

ChiCo: A Platform to Support Children Co-Design

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Multi-touch interactive systems are being increasingly exploited in the last few years for learning purposes, since they are able to foster collaboration in children. However, there are other factors that need special attention when trying to engage children in a collaborative process, like level of fun and simplicity of tools provided, for instance. This paper describes the design, implementation and evaluation of ChiCo, a platform aiming at supporting children in a co-design process.

Multi-touch Interaction, Mobile Computing, Children, Collaboration, Co-Design.

1. INTRODUCTION

The use of multi-touch interaction with tabletops has been suggested to engage kids in scientific inquiry and collaborative explorations (Olson and Horn 2011). Within a project on emergency preparedness, children took part in the co-design of a game in order to understand how they learn and what features they find valuable to make a game fun (Díaz et al, 2012). Since multi-touch tabletops seem to elicit collaboration in children and support effective learning (McCrinkle et al. 2011) they emerged as a suitable option to encourage participation in such co-design process. Besides a multitouch tabletop, we identified other elements that can contribute to engage children in the production of ideas by enabling the exploration of environment, supporting situated and collaborative design and allowing the embodiment of actions.

In this paper we describe the design, implementation and evaluation of the resulting platform: ChiCo (Children Co-design).

2. CONTEXT AND RELATED WORK

Low-tech prototyping tools have been used in a narrative-based methodology to strength children's potential as design partners (Duh et al. 2010), and in participatory design sessions to engage children in the design of educational applications (Triantafyllakos et al. 2011). An interesting approach leverages and enhances by means of technology comicboarding to support children in brainstorming sessions (Morajevi et al. 2007). The POGO story world (Rizzo et al. 2002) is a

technology-aware narrative environment that supports children in story building, allowing them to make use of technological tools.

During the last two years we conducted a series of co-design workshops in which children were asked to create a paper-based prototype of a game to teach other children about emergency preparedness for which they could use a camera with a built-in printer (Giaccardi, et al 2012). In these experiences we found that children could work in teams, collaborate spontaneously and brainstorm effectively to produce ideas. However, some issues arose as a result of lacking enabling technologies (Alvarado 2012). Children took valuable time in trivial activities (like cutting paper, pasting it onto the paper-roll, writing, drawing and colouring); time that could have been used in more meaningful tasks like discussing the dynamics of the game. Moreover, the camera they used in the workshops took too long to print one single picture, so for each session in which around 12 and 15 pictures were printed out, a considerable amount of time was wasted in this task. Finally, the game prototype was not reusable, since it was a piece of paper that cannot be modified in further design sessions.

3. CHICO DEVELOPMENT

The aforementioned issues led us to develop the ChiCo platform; a system that supports children in producing a digital prototype that is persistent in time and can be easily modifiable.

3.1 Design and implementation

ChiCo consists of three main modules (see Figure 1): (1) a canvas main application running on a multi-touch tabletop where the prototype is going to be created; (2) a mobile application that will serve to explore the environment and take photos, and (3) the middleware that will make possible wireless communication between the mobile and the tabletop applications (photos taken with mobile devices are transferred to the tabletop via Bluetooth). From the interaction point-of-view, this transfer was designed to occur when the user slides a photo out of the mobile screen with his

finger towards the tabletop. Immediately after, the image appears onto the canvas where it can be manipulated with other application tools to create the storyboard of the game.

The multi-touch main application was written in ActionScript 3 using Flash Pro CS5.5 for the user interface. The mobile application was developed with the Android SDK so it runs on devices with Android 2.3.3 or above. Finally, the middleware was written in Java.

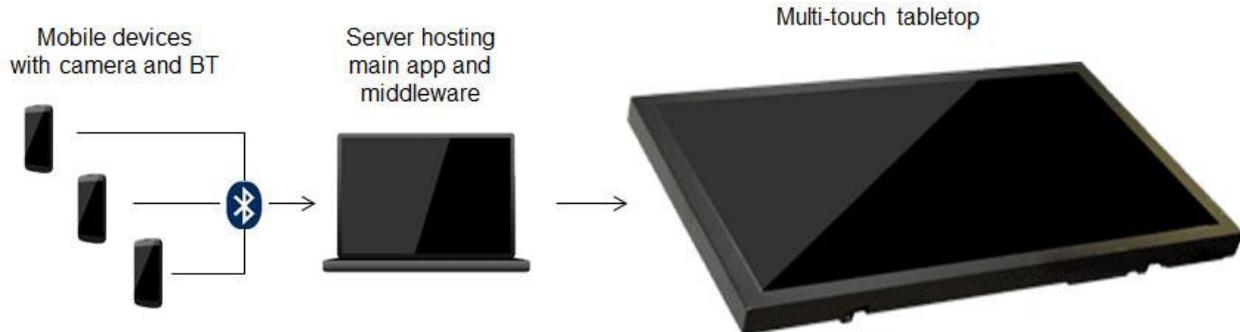


Figure 1: Diagram of the ChiCo platform

3.2 Usability evaluation

The first prototype of ChiCo has been evaluated using Cognitive Walkthrough by 14 experts with background in HCI. They were presented a typical usage scenario including the steps the child would follow to perform the tasks. This scenario was designed taking into account the findings of previous co-design workshops (Giaccardi et al, 2012). Once completed, they were asked to fill in a questionnaire to identify usability problems and assess whether the tool is easy to use and to learn. Evaluators considered ChiCo is usable, although some minor changes are needed on the user interface (e.g. enlarging buttons, changing label texts). The 93% of the evaluators said the platform will be easy for children to learn to use, and 79% think children won't need much time to get used to the platform. In any case, this is only a preliminary evaluation that does not empirically validate the utility of ChiCo. Next step will be the use of ChiCo in further workshops with children where we will be able to realize how the platform really supports collaborative design and does not limit their creativity and playfulness.

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