the narrative possibilities children can create. A meta narrator initiates the story, describing a meeting of birds in pursuit of a king. From this point on, children self-express and negotiate their own creations in a non-linear, open ended way. User-controlled alternating scenes help provide structure for the stories.

2. Personalization: Our user testing suggested that character personalization would be an important element, so children’s first task is to create their own bird on the writable top surface of the interactive props.

3. Agency: To create more moments for joint dialogue and coordination, the system has two backdrops: day and night. Children alternate backdrops by getting “out” of the story for a moment, verbally coordinating with each other the scene change, and getting back in, leading to moments of meta-dialogue and to greater agency over the shared development of the stories.

4. Real-time reciprocity: Real-time reciprocity of movements is fundamental for weaving a negotiated story over the internet. Fiducial codes underneath the props track the movement of birds and map them onto both tables. Through interconnected server and client modules in the Processing programming language, users interact in real-time, creating a joint “puppet theatre”.

5. Independent sounds and movement: Our user testing also suggested that having ambient sound and animated ambient objects lead to more creative storytelling. Our system includes sound elements in the background, as well as narrative elements such as rain, falling leaves, and non-player animated animals, providing subtle immersion into the tabletop world without diverting users’ attention.

6. Recognizable cultural forms [4]: The use of tabletops naturally organize the play around it. Graphic and sound aesthetics resemble a video game, a recognizable format that automatically evokes interaction.

7. Physical movement: Instead of traditional screens (e.g. tablets), tabletop surfaces enable children to move around, as well as embodied play and collaboration.

Future Design Directions

We plan to improve the CoB so that it will allow us to further investigate the research questions mentioned in this paper. First, allowing users to control sounds would permit greater agency over narrative outcomes. To open new possibilities of self-expression, we plan to add new, customizable scenes, and user-defined semi-autonomous story elements (e.g. a flock of birds), as well as record and playback capabilities. We also plan to add further opportunities for negotiated interactions, such as players coordinating movements to change the backgrounds. We will work to assess the effects of our design elements over the richness of the narratives (e.g. increase in time, story elements, etc.). Finally, we envision extending the CoB to regular tablets and other digital devices to reduce hardware costs.

Conclusion

We presented The Conference of the Birds, a digital collaborative storytelling environment aimed at developing literacy. We aim to contribute to this field by demonstrating the roles of context, personalization and agency in the creation of more complex and sustained narratives. We seek to understand how children imagine, collaborate, and negotiate stories with peers that do not share the same physical space and the particular affordances of this approach.

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