

# Comicboarding: Using Comics as Proxies for Participatory Design with Children

Neema Moraveji<sup>1</sup> Jason Li<sup>2</sup> Jiarong Ding<sup>3</sup> Patrick O'Kelley<sup>4</sup> Suze Woolf<sup>4</sup>

<sup>1</sup>Center for Interaction Design, Microsoft Research Asia, Beijing, China

<sup>2</sup>Education Department, Brown University, Providence, RI, USA

<sup>3</sup>School of Information, University of Michigan, Ann Arbor, MI, USA

<sup>4</sup>Microsoft Corporation, Redmond, WA, USA

neemam@microsoft.com jason\_li@brown.edu dingj@umich.edu {pokelley, suzew}@microsoft.com

## ABSTRACT

Comicboarding is a participatory design method that uses specially created comic books to generate engaging, productive brainstorming sessions with children. By leveraging known plot formats, interaction styles, and characters in comics, researchers can elicit ideas even from children who are not accustomed to brainstorming, such as those from schools where rote learning is the norm.

We conducted an experiment using two variants of the comicboarding methodology with 17 children in China, where traditional participatory design may fail in the face of local cultural practices. The results suggest that comicboarding holds promise for co-design with children.

## Author Keywords

Participatory design, children, methodology, comic books, cartoons, developing regions.

## ACM Classification Keywords

H.5.2 [Info. interfaces and presentation]: User Interfaces

## INTRODUCTION

The study of user-centered design (UCD) and participatory design (PD) methods as they apply to children is a burgeoning area of research due to fundamental differences between adults and children. Results of conducting PD with children vary widely across age groups, educational environments, and facilitator skill. This wide variance, exhibited in the literature, could be attributed to the way traditional PD storyboarding emphasizes generative brainstorming and extrapolation facilitated by an adult.

Conducting PD with children often requires finding highly expressive or precocious children. These children are usually “selected either by their parents volunteering them or by teachers” [5]. When such children are not found,

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another effective method is to train children during a long-term relationship [1]. While the effects can certainly be advantageous, practitioners and academics alike have a difficult time investing in such long-term investment. Results of such PD sessions may also be skewed in favor of the characteristics of those children, instead of a more representative group.



Figure 1: A sample set of panels from a comicboard.

Children from rote-learning educational systems are not alone in finding brainstorming difficult. Most children untrained in the practice find it difficult to generate unbounded ideas and grow frustrated quickly when failing to meet these expectations [3, 7]. In developing countries, rote learning is the norm and eliciting ‘brainstorm’ activity can be trying [8]. It is in this context that we found ourselves attempting to design with children unaccustomed to exercises in creativity.

In this paper, we introduce and offer preliminary evaluations a technique called *comicboarding*; its goal is to elicit ideas from school-age children with any type of educational background. To do this, comicboarding reduces the barrier to successful PD sessions with children by scaffolding the brainstorming process using comics. We also present a variant, magical comicboarding, as an attempt to lower the barrier to brainstorming even more. We end the paper with insights into the general utility of comics in the PD process.

## RELATED WORK

The literature provides contradictory results of eliciting design ideas from children by using low-fidelity prototyping. While difficult to compare, some (e.g. [11, 1]) had great success while others (e.g. [8, 7]) had significant difficulty. Why the discrepancy? Among other reasons, the

facilitator's skill and empathy, the children's personalities, and the study setting surely played roles in the outcomes.

[5] noted the important contribution of 'difficult' or disruptive children in group design sessions but did not explore one-on-one PD with them. In [8]'s work in developing regions, researchers had to resort to high-technology devices to spark student brainstorming.

[7, 11] noted children have difficulties "connecting what they had drawn on paper to what they would see on the screen", "producing their own storyboards", and that they "need a starting point for prototyping." These same children felt an "overwhelming feeling of restriction" due to the lack of "boundaries" or structure within which to brainstorm.

One method of providing this structure, notes [9], is to research "user-centered idea generation techniques that are not for solving problems but for creating solutions for possible use situations."

The ideas explored here use comics and magic. [10] had children "play out the parts of characters [of comic strip characters] on screen", using the characters to create a shared context. The dialogue was used to inform design.

The literature has not described the utility of comics in aiding the process of PD with children as "informants" [2]. Similarly, magic as a user experience element was explored by [12] but has not been applied as a method of PD.

#### USING COMICS FOR PARTICIPATORY DESIGN

Using comics, structure can be provided by placing the design problems, contexts of use, and product personas within a story and facilitating the children's ideas to complete that story. That is, well-known, age-appropriate comic strips and their associated characters provide a theme and set of constraints to what is otherwise an open-ended and unbounded exercise in imagination. The familiar comic format contributes structure and comfort, thereby increasing participation.

#### Scaffolding Generative Ideas of Children

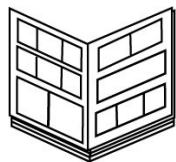
A review of the definition and importance of scaffolding:

"Instructional scaffolding is the provision of sufficient supports to promote learning when concepts and skills are being first introduced to students....These supports are gradually removed as students develop autonomous learning strategies, thus promoting their own cognitive, affective and psychomotor learning skills and knowledge." [13]

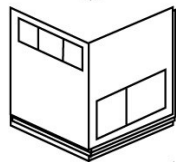
In some sense scaffolding is the formal implementation of Vygotsky's "zone of proximal development", or the gap between what a child is able to do unaided and what they can do with the help of a more capable guide, such as an adult or some other scaffolding support [13].

Rather than asking children to create a comic strip from a 'blank slate', we had them fill in a partially complete

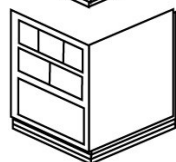
comic; a certain degree of scaffolding is preferred to support "idea generation in small steps" [6]. We added three types of idea solicitation into the comic with varying levels of constraint (Figure 2).



1. Dialogue: The most constrained solicitation method is leaving dialogue balloons empty. (Bounded, constrained)



2. Panel: Space for creating comic panels of varying size into the middle of a story, bounded at the end by the existing comic. (Bounded, free-form)



3. Page: The least constrained is unbounded empty space for panels of varying size at the end of a section or chapter. (Unbounded, free-form)

Figure 2: Three types of scaffolding in a comicboard.

By choosing an appropriate comic, one can gain significant ground by leveraging an existing storyline, set of characters, and theme. In East Asia, for example, the Doraemon [4] comic involves a common theme: a cat from the future regularly pulls fantastical inventions out of his magical pouch for the children in the comic. The bulk of the stories are centered about their interactions with each other, using (and abusing) the new device.

#### Rendering

Instead of attempting to articulate specific design ideas set in the imagined context, we propose that children narrate their ideas as a continuation of an existing story. By offering part of a story first, comicboards eliminate the cognitive load required to imagine a scene and usage within that scene. By allowing them to narrate rather than describe, the trouble children commonly have articulating factual detail is sidestepped.



Figure 3: A child corrects an artist's drawing.

During each session, an artist offers to illustrate the child's ideas for them, allowing the child to focus on ideas rather than on translating their thoughts into drawings. (They were also given the option of drawing themselves.) Furthermore, having a talented artist implementing the child's wishes in the comic strip may keep them engaged and excited at the prospect of contributing to a real comic strip.

## EVALUATION

We wanted to evaluate if and how comicboarding (CB) and magicboarding (MB) are useful in a UCD process. We compared them to each other and to traditional storyboarding (SB). We define a successful PD session here as one that is able to produce feature ideas within a story. Quantity was valued over quality because comicboarding and magicboarding are designed to be used at the early, open stage of design ideation.

Each session addressed the same design problem with one of 17 children (6 CB, 6 MB, 5 SB) in China from age 6 to 13 and from rural poor to urban upper-class.

### Storyboarding

We ran 6 'blank slate' SB sessions using informal strategies to motivate the children such as allowing them to bring in their favorite toys or giving them an electronic device. Even with these aids, our results confirmed the claims made in the literature that the open-ended nature of SB left children largely bewildered and frustrated. The few ideas they did contribute were most often based on familiar activities and toys, whichever was most fresh in the child's memory.

### Comicboarding

We created a comic using Doraemon and had him introduce the design in question into the story. The CB contained an instance each of all 3 levels of PD scaffolding (Dialogue, Panel, and Page). The artist acted simultaneously as the facilitator. If they had trouble starting the process, the facilitator would begin to draw the outline of some panels and, if the child still did not volunteer ideas, begin to draw a scene that followed incrementally from the previous panels. The child narrated their ideas to fill in the blanks while the artist drew or in rare cases, they themselves drew.

#### Results and Discussion

The child often read the CB front to back before brainstorming, which acted as a sort of warm-up exercise. Once they got started, the child often spoke faster than the artist could draw but was happy to repeat themselves as long as they could watch their ideas appear on paper.

Unlike our experiences with storyboarding, children unaccustomed to brainstorming fared just as well (i.e. generated as many ideas) as those who were accustomed to it. The latter were faster at and more enthusiastic about the task, while the former worked on the fill-in-the-blank comic as they would a fill-in-the-blank homework problem, in that they weighed the information given in the panels before and after, and paused to think before giving us their idea.

Even children who enjoyed drawing tended to cede the drawing of the comic to our artist, possibly because of an unequal relationship [1]. However, all children enjoyed watching their ideas become incorporated into a comic, especially those children who 'don't' draw. Additionally, because our artist was familiar with the traditional symbolic vocabulary of comics, the scenes dictated by the child were translated into forms consistent within the existing comic -- essentially scaffolding the child's ability to create.

## Using Magic

To counteract a potentially unequal relationship between artist and child, we added a Wizard of Oz component to the CB method to remove the physical presence of the artist. We had the book 'draw itself on command' to retain the empowering feeling of creating a comic book. We call this technique *magicboarding*.

To create a magicboard, we began by digitizing the CB into PowerPoint slides and placing copies on two notebook computers connected to one another. We placed the artist in a separate room from the child and facilitator. As the child described their ideas, the facilitator translated their statements into 'commands to the computer' that would implement the child's ideas. The 'commands to the computer' were actually commands for the hidden artist, who rendered the child's ideas using a digital pen on a Tablet PC. To the child, images appear 'magically' on command, and this effect is designed to place their minds into a more creative and playful state. Because the drawings were virtual slides, no bounded set of panels existed; the artist could always add more as the demand arose.

#### Results and Discussion

Like CB, MB was successful in eliciting ideas from children. Children found the 'magical' factor fascinating, but it did not necessarily relieve them of the pressures of the task at hand or make the experience entirely game-like.

### Comparative Results

We enumerated the ideas generated at the end of our CB and MB sessions. Ideas included visual interface elements, interactive experiences, and permutations of the given ideas. Again, the ideas generated from SB were largely irrelevant and did not address our design problem.

PD method	Dialogue	Panel	Page	Mean
Comicboarding	0	2.8	1.7	<b>4.5</b>
Magicboarding	0	0.6	1.6	<b>2.2</b>
Storyboarding	-	-	-	<b>1.7</b>

**Figure 4: Mean ideas generated per method. Storyboarding did not use a scaffolding technique.**

These results show CB was the more prolific method. CB gains its advantage in the Panel blanks (blanks nested between two filled-in sets of panels). The difference between the Panel blanks in CB and MB is that the blank panels of the latter do not have fixed bounds because of the software used allowed us to add or delete panels as necessary. So a possible explanation is that CB was conducive to more ideas because it was more constrained.

However, it is important to note that this finding does not infer that greater constraints lead to more ideas. In fact, when we constrained the CB more, in the case of Dialogue blanks (fill-in-the-blank balloons), children not only failed to generate any ideas but filled in the blank with illogical, trivial phrases so that they could move on.

## GENERAL DISCUSSION

There are few standards for evaluating the quality of an idea. Because our method pertains to low-fidelity prototyping, appropriate for an early stage of design when “there are no bad ideas (yet)”, a simple count of the number of ideas generated is more meaningful than an analysis of the detail, relevance, feasibility, etc.

Comicboarding elicits ideas that develop the stated context of use (e.g. multi-person) as well as introduce new functionality (e.g. a new button), new system response to user input (e.g. visual feedback), and new methods of interaction (e.g. voice).

Comicboarding is most useful at a stage in the design process when researchers are confident about certain decisions but want more ideas about details or other portions. The known variables set the context and scene in the comic and the unknowns are strategically presented as opportunities for contributions. Setting such a scene using storyboarding often involves asking children to “imagine you are holding a camera...” or “tell me a story about the last time you...” This method tends to elicit high-level contexts (if at all) rather than detailed ideas.

The scaffolding provided by CB proved crucial as compared with regular SB. The SB method failed to engage the child and put their imaginations to work as the ideas generated during storyboarding most often followed whatever was last on the child’s mind. As a result, the ideas generated by SB lacked the level of usage detail seen with CB. Several factors may explain this failure, including the unexciting nature of a ‘blank page’ exercise and the absence of a comic’s pre-established fantastical setting. The SB may confuse kids by introducing too many options and variables. In CB, less creative kids generated ideas just as well as more creative ones, only more slowly.

### Limitations of the method

First, children may bring in ideas from existing comics in the series rather than generate new ones. Second, access to an artist who is able to mimic a comic’s illustration style and possesses a working knowledge of the selected children’s comic is not always feasible. Third, because the context and theme of the comicboard is predetermined, the scope of the generated ideas is limited.

## CONCLUSION

Our research team was engaged to assist in the research of products aimed at children. As part of the UCD process, we tested several different PD methods described in the PD literature. After some early, unsatisfactory results, we begin experimenting with comicboarding and magicboarding.

Though the methods require more empirical evaluation to prove their efficacy, comicboarding offered a shorter learning curve relative to storyboarding. The comic format, with its known characters and story-telling process, provided scaffolding for children in the brainstorming

process. Through comicboarding, our team was able to generate more ideas than with other methods. Further, comicboarding proved successful in generating ideas with children from varied backgrounds in a developing region.

An alternate form of comicboarding using magic did create more initial interest among children. However, the moderate constraint of standard comicboards was actually most conducive to idea generation.

### Future Work

We plan to compare comicboarding and magicboarding with other PD techniques and to modify the methods to elicit various types of ideas.

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