Out of the Lab and into the World: Bringing Story Listening Systems to the Classroom

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Abstract

The goal of the research is to develop and evaluate the effect of *virtual computer peers* in promoting emergent literacy activities. Virtual peers are projected images of children who have the ability to understand and respond to some aspects of their real child partners. In this poster, we present the results of two design experiments that examined the integration of a virtual peer system into formal and informal educational environments and the modifications needed for the system to have longevity in these contexts. One design experiment took place at a daycare center and one at an elementary school in a large urban setting. Results revealed an array of challenges, but also suggested many solutions.

1   Introduction

Current research in the *emergent literacy* paradigm indicates that a dual focus on oral and written literacy is critical, because the development of children's writing, from drawing to conventional forms, is intertwined with the development of oral literacy skills (Sulzby, 1996). In the 4 to 7 year old age range, the stories children can tell are more sophisticated than those they can write (McGee and Richgels, 1990). Research in emergent literacy also indicates that *peer* collaboration during oral language play such as storytelling is key to literacy development. Sawyer (1997) proposed that conversational collaboration between peers is one of the most developmentally valuable characteristics of sociodramatic play. Neuman (1992) observed that when children played in a literacy rich environment, they scaffolded each other and resolved conflicts by negotiating the meaning of literacy-related objects or routines. This cognitive conflict resolution has been argued by Piaget (1962) to lead to cognitive restructuring and growth; in fact, Pellegrini (1993) proposed that it is the key factor in play that affects children's literacy development.

The goal of the research we report in this poster is to develop and evaluate the effect of *virtual computer peers* in promoting emergent literacy activities. Virtual peers are projected images of children who have the ability to understand some aspects of their real child partners, and to respond. Child and virtual peer interact through non-screen-and-keyboard based technologies, such as toys and dolls. In this poster, we present the results of initial design experiment work (Brown, 1992) that targeted questions of implementing such technology in formal and informal educational settings.

2   A Virtual Peer: Description of the Sam System

Sam is a virtual child who children (ages 4-7) interact with by telling stories and playing with real toys (Cassell, et al., 2000). The Sam system has two components: a life-sized child named Sam, who is projected on a screen and a toy house with several wooden figurines. Sam can both tell stories, using a recorded child's voice, and listen to the real child's stories, responding with appropriate feedback and short comments. Sam and the child take turns telling and listening to each other's stories. Sam and the child can pass the figurines back and forth between their worlds by way of a magic room in the house (the attic).

After children greet Sam, Sam tells a story, moving a figurine around the toy house. Then Sam says, "I'll put the toy in the magic room so you can tell a story," and places the figurine inside the attic. When the children open the door to the attic, they find the toy Sam had been playing with. The child picks it up and begins to tell a story. Sam follows the figurine as the child moves it throughout the house, nodding, smiling, and prompting, "And then what happened?" when the child hesitates. When children are done, they return the toy to the magic room, and Sam begins telling another story. Taking turns telling stories continues until the child decides to stop playing with Sam.

Figure 1 – Sam greeting

Figure 2 – Sam gesturing with figurine

3   Design Experiments and Results

A preliminary study with the Sam system showed promising results. Children were able to interact with the system successfully and their stories became linguistically more like Sam's stories even during a single session (Ryokai, Vaucelle et al., 2003). Encouraged by these results, we are now undertaking a larger project to investigate ways in which Sam and other Story Listening Systems can support emergent literacy skills in formal and informal educational settings. The first questions that must be addressed concern the (1) integration of the Sam system into ongoing educational environments, and (2) what modifications to Sam need to be made for it to have longevity in these contexts.

Two design experiments are reported. One took place at a daycare center and one at an elementary school in a large urban setting. These settings allowed us to examine a range of ages (4-7 yrs) and classroom styles (informal vs. formal). Children's language skills were pretested using the TELD-3 (Test of Early Language Development, Third Edition). Other data sources were video recordings of children interacting with Sam, including the stories they told; researchers' field notes & reflections, and interviews with children and their teachers.

3.1   Informal Setting: Kinder Center West[1] (4-6 yrs.)

The Kinder Center West is a university-run campus day care facility for children of university faculty, students, and staff. UIC personnel worked with the combined 4/5/6 year old classroom. The classroom follows a daily routine that includes periods of organized activities and free choice time. During free choice time, children may choose from a variety of activity centers in different parts of the classroom The Sam system was available during free choice time and was set up in the computer area or in a separate conference room across the hallway.

A total of 15 children each interacted with Sam on an average of 5.2 days of the 11 the system was available in either location. We looked at interaction with Sam in two different locations at the Center: inside the classroom as an activity center and in a private conference room across the hall. The maximum number of days spent was 11; the minimum was 0. The mean total time spent with the system was 1 hour and 19 minutes (telling stories, listening to stories, playing with the house and toys, or watching and listening while other children did these things), range 0 to 5 hours 33 minutes. Children told an average of 5.2 stories (range 0 to 19). The average length of time a child spent with the system on a single day was 15 minutes, (range 8 sec to 1hour 13 minutes).

Discussion of Results from Kinder Center West

<u>Children's free choice use of Sam:</u> Children's use of the Sam system varied widely both in terms of the time they spent with Sam and what they did during that time. Some children showed "ideal" turn-taking interaction with Sam: first listening to a story, then telling one, then listening to another one, etc. Sometimes children preferred just to listen to Sam's stories. Other times children would tell their stories, put the figure in the attic, but then walk away as Sam began a story. Finally, some children preferred to play silently (or with sound effects but no words) with the toys in the house, ignoring Sam's prompting. Interestingly, no child was completely consistent in how they interacted with Sam, although many did tend toward a preferred kind of interaction. Both boys and girls seemed to enjoy interacting with Sam and the house.

<u>Classroom vs. conference room:</u> There were tradeoffs to being outside the classroom. On the one hand, interactions with Sam in a more focused, private, quiet environment were more consistent with the original design. However, being in a separate room eliminated opportunistic and/or very brief interactions with Sam. Although we did observe some

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[1] Names of sites have been changed.

children interacting differently with Sam in the conference room and we did have a few children play with Sam who hadn't before, it is unclear whether this was because of the change in location or just part of the range of variation we observed in the classroom. We did see all of the same styles of interaction with Sam that we saw in the classroom.

Repeated sessions: After the first few sessions, where Sam was constantly in use, we found that we had periods of a few minutes at a time when nobody was interested in using Sam. Sometimes while interacting with the system, children seemed to lose interest in Sam, ignoring Sam's stories and prompting, even though they still enjoyed playing with the house. Other children became more interested in interacting with the researchers (and the computer & video camera) than with Sam. In future work we will explore several ways to maintain or increase children's interest in interacting with Sam, including different types of context-based prompts, context-based story selection, and story selection by the children themselves.

3.2   Formal Setting: Lane Elementary School (6-7 yrs.)

Lane Elementary School is located in a middle-class suburb of a large Midwestern city, and educates children from Kindergarten to Grade 5. The Sam System was tested with children from a combined Grade 1 and 2 classroom, supervised by two co-teachers. We worked with the 21 1st graders (average age 7 years and 3 months) in the combined classroom.

In this setting, Sam was set up in a room separate from the classroom, as requested by the teachers. Their request was largely a matter of pragmatics: with 50 students in the space it was not possible to set up an activity center for Sam. In fourteen sessions of running subjects with the Sam system at Lane, we managed to give most children four turns. We made sure each child had at least one session individually. In other sessions, they worked with a randomly chosen classmate. Sessions lasted approximately 15-20 minutes for dyads and 10-15 minutes for individuals.

Discussion of Results from Lane Elementary

Individuals vs. dyads: We noticed that children who told stories alone (individual) or one at a time (dyad but taking turns) told stories that were longer and better structured. In dyad sessions, when there was collaboration while telling the stories, these stories were more "play acting" than storytelling. When asked, many children preferred playing with a friend.

Number of toys in the house: We concluded from our observations that a balance needed to be struck between the presence of too few toys (which did not provide sufficient stimulus for stories), and too many toys (when they tended to arrange/play with the furniture in the house more than tell stories). Two or three items in each room seemed to be a good compromise.

Same gender vs. different genders: We noticed no trend regarding whether same gender vs. different gender pairs told better stories together. However, prior friendship between

same gender pairs appeared to be disruptive to performance: when same gender friends were paired together, sometimes there was more fooling around than actual story telling.

Prompting: We experimented with the amount of prompting that children received from Sam. At first, we only prompted when there was a long pause in the child's story using prompts like "Tell me what happened next" or "Then what happened". Other prompts like, "Uha" and "Mmmm" were given more frequently. Although during the session it seemed appropriate to use lots of prompts, when researchers began listening to the sessions and transcribing them from CD's, the frequent prompts seemed to disrupt the flow of their story. We are pursuing more context-sensitive prompting mechanisms.

Repeated sessions: Over time the children's willingness to interact with Sam increased. This may have been a familiarity effect – the more familiar they were with us and with the procedure, the more eager they were to participate. Children who heard many stories complained about hearing the same stories over again. We intend to create user profiles for individual children that will enable Sam to adapt story selection to their preferences.

4   Conclusions and Future Work

This first round of experiments was rich in design findings, and gives us plenty of avenues to explore in our first round of experimental studies in Fall 2003. We have established that Sam systems are viable in the educational settings: across ages and educational contexts children found Sam extremely engaging. Teachers were also uniformly enthusiastic about their classes' experience with Sam and welcomed us back to their classrooms next year.

In future work, experimental studies will be investigating whether Sam's language is acting as a model for the language that children use in their stories. To investigate this we have been developing a new set of stories that children will hear which manipulate the amount of decontextualized language Sam uses, for example, using many spatial expressions or many examples of quoted speech. We will then be examining the stories that children generate for evidence of them modeling these aspects of Sam's stories.

5   References

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