

# Evaluating Early Prototype Technology and Activities in the Development of Online, Cross-cultural, Children's Book Communities

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## Overview

In this project a group of researchers from the University of Maryland and the University of Maryland Baltimore County are working together with colleagues in Argentina, Hungary, Mexico and the US to create children's book communities. This case study describes early work in developing the online book community, known as "ICDLCommunities" because it is associated with a large digital library of children's books known as the "International Children's Digital Library" (ICDL) ([www.childrenslibrary.org](http://www.childrenslibrary.org) or [www.icdlbooks.org](http://www.icdlbooks.org)). The idea is to enable children from across the world to communicate with each other about the books they read and about their lives; for example, what it is like to go to school in their country; what people eat; what games they play, and so on.

In this case study we focus on the evaluation of early prototypes of components of the ICDLCommunities software. We describe the field evaluations of school-based groups of children, aged 7 to 9, who were supported by their teachers and researchers from our team. Much of the early prototyping work was done using paper and video which was then sent to the children in another country. A strong focus for both kinds of activities was to help the children to get to know each other better. As the children became more comfortable working together they were set the task of reading a story form a book in the digital library and then "writing" a new ending for the story. These new

endings mostly took the form of drawings with a few words. The children from each community then exchanged their stories. This exchange encouraged them to communicate with each other, because they wanted to ask questions about parts of the stories that they did not understand.

Eventually, when the system is fully developed we expect the children to interact online using tools developed for writing and exchanging stories. A higher level goal that underpins the research is to encourage cross-cultural understanding and tolerance.

## 1. Background

In this increasingly globalized world, it is becoming more and more necessary for people to be aware of other traditions and beliefs and to be more accepting of each other's differences. Even though technology has brought people closer together, it also brings instantaneous reports about various conflicts and acts of aggression grounded in religious and cultural biases. Thus, in order to circumvent these cycles of intolerance, children, who are prone to absorbing the narrow-minded attitudes of their communities, in particular need to be introduced early on to the diversity of ethnicities and cultures in the world. Among others, two ways to accomplish this are: (i) to have children read children's literature from other cultures, and (ii) to expose children to and have them interact with children from other cultural groups (Ohio State University, 2002; Webb, 1990). The International Digital Children's Library Communities (ICDLCommunities) incorporates these two approaches in creating and supporting digital communities for children.

In creating a successful online community, there are two critical components: sociability and usability (Preece, 2000). Sociability is the meaningfulness or quality of the interaction between community members. Individuals come together and form communities—both physical and virtual—for a variety of reasons; among others, they may want sympathy, need answers to questions and concerns, or have a place of origin, culture, or hobby in common (Maloney-Krichmar & Preece, 2005; Preece 1999, 2000). If these communities enable them to make significant connections, people maintain their membership within the group. However, key to creating meaningful interactions is the ability to communicate well, which can be a challenge when dealing with online communities of children. Children have limited linguistic and communicative abilities. They are also just learning to socialize and may not be as attuned to the needs and emotions of others. Thus, in evaluating the sociability of the system, the standards of quality that are known to be applicable to many adults may need to be reassessed for children.

In online communities, sociability is mediated by technology, so thought is needed about how to support social interaction when people are not collocated and may never meet each other. This can create two kinds of issues. First people may not feel a sense of responsibility to each other and for their own actions. Second, when non-verbal communication cues are not present or reduced the possibility for misunderstandings is increased. The usability of a computer system determines

how efficiently and effectively members can communicate and interact with each other. The ideal interface would: enable users to learn to maneuver through it easily, be responsive (i.e., not take a long time in uploading or downloading), and support error-free interactions. In supporting children's online communities, these factors, as well as their limited motor, technical, and critical thinking skills, have to be taken into account. Thus, designers have to consider the difficulty these young users have with using keyboards and mice, their possible lack of exposure to technology and technical vocabulary, and their limited ability to process or navigate complex instructions or structures. In addition, they have to keep in mind the children's safety while in this online environment.

The degree of sociability and usability provided ultimately affects the success of any online community. For the ICDLCommunities project, a third criterion is cross-cultural exchange which requires an environment in which children can learn about each other's cultures and communicate successfully across cultures and languages. As already mentioned, the communication skills of this age group are limited and, when additional languages and foreign cultures are added, this makes sociability and mutual understanding extremely complicated. For instance, the children may not realize that people from different cultures behave in different ways and do not have the same standards for politeness (De Souza & Preece, 2004; Preece, 2004). In China, for example, it is not customary for some families to say "please" and "thank you" at the dining table since one is among close family members and this kind of behavior indicates closeness and familiarity, whereas in the US it is not deemed polite. All interface design benefits from careful consideration of usability but when designing to support communication between children who speak different languages and experience different cultural norms, it is particularly important to understand these social and cultural challenges and to make sure that the interface is as straightforward to use as possible.

This case study begins with a brief review of the research on children, technology, online communities, and culture before discussing ICDLCommunities. We then describe how we evaluated the children engaged in and the prototype tools designed to support them. We begin by describing our data collection and analysis methods, followed by a discussion of the findings. We not only analyze the effectiveness of our methodologies and interface design, but we also discuss what we learned about the ways children liked to think, act, and communicate with each other. In this study, culture and identity emerged as noteworthy issues for the children. We conclude with a summary of the lessons learned and some recommendations for modifications to the interface.

## 2. Children, Technology, Online Communities, and Culture

Computer technology has drastically changed the way people communicate and use information. Numerous researchers have conducted studies to discover usage patterns in order to improve information and communication technologies. However, an overwhelming majority of these inquiries have focused on the needs of adults. It has only been in the last decade that a few scholars have

focused on children's digital needs and use. Research on children and technology gives insight into the ways children view and use technology and their desire to be consulted in the development of resources and services intended for them, particularly since they think differently from the adults who design these systems (Druin, 2002). Because of safety concerns, little attention has been given to understanding the potential of online communities for children and how best to design these digital spaces, even by researchers specializing in children's technology.

## 2.1 Children and Information Technology Design and Evaluation

Many of today's children and youth use digital tools and information regularly in their lives (Center for Media Education, 2001; Grinter & Palen, 2002). As reported by several researchers, they view technology positively and often use it to forge their identities (e.g. Druin 2005). However, when developing new technologies for children, adults tend to overlook children and their ideas believing that, because they were once children, they can predict what children will like or not like, do or not do. Furthermore, young people are treated as a "marginalized user group" and they are rarely consulted about their needs or wants when, in fact, recent research indicates that they want to have a say. Developers therefore need to keep in mind that designing children's technology is different from designing for adults and the methods they use need to reflect this difference (Druin, 2005). Similarly, evaluation methods need to be adapted to the needs of child users (Hanna, *et al.*, 2004; Baauw & Markopoulos, 2004).

Designers and evaluators have to take into account the varying developmental levels of children and youth; younger children, especially non-readers or beginning readers, for example, rely on visual and auditory cues, rather than on textual directions (Druin, 2005). In addition, since children's fine motor skills are not fully developed, designers should pay attention to mouse interactions to facilitate children's interaction with the computer (Inkpen, 2001). Furthermore, digital tools have to be aesthetically pleasing, entertaining, and engaging so as to keep children's intrinsic motivation high and to encourage children to use them (Chiasson and Gutwin, 2005).

## 2.2 Children and Online Communities

There is a small but growing number of online communities for children despite the challenges of ensuring safe interaction for children online. However, many of the communities that are available tend only to allow one-way posting to family and friends and sometimes voting to rank contributions, e.g., PBS's Backyard Jungle ([www.backyardjungle.org](http://www.backyardjungle.org)), a community for children interested in nature, Cartoon Network ([www.cartoonnetwork.com](http://www.cartoonnetwork.com)), and Disney's Surf Swell Island ([www.surfswellisland.com](http://www.surfswellisland.com)). One site, Habbo Hotel ([www.habbohotel.com](http://www.habbohotel.com)), does allow 13–18 year olds to "hang out and make new friends"; in this virtual hotel, teens can register to "become" Habbos, explore the various rooms and activities, and chat with existing friends or new people. Classroom-based community activity can be more imaginative because the

online environment can be controlled; for example, Ellis and Bruckman's (2002) Palaver Tree encourages children to learn history by communicating with seniors who have lived through the experience.

Currently there appear to be few international online communities that engage children who speak different languages and come from different cultures. Some of the issues that researchers have found to be relevant when developing online communities may provide a useful starting point for these communities. These include:

- (i) encouraging cooperation and collaboration (Kollock & Smith, 1996);
- (ii) managing competition (Kollock & Smith, 1996);
- (iii) supporting development of trust and empathy (Preece, 1999; Maloney-Krichmar & Preece, 2005);
- (iv) supporting individual and group identity;
- (v) ensuring privacy when appropriate (Preece, 1999);
- (vi) ensuring non-aggressive interaction;
- (vii) supporting social awareness so that participants know who else is present and the kind of activities in which they are engaged (Donath, 2002);
- (viii) managing participation, including non-participation, i.e., lurking (Nonnecke & Preece, 2000); and
- (ix) encouraging a sense of purpose and fulfillment among participants (Preece, 2000).

Druin advocates that children's software should promote social engagement, offer suitable challenges, and enable children to be in control of their own learning (Druin *et al.*, 1999). Research with children suggests "... the need to create learning opportunities that support the 'messiness' of being a child, the interactive nature of children's questioning and exploration, and the need for children to express and construct their own paths to knowledge individually or with others" (Druin & Inkpen, 2001, p.4).

### 2.3 Children and Culture

Culture influences people's beliefs, attitudes, self-definitions, norms, and values, and in general, it impacts who we are (Triandis, 1994). It strongly affects human behavior and especially patterns of communication and interaction among individuals (Hall, 1981a, 1981b; Hofstede, 1991). Hall claims culture controls people's behavior in deep and persisting ways, many of which are outside of people's awareness and therefore beyond the conscious control of the individual. He considers "culture in its entirety as a form of communication" (Hall, 1981b: 28). Hofstede regards culture as the "software of the mind" (Hofstede, 1991). People act out norms without realizing that they are following their cultural programming.

Cultural anthropologists characterize cultural differences along many dimensions when discussing communication and interaction patterns. As an example, Hall (1981a) describes low- and high-context cultures. People in high-context cultures include little information in the actual message and expect the receiver to deduce the rest from the context. On the other hand, people in low-context cultures include much more of the information explicitly in the verbal message. The extent and nature of these differences in children is largely unexplored. Our evaluation will provide an interesting opportunity to assess them, and our community tools will have to accommodate these.

Children's enculturation into their communities starts at birth and, by their early teen years, they will have learned most of their cultural values. (Bakken & Dermon-Sparks, 1996). By creating online communities for this age group, we are enabling children to interact with and learn about children from other countries. This should encourage more openness towards other cultures. At the same time, interacting with the cultures of others will allow children to understand their own more fully (Hall, 1981b).

Studies show that individuals from different cultures interpret user interface characteristics such as colors and icons in diverse ways (Aykin, 2004; Evers, 2001). What is meaningful for one culture may not be so for others. For instance, while the picture of a North American filing cabinet icon is evocative for users from that geographic area, it will mean very little to Chinese or Arabic users. What is acceptable to one culture can be distracting and even offensive to members of other cultures. For example, the color white is associated with death and grieving in India, while it represents innocence and peace in most Western cultures. Moreover, cultural differences surface in the way people select, interpret, process, and use information (Triandis, 1994), including the way they search for information via computers (Komlodi *et al.*, 2004). These differences have to be considered when designing and evaluating user interfaces for a global audience, whether adult or children.

## 3. The International Children's Digital Library Communities

### 3.1 The International Children's Digital Library

The International Children's Digital Library (ICDL) ([www.icdlbooks.org](http://www.icdlbooks.org)) (Druin *et al.*, 2001) is a multicultural, multilingual online archive of literature for children ages three to thirteen. It contains children's books on a wide variety of topics and aims to expose children to new ideas and teach them about the world around them, especially similarities and differences in cultures, lifestyles, and priorities. The goal of the ICDL is to have 10,000 books featuring 100 different languages in its collection. The ICDL is an ongoing project of the University of Maryland's Human-Computer Interaction Laboratory. Its design team, which is comprised of specialists from information studies, computer science, education, art, and psychology, as well as child partners is experimenting with interface design, book digitalization techniques, and storage, retrieval, annotation and delivery technologies.



Figure 1 The International Digital Children's Library home page

In order to ensure the appropriateness of the design and technology for its young users, the ICDL utilizes “Cooperative Inquiry”, an intergenerational, participatory method that strongly involves children (ages 7–11) and their teachers in the technology development process (Druin, 2002; Druin, 2005). There are three ways a user can search for books from the main page (see Figure 1); in addition to a keyword search, s/he can search by location (materials about, from, or set in a certain country or region) and by categories (see Figures 2 and 3). Under the categories search, which may be performed in simple or advanced mode, the books are grouped according to the ways that children might look for them. This includes traditional categories, such as subject, genre, and publication date, and novel categories, such as setting, characters, true vs. make believe, color of book cover, shape, and the way a book makes one feel.

### 3.2 The International Children's Digital Library Communities

An extension of the ICDL, the ICDLCommunities project enables children's communities to develop around the book collection. The ICDLCommunities' software provides tools that allow intercultural communication between children without the use of machine translation and promote cross-cultural understanding. The project's intent is to develop a supportive, safe online environment for children (ages 7–11) who speak different languages and are from different cultures to come together to do activities related to books in the ICDL. Through these experiences we anticipate that the children

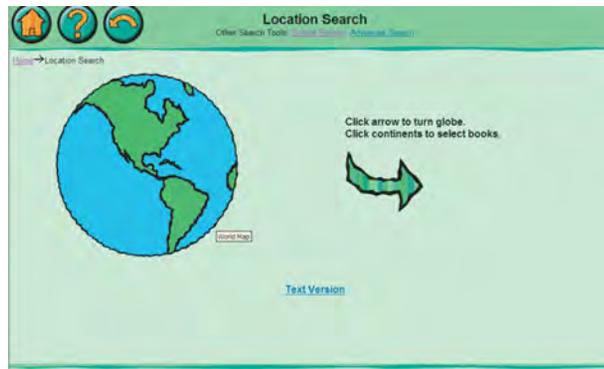


Figure 2 ICDL Location Search



Figure 3 ICDL Categories (Simple) Search

will develop a shared understanding and empathy with each other. In ICDLCommunities, children can generate personal profiles using drawings and photographs, they can communicate with children in other countries about these profiles, and they can read books in their own language from ICDL's collection. They can also create new stories, exchange these with children in another country, and ask and answer questions about these stories.

The tools and processes for ICDLCommunities are currently in development and, employing the cooperative inquiry method, the project team is working with child partners to gather field data, initiate ideas, and test and develop new prototypes. Currently, the team is developing two components:

- (i) the Story Maker (Figures 4–6), and
- (ii) the Communications Area (Figure 7).



*Figure 4 Story selection and reading*



*Figure 5 Copying elements from existing stories*

The Story Maker allows children to edit books they read (Figure 4) in ICDL or create new stories. When creating stories, children can reuse elements from the book (Figure 5), draw, and label things (Figure 6). The Communications Area allows children to read stories created or revised by other children and exchange questions and answers about the stories (Figure 7). Because children may have difficulty reading, writing, or typing, it is important that they be able to communicate



Figure 6 Selecting words for labels in new stories



Figure 7 Asking and answering question on stories

visually in this environment. Consequently, the team has created and continues to explore prototype tools that enable children to make their own drawings, develop picture dictionaries, and exchange messages mostly graphically and with some labels. Teachers, parents and older children can aid them in these activities.

### 3.3 Preliminary Evaluation: United States and Hungary

Several design sessions with a group of local children, known as “Kidsteam”, helped to generate and evaluate early design ideas. Then, in May 2004, seven Hungarian children (four boys, three girls, age 8) participated in a two-hour session, in which they created new stories for the Kidsteam in the United States. They produced these stories using drawings, pictures from paper versions of children's stories, and words (see Figure 8). They also interpreted the stories created by the American children and asked questions about them. The American children had several meetings during which they too created their stories and interpreted those from the Hungarian children (See Albuero *et al.*, 2005; Komlodi *et al.*, 2005 for a more detailed description).

As this was at a very early stage in the project, the evaluation was informal and involved unstructured interviews and observation. One of the researchers worked with the children and their Sunday School teacher. The goal of this first exploratory study was to see how the children reacted to creating and interpreting new story endings and to the idea of exchanging their stories with children from America. Would they be engaged? Would they be interested in communicating with American children? Could the children interpret the stories from the other country? What questions would they like to ask one another?

As soon as the Hungarian children were given the stories prepared by the American children they started to ask questions about the other children and wanted to exchange photographs. The stories represented communication to them. They liked receiving the stories and being able to communicate with the stories' authors. However, while the children could easily invent new stories



*Figure 8 Making stories in Hungary*

orally and enjoyed drawing in general, they had difficulties conveying in their pictures the actions, transitions, and emotions of the characters in their stories. They also felt unsure about how to create stories that those who do not speak their language can understand. Interpreting and asking questions about the stories they received proved to be the most challenging of the activities. While they could identify most of the images represented, they could not decipher the meaning of the whole story. Interestingly, the two groups came up with different types of questions for each other. While the Hungarian children were interested in the emotional state of the characters (sad, happy), the relationship between the characters (friends vs. enemies), and values (good vs. bad), the American children were more concerned with clarifying the characters (Who is this guy? Is this the same dog as the one in the house?) and the plot (Is the green dog sick? Is he killing the puppy?). Despite these challenges all the participants were strongly engaged and motivated to continue the activities. Unlike adults who would probably soon have become frustrated, the children looked upon the activity as a game in which discovering the meaning of the stories was a puzzle that was fun to solve.

## 4. The main evaluation field study: Argentina and United States

In order to gain a deeper understanding of some of the issues raised by the preliminary evaluation, we conducted a more extensive evaluation later in the project. The aims were to:

- (i) further assess the book-related and communication activities that were modified based on feedback from the first study;
- (ii) test some software prototype tools; and
- (iii) to evaluate the children's cultural attitudes.

The ICDLCommunities research team conducted these lengthier and more detailed evaluation sessions in November–December 2004 with children in schools in Buenos Aires, Argentina and Baltimore, Maryland. The children performed four activities:

- (i) getting to know each other;
- (ii) reading stories and creating new endings;
- (iii) interpreting each other's stories; and
- (iv) asking and answering questions about each other's stories.

In this evaluation, the ICDLCommunities team employed the ethnographic approach, which relies on primary data collected from the field through observation and recording of the participants' actions, words, and expressions as well as through interviews and interactions with them (Fetterman,

1998; Wolcott, 1999). This method has several advantages. Unlike paper-based or other non-face-to-face approaches (e.g., written surveys or questionnaires, journal-keeping, pure observation), researchers can, with this technique, personally witness the participants' actions and reactions instead of depending on written responses that may be incomplete due to the participants' editing what they write or deficiencies in their recall or expressive abilities. The researchers can note bodily (posture and gestures) and facial expressions that are just as important as words, but which are absent through other methodologies. They can also request clarification on comments or replies, as well as ask follow-up questions. The ethnographic approach is particularly appropriate for use with young children because they are limited in their communicative skills and adopt different communication styles from adults.

At the two sites—Argentina and the US—the researchers observed the children and took notes throughout the sessions. They also videotaped some of the activities, as well as solicited the participants' input on the various stages of the process. In addition to the primary activities, the researchers conducted demographic and cultural attitude interviews, which were audio-recorded. The researchers then analyzed the notes and audio and video data, paying particular attention to the children's behaviors and preferences. They identified key issues that enabled them to make recommendations for improving the book-related activities and the design of the software tools.

Six children (three boys, three girls, ages 7–9) participated in Argentina and eight (four boys, four girls, age 8) in Baltimore. In Argentina, the children met for three hours a day over six consecutive weekdays. Since this was during their summer vacation, they came to school especially for these sessions. In Baltimore, the children came together four times, one hour each spread out over eight days. They stayed after regular school hours for these activities. Two researchers were present, with occasional help from the children's teachers in the US. About half the Baltimore children had computers at home and all seemed comfortable with drawing programs and games.

All the Argentinean children were experienced users of desktop PCs, having played with computer games and websites (e.g., [www.cartoonnetwork.com](http://www.cartoonnetwork.com)). They were fairly skillful with a mouse, but were not too capable with a keyboard. Not surprisingly, none of the children had user interface design or evaluation experience. The children in both countries had very limited familiarity with the language of the other country, mostly consisting of limited vocabulary and basic conversational phrases.

The process used in the two countries differed slightly because of logistical problems, such as the time available at the sites, and problems with network connections. But since we did not *compare* our results from the two countries but *built on* the activities from one country to the other, these differences did not negatively effect our data collection or results.

### Getting to Know Each Other

The Argentinean children all attended the same school, but they were not in the same classes. The American children did not know each other across genders; the boys were from one school, while the

girls were from another. Thus, in order to begin to develop group camaraderie and help the children become comfortable with the researchers, the first activity in both countries was introductions. In Baltimore, the children went in turns and said their names and their favorite activities so that the children in Buenos Aires would know more about them. In Buenos Aires, the children said their names, their ages, and their favorite toys as a way of introducing themselves to the American children.

Because the children in Argentina met a couple of days earlier and had more session time than the American children, they were also able to create paper-based introductions for the group in Baltimore. Using markers, they drew their favorite toy on a big piece of paper, and digital pictures of these posters were taken. Upon the children's requests, the pictures showed them holding up their posters (see Figure 9). The children were also asked if they had any questions for the Baltimore group; they came up with around forty.

In the US, one of the researchers pointed out to the children where Argentina is located on a world map. She then introduced the Argentinean children through the pictures and descriptions sent by her colleague in Argentina. After the introductions, the American group did not have questions about the Argentinean participants, but they identified with those with whom they found things in common (e.g., liking soccer or owning a PlayStation). The Baltimore children did not prepare formal introductory messages, but recited brief spontaneous presentations about themselves to the research camera set up to record their activities, which were then shown to the children in Argentina.

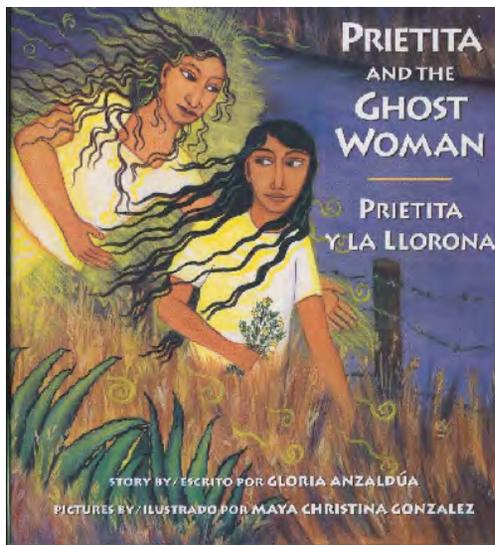


*Figure 9* Argentinean children with their introductory posters

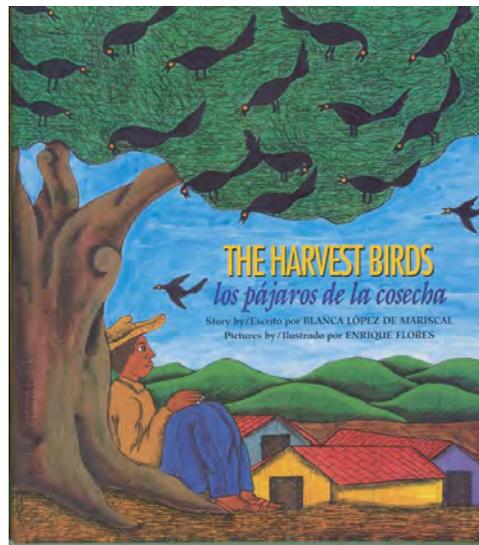
### Reading Stories and Creating New Endings

For the principal activities of the evaluation, two books were selected from the ICDL. Both are bilingual (English/Spanish), around 30 pages in length, feature plenty of pictures, and only contain brief text on each page. *Prietita and the Ghost Woman* (*Prietita y la Llorona*), written by Gloria Anzaldúa and illustrated by Maya Christina González, is the story of a little girl who goes in search of a healing plant for her ailing mother, encounters la Llorona, and grows up in the process (see Figure 10). *The Harvest Birds* (*Los Pájaros de la Cosecha*), written by Blanca López de Mariscal and illustrated by Enrique Flores, is about a young man who is determined to become a farmer and becomes a successful one with the help and advice of his feathery friends (see Figure 11).

Both books were read to the two groups and, to ensure that they understood the stories, they were asked to do a brief retelling. Because they had more time, the Argentinean children read their story in both languages, with one of the researchers reading in English. The purpose of this was to enable the participants to learn some vocabulary from the other children's language, as well as to give them a sense of what the reading activity was like for the remote group. The children were then asked to create alternative conclusions to one of the stories. The Argentinean participants invented endings for *Prietita and the Ghost Woman*, while those in the US worked on *The Harvest Birds*. The Argentinean children had been introduced previously to the notion of inventing new endings, since



**Figure 10** Cover for *Prietita and the Ghost Woman*



**Figure 11** Cover for *Harvest Birds*

one of their extra activities was to act out a traditional story, first with its original ending and then with a revised one.

In Argentina, the entire group first sat around and told their ideas for new endings in turns. They were then invited, but not obliged, to form groups to create the endings; all but two boys preferred to work by themselves. They were not instructed on how to do this and, at first, most of them drew pictures that were not related to the story and had to be reminded of their task. The children in Baltimore were divided into three groups, though there was a strong resistance to group work from the boys. Initially, members of each group drew pictures individually before they were prompted by the researchers to talk to each other and agree on a new ending. Some of the children had their own full stories and did not want to combine them with the ideas from the others in the group. The children in both countries depicted their new endings with both images and words on paper, using markers, crayons, or cut-and-pasted figures from photocopied pages of the books. The new endings were then digitally photographed and sent to the researchers at the other site.

### *Interpreting Each Other's Stories*

At their next session, the children in both countries read the other group's story, but only up to a cut-off point. They then saw the endings created by the remote group and were asked to interpret them. In Baltimore, the pictures were printed out with a color printer and passed around to the children. However, because of the prohibitive cost of printing in Argentina, the drawings were displayed using Tablet PCs and an image viewer there. The Argentinean group, as a whole, looked at and discussed the three endings from the American participants (see Figures 12–14 for one of the endings). The children in Baltimore were divided into the same groups in which they had previously worked. They were briefly shown the five story endings created by the Argentinean group and were asked to pick one to interpret. The bilingual adults translated the English words on the American children's pictures for the Argentinean children. In the US, the adults assisted the children in translating the Spanish words using a Spanish-English dictionary. The Argentinean children could not make too much sense of the American children's stories, while the American participants made some good guesses.

### *Asking and Answering Questions about Each Other's Stories*

After trying to decipher the meanings of the story endings created by those from the other country, the children came up with questions about the illustrations (see Figures 15 and 16). They did this by using four specially-designed question templates. These templates helped to structure the questions. They were designed to allow the children to ask questions without using natural language; the templates ask the following questions: "What is [this image]?"; "Is [the image] this or that?" (see Figure 16); "What is the relationship between [one image] and [another image]?"; and "[When,



**Figures 12–14** A series of three pictures, depicting a new story ending created by one of the U.S. groups

Where, How, Why] did the [subject] [verb] [object]?” The “what-is” (definition), and “is it this or that” (selection) relationship questions caused little difficulty, while the last question created many challenges for the children who tried to interpret and answer them. Thus the first three types were further refined for the future prototypes.

Most of the children in Baltimore cut out pictures from the other children’s stories to create their questions in the templates, but one boy wrote his question directly on the illustration. The group in Buenos Aires superimposed their questions on the templates and images on the Tablet PCs. Some of the specific questions that surfaced were: What is this thing? Who is this person? What is s/he doing? Do they love or hate each other?

The questions were then digitally photographed and sent to the researchers at the other site. Each child or small group of children received the questions about their ending and were assisted by the researchers in interpreting and answering them. The researchers explained what each template meant and helped in translating the words. The responses were photographed and sent back to the other group. In some cases, there were additional clarification questions but, due to the limited time frame of the sessions, these were only expressed orally.

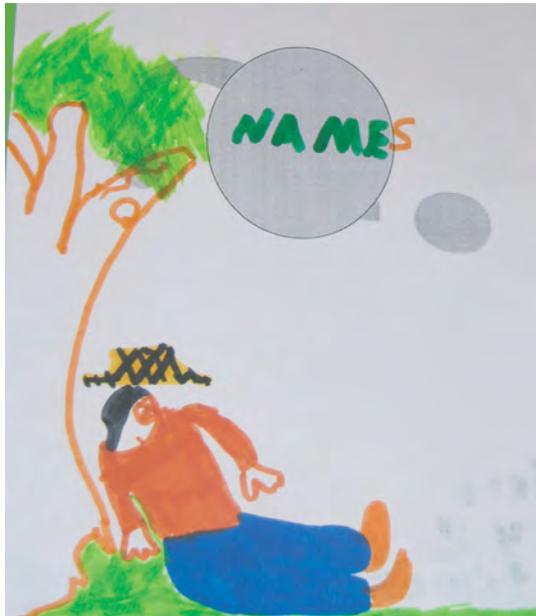


Figure 15 Question for Figure 12: What is the name of this person?

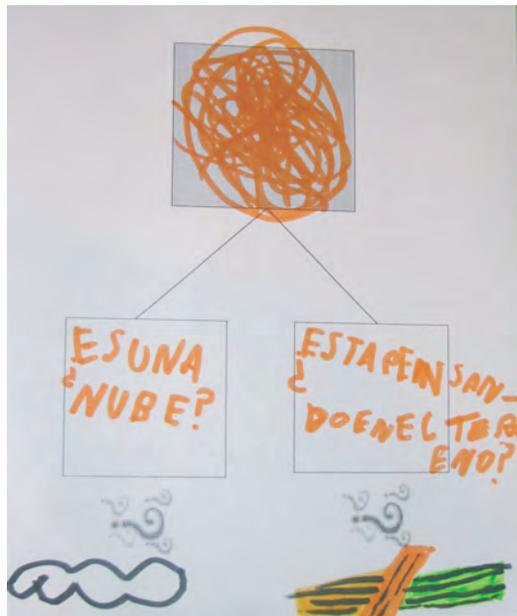


Figure 16 Question for Figure 13: Are these clouds or fields?

### *Interviews with the children*

In addition to the four primary activities, the researchers also conducted interviews with the children using two prototype questionnaires. These interviews focused on the children's demographics, their online experiences, and cultural attitudes, including their knowledge about other cultures, particularly that of the remote group. The children were questioned individually and away from the rest of the group. In addition to their names and ages, they were asked how often they go online to surf, e-mail, and chat. They were also asked if they have traveled to other countries and what they knew about Hungary and the country of the remote group (either the US or Argentina). The interviews lasted no more than five minutes.

## **5. Discussion**

These sessions confirmed many of the findings from the Hungary-US test and provided some new insights. The children enjoyed the activities very much, particularly communicating with the children from the other country and drawing images. They were fascinated with the idea of talking with and learning about children from another country (i.e., sociability and cross-cultural exchange). They were also interested in finding out about the other children's country and language (i.e., cross-cultural exchange). However, they had some usability problems using the prototype software to develop their own stories and for asking the questions necessary to interpret the stories sent by the children from the other country. In the sections that follow we first discuss some of the general findings before giving recommendations that will enable designers to improve their designs.

### ***5.1 Sociability: Team Building, Social Aspects, and Identity***

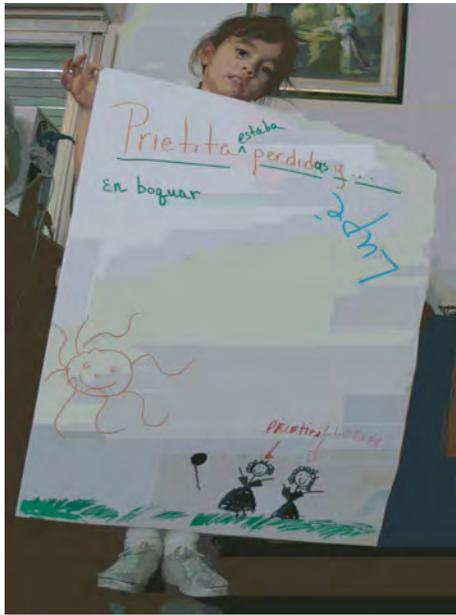
Sociability came into play in both the local teams of children working together (team building) and in the interactions with the remote children (representing identity online). One of the long-term goals of ICDLCommunities is to enable teachers to use the technology in schools and other similar environments to teach children to communicate with other children, including those from other cultures. In such a setting, it is important that the children be comfortable with each other and be able to work together. Thus, before any collaboration can happen, there must be some team building activities. In these sessions, the children in each country do not necessarily know each other beforehand; in fact, the participants in Baltimore were from two different schools. From our evaluation we learned that a longer introductory activity than the one we planned is needed to create a rapport between the children in each group. Because the children did not know each other, it was difficult for them to work in teams, and they needed to be prompted several times before they would work together. There needed to be additional activities focused on team building over a longer period of time.

Furthermore, their shorter attention spans, made keeping the children focused on their tasks a challenge. Though they were enjoying themselves, they often quickly forgot that they were supposed to be doing a group activity. In most cases, only one or two of the children would make the effort to accomplish the work, while the rest played alone or with children in other groups. Several teachers and researchers are needed to facilitate the process.

The representation of the identity of the participants in the community is crucial in allowing social interaction, and this is even more important for children. In these sessions, the children were meeting new people, not only in terms of some of their own group members but especially the participants from the other country. The researchers in Baltimore facilitated the process of getting to know others by showing pictures of the Argentinean children and giving some information about them. The American children very much enjoyed seeing the pictures of the Argentinean group. They liked learning about the favorite toys or games of the other children, and they were especially attracted to those with whom they had something in common. The Argentinean children were at a disadvantage because, due to the time constraints of the children in Baltimore, they did not get the opportunity to see pictures of and learn about their American counterparts. They wanted to see photographs of the American children with their families and pets, as well as those that show their games or what they do for fun. Though they did get to come up with a list of questions for the American children, there was insufficient time to get them answered. More time needs to be dedicated to allowing the children to get to know and exchange information about each other.

As the sessions progressed, the children tended to forget about the children in the other country, even the ones in Baltimore who saw the pictures of the Argentineans. In the story creation activities, they often forgot that they were trying to tell the stories to children in the remote group. Clearly, they needed to be able to visualize the other children, or there needed to be some other way of reminding them. Including images of the children who authored the stories with their stories and the questions that emerged. This was reinforced by the fact that, when the American children had to select story endings to interpret, they picked the ones where the Argentinean children were included in the pictures (see Figures 17 and 18). It seems that it would be more helpful to have pictures of all the children from the country, keep them somewhere visible during the entire process, and attach them to the appropriate illustrations.

In addition to the importance of learning more about others, the children also needed to express their own identities and cultures. They liked showing pictures of themselves to the other children and enjoyed sharing information about themselves and their lives. When a video camera was set up in Argentina to record the proceedings, the children immediately stood in front of the camera and talked about themselves. Similarly, American children, without prompting, began to introduce themselves and send messages to the Argentinean group. They also began showing various personal objects on camera; for instance, they explained the characters and the English words on their drink cartons. We realized that the children should have as many chances as possible to share images of and



**Figures 17 and 18** Two Argentinean girls holding their story endings

information about themselves through all available media in order to represent their identity in the community.

## **5.2 Usability: Story Reading & Creation, Picture Interpretation, and Questions & Answers**

Since ICDLCommunities is an extension of ICDL, it is only logical that social interactions among its members would revolve around the books in the collection. In this evaluation, story reading was the starting point for story-related communication between the children in the two countries. The children in Argentina were impatient or confused by the bilingual reading of the first story. It also took a long time to read the story in this way. This method demanded too much of the children, and the reading went better with the second story, which was only read in Spanish. The children in the US, on the other hand, were somewhat bored by *The Harvest Birds*, the story assigned to them. In general it is important to select a compelling but short story so that the children can focus on creating the new story endings that motivate communication.

We also learned that some of the children tended to resist changing story endings. When both the Hungarian and the Argentinean children were first introduced to the idea, they initially did not want to change the conclusion because, according to them, “No, the *story* is not like *that*.” It was only after much persuasion that they invented new endings. While this resistance indicates a respect

for the original stories, facilitators need to make sure that the children understand beforehand the purpose of the activity and provide instructions and examples. In this case, the children needed to be reassured that it is okay for them to change the end of the story and that in fact this is what they are expected to do. Such activities may seem strange, particularly if the children have experienced a rather formal education system. We will continue to evaluate this activity in future prototypes.

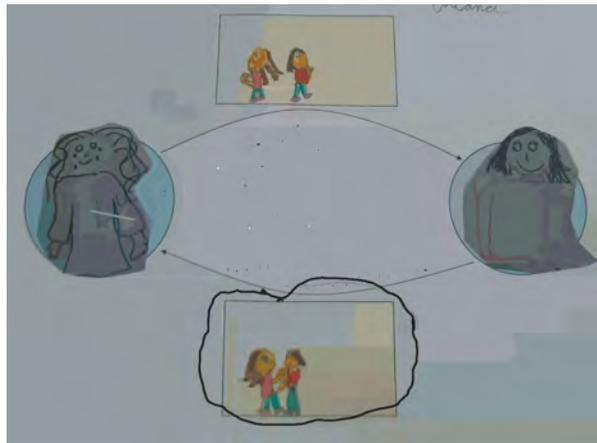
Once the children got used to the idea of story creation and were working in groups, some of them were reticent about sharing their ideas, while others did not want to combine their stories with those of other members in their group. This is an example of the group dynamics problem described above. While communicating ideas with the group is the ideal way to create consensus, this might only work for the outgoing children; the shy ones may need additional time to formulate and share their stories. When it came to drawing their new endings, the children found it difficult to “make a story” on paper. While they loved drawing, they preferred to draw a single picture, instead of trying to create a series of pictures that depicts a progression of actions or events. Initially, their pictures had few or no references to actions, emotions, or relationships; some indications of these were added upon the suggestion of the researchers. Again, the children need more help with and examples of storytelling through pictures. One idea for providing this help is to structure the activity around a story template, with spaces for sequencing.

Interpreting the pictures sent by the other children proved to be quite challenging. The children had a difficult time trying to figure out the images, not only because of the quality of the drawings but also due to unfamiliarity with cultural objects and representations. The Argentinean children, in particular, were confused about why they were doing this activity; they had to be reminded that the American children created these stories. This reinforces the need for continued identity representation of the authoring children. The children needed help from the adults in beginning to ask questions and making good guesses about what the other children’s story was about. The children in both countries had more trouble deciphering the pictures that featured drawings (see Figures 12, 13, 17, and 18); they had a much easier time when the other group cut out pictures from the original story (see Figures 14 and 19). When the children provided accompanying text on their pictures, the other group also had problems reading the handwriting. In order to make this activity easier, images from the original story should be used and the hand-drawn images should be labeled with typed labels. Adults may also need to assist the children in interpreting the story endings.

Asking questions about the new story endings was also challenging. Because they could not figure out the images in the first place, the Argentineans had difficulties in creating questions. They also had difficulty understanding the question templates. American children had an easier time using some of the templates. However, they could not comprehend why they could not call the Spanish teacher over from the next room to just translate their questions. Many of the children in both countries were not interested in linear storytelling; instead, they wanted to express and know more about the emotions and relationships between the story characters (e.g., Do they like or hate each other? Are they enemies



*Figure 19 Ending by American children*



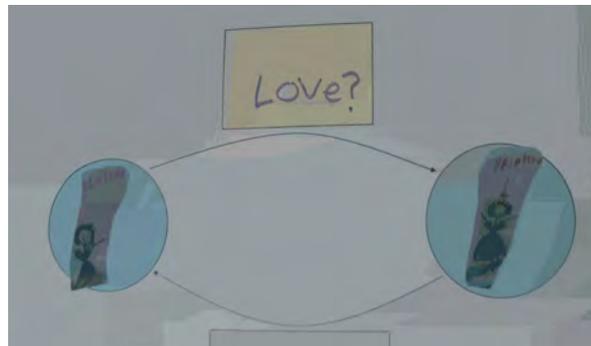
*Figure 20 Question for Figure 14: Are Prietita and La Llorona enemies or friends?*

or friends?) (see Figures 16, 17 and 20). These kinds of questions were not possible through the templates. In order to be more helpful to the children, the adults may need to be trained on this activity, particularly in the use of the question templates. Additional templates also need to be created in the online community environment so that children can represent emotional relationships more easily.

In fact, the emotional state of characters and emotional relationships among characters was a recurring theme in all the story- and question-related activities. Children from all three cultures were fascinated by the relationships among the characters and saw this as the main clue to figuring

out what the story was about. Next iterations of the ICDLCommunities toolkit will accommodate this need by adding relationship markers to the story creation area and supporting questions about emotions and relationships.

The children also had a challenging time with the question interpretation. Just like the story interpretation, they had trouble with this task. It was difficult for the children to distinguish the representations of the stories, questions, answers, and authorship markers (the author children's names) from one another on the hand-drawn pictures (see Figure 15). More distinct tools and representations for each of these activities need to be provided. As in the story interpretation, they had trouble reading the children's handwriting, especially when the words were broken up or not written neatly in a line. In order to minimize the confusion between images from the story endings and new images in questions, the children suggested that a better solution would be to cut out and use the images from the story ending in asking the questions (see Figure 21).



**Figure 21** Question for Figure 13: Does Prietita love La Llorona?



**Figure 22** Answer to Figure 17: Prietita loves La Llorona

Some of the answers were much harder to draw than the original story endings because the questions asked required answers with concepts that were more complicated to convey. For instance,

Q: Why did he have a hat?

A: He just had a hat because it was in the story.

or

Q: Why did he plant so many seeds?

A: Because he wanted to fill his field.

In many cases, they wrote out their answers instead of drawing them. Other questions could be answered by confirmation (see Figure 22). The children had the easiest time with the multiple-choice questions; they liked being able to simply circle the correct option. In Argentina, only one child enjoyed this activity; he offered to answer the questions for the children who were not present. The design team is developing and evaluating more intuitive question templates for the children.

## 6. Conclusion: Lessons Learned

These pilot sessions provided the ICDLCommunities team with feedback about the book-related activities, the prototype tools and interfaces, and questionnaires. We believe that these findings are useful for designers of all online communities created for children. As discussed in section 5, the team learned the following lessons about the activities:

- *Team building*: Several extended activities are needed to build cohesive teams of children at each site for the collaborative activities.
- *Introductions and communication*: Introductions and communication should receive more attention, as these are activities that the children enjoy as much as drawing. These should be allocated sufficient time.
- *Story creation*: Provide instructions and examples for story creation and interpretation. Most children at this age are not familiar with these activities and need examples.
- *Emotions*: Allow for flexible and powerful representation of emotions and emotional relationships between characters in story creation and question asking and answering.
- *Question asking and answering*: Asking and answering questions graphically is challenging, so practice and sufficient help are needed.
- *Task management*: As group work is demanding, it is important to allow children both individual and collaborative time.
- *Facilitation*: Provide training for the adult facilitators.

These sessions provided feedback for modifying the design of the prototype tools and the activities that the children are encouraged to do using these tools. The next version of the prototype and the processes will include the following recommendations:

1. *Provide spaces for sharing images, especially in identity representation.* The children liked sharing pictures of themselves, their things, and their work. The interface should provide a space, where the children can provide a “permanent” representation of themselves or things that are important to them. There could also then be a separate space, where they can continually change the pictures. The first picture provides continuity and reminds the other children with whom they are corresponding, while the second space allows the children to share additional pictographic information. This exchange of pictures can create closer links between the members of the online communities.
2. *Provide more support for story making.* The children enjoyed creating new endings for stories, but it was challenging for them to recreate these in multiple drawings. Recognizing hand-drawn characters and elements was difficult; using images from the books should be made easier. Labeling images can also help with story creation and interpretation. It would also be useful to have a story structure template or other scaffolding. Another important aspect for the children was to be able to express the emotions and relationships among the characters in the stories more easily. A simpler interface could be used for storytelling that focuses less on the details of how things look and more on the ideas, events, and the flow of the story.
3. *Create additional question templates.* Some of the existing templates were useful, but they did not cover the gamut of questions asked by the children. New templates should be created to assist in asking the more popular questions, such as emotional relationships and clarification.
4. *Provide a useful dictionary, which allows the children to look up words in the ways with which they are comfortable.* The children in both countries liked communicating in the other children’s language. They liked it when they could understand words in the other language. They also enjoyed using the dictionary. However, the children in Baltimore had two problems with the dictionary. They could not understand the concept of looking up words alphabetically, and they could not understand the difference between Spanish-English and English-Spanish sections of the dictionary. Just as the ICDL created new metadata categories, the dictionary for ICDLCommunities may have to come up with new ways of finding words.

Working with cross-cultural groups of children has many challenges. The age and developmental skills of this population makes it challenging to explain processes and achieve results. The lack of communication and sociability skills, compounded by different languages, also makes the creation of online communities quite problematic. However, these pilot sessions have revealed several lessons about the ways children work and think, and these have been useful in improving the design of the ICDLCommunities interface.

The lessons learned in the evaluation process are invaluable for the development of children's online community tools. Adult designers and developers have difficulty forecasting children's preferences, strengths, and weaknesses in an unexplored area such as cross-cultural online communities. While logistically challenging, it is crucial to involve children in the evaluation of the processes and tools. From an evaluation perspective one of the most interesting findings was that the evaluation needed to focus on the children's activities as much as on their interaction with the software. In part this is due to the early stage at which the evaluation was conducted but it draws attention to the need for researchers and developers to understand the social and cultural processes involved in using this kind of collaborative software. Another important finding involved the need to support children in understanding the relationships and affective states of the characters in the stories.

It was also crucial to involve children from other countries in the evaluation of the interfaces that are developed for an international audience. The children from Argentina and Hungary helped identify solutions that worked seamlessly when transferred from the US to other countries and helped find problems that needed improvement for the next round of the prototype.

For those wanting to read more about this and more recent work see: Komlodi, A. *et al.* (2007) Evaluating a cross-cultural children's online book community: Lessons learned for sociability, usability and cultural exchange. *Interacting with Computers* (in press).

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