I-Theatre: developing narrative skills in kindergarten children

Abstract
In this paper we introduce i-Theater, an interactive integrated system for developing narrative skills through story-creation and storytelling, dedicated to young children.

Keywords
Children, TUI, multi-touch, storytelling

ACM Classification Keywords
H.5.1 Multimedia Information Systems: Animations, H.5.2 User Interfaces: Haptic I/O, User-centered design

Introduction
Storytelling has a very important role in developing the narrative skills that are fundamental for a child’s cognitive and emotional growth. Research has shown that children start creating simple narratives very early [6], around age two. Later on, children gradually acquire the skills that are at the basis of future literacy via both formal and informal learning experiences. Kindergarten years cover a period of preparation for reading and writing, supporting the crucial transition from spoken to written language competences that typically appear later on [3]. Narrative skills are the basic building blocks for learning to read and write, thus being able to develop them in preschool children is very important.

In kindergarten, storytelling is a frequent didactic activity and one of the most engaging ones for children. Different storytelling approaches are deployed by teachers for supporting the development of narration skills and start establishing a relationship with written words [7]. By starting from simple phrases regarding past events, children’s narratives gradually evolve to more elaborate stories, taken from personal experience, tales, or original ones that become a fundamental tool for learning about themselves and others. Narratives are interpersonal and created to be told to others in ways that can be easily understood.
Being able to tell a story allows children to share their experiences with others and make sense of the world around them. Storytelling and role playing encourages the child to develop many of his/her narrative skills: from the ability to recall past events or tell about something that is not currently experienced or real to the ability to organize these experiences in a structured way, from the ability of contextualizing a story to being able to keep track of a speech and elaborate the elements of a story [1].

We believe that technology can be used to motivate and engage children in a more powerful way with respect to other educational tools, and it enables to early approach advanced narrative concepts without being detrimental to a child's creativity and motivation. In this context ICT technologies may support teachers and educators in developing narration skills in kids, since it may provide tools for empowering children and giving them the necessary independence to being able to explore the story-making process. This does not involve only telling the story, but also giving the child the tools for enriching and thinking about it, starting to organize a plot structure.

**I-Theatre approach**

The overall pedagogical objective of the i-Theatre project is to support children in the development of their narrative skills, not only with reference to the chronological sequence of narrative events, but also with the exploration of a child's own creative and expressive, personal and emotional, social dimensions. Research has also demonstrated that early childhood education is most effective when it successfully combines didactic skill-based activities with more child-centered activities [7]. The approach adopted in i-Theatre focuses on combining hands-on activities with digital and more traditional tools. Moreover, i-Theatre enables children to have full control of the story. This is a key aspect according to the children requirements pointed by Druin et al [4] concerning their interaction with technology - control, social experience and expressive tools - and the fact that technology should support their curiosity, their love for repetition and control [5].

Tangible interfaces have a special role in facilitating this process, by more naturally engaging children in playful learning activity, providing them more intuitive interfaces to interact with, that are closer to their everyday world and playing objects. On one side, physical objects and physical activity are often at the core of kindergarten and primary school activities. Manipulative materials are often used to support the teaching of mathematical concepts. This successful strategy of learning-through-manipulation can be extended also to other fields, such as storytelling. On the other side, the use of traditional GUI desktop interfaces may be difficult to propose to pre-schoolers, not only because it requires eye-hand coordination or fine motor skills, but also because it often includes the use of abstract menus and written language. Differently from previous projects targetting primary school children (such as TellTable [8]), our project addresses young children, so we decided to design a very basic and straightforward GUI, with no menus, written or abstract components, that could have been confusing for children. Instead we leverage on the manipulation of physical objects for accompanying children through the different phases of the storytelling process.

iTheatre is designed focusing on the real added value of using technology in teaching, and leveraging on the synergy of pedagogical motivations and technology facilitators. We explored the design of i-Theatre with the objective of realizing an effective and customizable
storytelling tool for educational purposes, deployable on different young children playing and learning contexts. To this aim, we analyzed how this system could be introduced into classrooms, becoming part of other pedagogical activities, thus providing a novel kind of support to teachers.

**Description**

The i-Theatre system (figure 1) is an interactive integrated system for story-creation and storytelling based on tangible interfaces, dedicated to 4 to 6 years old preschool children. With i-Theatre, children give life to their characters and stories through a creation process that involves both traditional tools and digital instruments. Using i-Theatre, children are able to create, record, review and manipulate their stories in a simple and engaging way. The system has the appearance of a table and it is characterized by two main complementary components: (a) a multi-touch based interface for scene composition and the control of the story characters; (b) a set of physical objects providing a tangible user interface toolkit to perform the activity of recording and archiving through physical intuitive objects.

With i-Theatre children are stimulated to work in a cyclic process of thinking, hands on activities, storytelling and re-thinking. First they are invited to reflect on the story and to draw their characters and background on paper. Drawings are then fed (and digitalized) into i-Theatre. Based on their created drawings, children are then enabled to animate their characters by using the multitouch screen. They can manipulate content in a very simple way, as if they were moving drawings over a tabletop. Any object (e.g. a paper cup) of reasonable size can be used as a tangible user interface (the personal archive) to archive the elements of the stories (characters and backgrounds) as well as the whole stories. During working sessions with children we decided to let them build or personalize their own personal archive as a part of the activity, so as to develop an affective interaction with the part of the system interface that represents the child’s own personal space in i-Theatre. Additional manipulative objects, the scene cards, are used for breaking the stories in single scenes that can be compounded in different ways. The opportunity of arranging and re-arranging scene cards encourages the child to explore different narration schemes and supports the conception of several classroom activities.

The use of the multitouch offers the possibility of capturing the narration, by keeping all the expressiveness, creativity and spontaneity of the playing event. Stories can be reviewed, modified and refined afterwards through the scene cards. The objective of the system is to encourage creativity by making a complex task such as a story creation, easier and more intuitive to perform through the manipulation.
of physical objects. We designed the i-Theatre system by capitalizing on learning activities that are already part of young children playing and teaching practices, such as the use of drawings for telling stories, the support of children in their narration and reasoning about a story creation and structure. Although children perform various tasks, all of them are centered around the narration objective. We deliberately avoided add-on functionalities that would distract them from the main goal of facilitating narration.

**Current state and future work**

A successful system for kindergarten children should be able to maintain the attention of the child in the performing tasks. For narration support systems, this means that the child should be engaged through all the story creation process. Observations collected during individual working sessions of young children using the i-Theatre system suggest us that we can effectively leverage on the technology described for creating pedagogical activities, that not only support story creation but are also stimulating for the child to reflect over the creation process and to create more complex and articulated forms of narrative.

For fully verifying the effectiveness of the i-Theatre approach, we intend to set up more longitudinal evaluations, in different usage contexts. In particular, we plan to evaluate the system in three different scenarios: the classroom, a summer course, a school dedicated workshop in a museum setting, as part of a museum installation. Beside the assessment of the system effectiveness with respect to its pedagogical goals, we expect that from these studies it will be possible to define more general strategies and guidelines for structuring further integrated pedagogical activities supported by the i-Theatre system.

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**Citations**


