

Show Me Stations: Connecting Preschools and Communities

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ABSTRACT

We introduce *Show Me Stations*, a media space technology designed to connect preschools with other institutions, schools, and community centers through synchronous video communication. By providing a flexible shared tabletop workspace, *Show Me Stations* facilitate remote learning and play with physical artifacts to promote educational and social experiences between preschoolers and other community members.

Keywords

Children, preschool, computer mediated communication

INTRODUCTION

The time before starting school is a key formative period in the life of a young child. Preschools look to support their young students in developing the cognitive and social skills for success in primary school. They are also often the child's first introduction to the community outside of their immediate family. However, it is a challenge for preschools to meet the needs of all children in light of the limited resources available in each classroom.

We begin by outlining some of the challenges that preschools face. We introduce *Show Me Stations* as a potential technological solution that can support preschools in making the most out of available resources by creating connections with other institutions in the community. Finally, we provide a brief sketch of the suggested deployment of the *Show Me Station* system.

Challenges for Preschools

The main priority for preschool-age children is developing social interaction and language skills to be ready for more structured instruction when they enter primary school. The way that children learn is through both structured (guided instruction) and unstructured (play) face-to-face interaction with both peers and adults [1]. One-on-one and small group interactions are central to developing vocabulary and modeling behavior. However, most preschools face challenges to maximizing this valuable one-on-one interaction due to limited resources available to each classroom. Despite valiant efforts to keep classroom size small, the teacher cannot provide each child with one-on-one interaction at all points during the day. Teachers focus on meeting the *needs* of each individual even if that may mean providing some students with more attention than others. We posit that providing more individual attention

and opportunities for one-on-one interaction for each child would improve the overall quality of any preschool program.

The second challenge created by the limited resources available to preschools is providing *every* child with an opportunity to attend and participate. Some children may simply live too far away from the closest preschool, as may be the case with rural populations. Other children require access to special support that the preschool may not be equipped to provide, such as medical equipment or special needs education specialists. The latter is of particular concern to communities, as integrating special needs children with their normally-developing counterparts is both a moral issue and a pedagogical one [2]. Special needs children benefit from integration by being provided with an opportunity to interact and model behavior after their peers. On the other hand, normally-developing children benefit from integration through an opportunity to develop a sensitivity and appreciation of the diversity in their community. The challenge for preschools lies in providing opportunities for integrated interaction while still meeting the unique needs of each child and the classroom as a whole.

In the following sections, we outline a proposal for creating more opportunities for one-on-one interaction and for connecting diverse elements of the community, as enabled by a media system technology called a *Show Me Station*.

SHOW ME STATIONS

A *Show Me Station* is an Internet-enabled table that creates an audio-video connection and a shared tabletop workspace with a second *Show Me Station* at another community site. Connecting the preschool classroom with other sites provides an opportunity for children to get extra attention in one-on-one and small group synchronous interaction with member of their community. It also supports connecting with special needs classrooms to provide opportunities for interaction without taking children away from the resources available in specialized schools. *Show Me Stations* seek to allow the teacher to become the facilitator of learning connections rather than the only source of educational content.

Scenario of Use

The following represents a scenario of Show Me Station use (see Fig. 1):

In the afternoon, the children at the Sunshine Way Preschool have some unstructured time to play. Some kids have already set up toys on the carpet in the center of the room, while others have congregated at several Show Me Stations in the corner of the classroom. Rita is having a tea party with Mary, despite the fact that Mary is currently at a hospital in a neighboring city. Each girl can see the toys the other has set up projected on the surface of her table. Three boys are enthusiastically listening to the latest adventures of "Captain Underpants" as read by Mr. Dapper from the local retirement village. They can follow along as Mr. Dapper's hand moves across the page and see all the pictures as the book is projected right on the table. Kelly and Alex from a specialized school for the Deaf in a town across the country are excitedly motioning for Nick to join them in a board game. Nick is a little unsure, because he doesn't know sign language yet, but the game is all set up and looks awfully inviting...

Show Me Station Technology

The technology behind the Show Me Stations is available today and we have already explored its use with children in a home context [3], however adapting it for use in preschools creates new opportunities. Each Show Me Station consists of the following components (see Fig. 2):

- A **videoconferencing** connection between any two tables is enabled with the integrated screen, speakers, camera, and microphone.
- A **shared tabletop surface** is created using a camera-projector system suspended above each table. The camera takes high-definition video of the table surface and transmits it to the other Show Me Station. At the other station, this video is projected onto the exact same position on the surface. Thus, anything that is happening over the surface of one table is visible on the other and vice versa. This loop of video transmission and projection creates a synchronized shared surface to allow users to collaborate on activities such as drawing together, playing board games, and more.
- A **teacher control interface** consisting of a simple remote control to change which connection is currently displayed at each station. The teacher can add and remove the available connection channels using a simple web-based computer interface.

Show Me Stations require access to high-speed Internet in order to transmit and receive all of this video and audio data, but very little other infrastructure is required. The classrooms do not need any specialized artifacts or accessories to make use of the stations: any book, most board games, and many toys that the preschool already has can be used in the context of a distributed activity.

Physical Set Up

Each Show Me Station can sit up to four children (two in front and one on each side of the table). In order to facilitate classroom-wide activities, there should be at least one station for every four children in the class. Placing the Show Me Stations in the classroom rather than in a special lab is important to encourage casual participation.

The location of the remote Show Me Stations will shape the role that they serve in the preschool. Ties to other local institutions (e.g., other schools, retirement communities, hospitals) are likely to become regular resources in the classroom. On the other hand, ties to distributed resources (schools in other countries, museums, etc.) are likely to be destinations for special once-in-awhile visits. In either case, it is important that the remote Show Me Stations are placed in locations that are publicly visible and yet limit access, to increase accountability and protect the safety of the children involved.

Context of Use

Show Me Stations can be part of unstructured experiences as described in the use scenario, but also as part of more explicitly coordinated learning opportunities. Teachers can draw upon the resource provided by the Show Me Stations in the same way that they are already familiar with coordinating field trips, theme lessons, and other classroom experiences. Here are a few examples of possible activities:

- Activity where children learn about history by inviting members of a retirement community to show photos and talk about their childhood
- Virtual visit to a museum with members of the staff showing a different artifact or sets of artifacts at each station.
- Coordinating with a preschool in a different country as part of learning a foreign language
- Inviting a class of older students to teach a concept to the preschool class (two older students per group of four younger students)
- Weekly reading groups coordinated by members of a retirement community where each station is reading and talking about a different book

A key aspect of the Show Me Station is that an activity should have the potential to benefit all of the participants, whether it is by empowering the community's elders to inspire the new generation, by meeting the educational goals of another learning institution, or by providing classroom access to those who otherwise would not have it.

In the next section, we outline a potential deployment path for the Show Me Station within a community.

DEPLOYMENT PROPOSAL

Through four phases of deployment, we outline the process through which the Show Me Stations can be incorporated into a community. Our goal is to gradually decrease the influence of the researcher and empower the community to make the Show Me Station their own.

Phase 0: Feasibility Deployment

The initial feasibility deployment would consist of installing two working prototypes to connect two classrooms in the same school. Children in both classrooms would be given the opportunity to try out the Show Me Stations and provide feedback on its design. The goals of this phase would include making sure that system bandwidth requirements can be met, resolving any usability issues that may be present in the prototype, and familiarizing the children and teachers with the system. At this phase, the researcher would have regular and frequent involvement to respond to concerns and issues that may emerge. However, the teachers would be encouraged at this point to start thinking about how they may use the Show Me Station in the classroom.

Phase 1: Single Connection with Retirement Home

In the next phase, two working stations would be set up to connect a community room in a retirement home and a preschool classroom. We choose this setting for the initial deployment because there is a great deal of potential benefit to both parties in engaging the elders in conversation and play with the children. Having the single table available in the classroom would allow children to use it in free play or for the teacher to implement a classroom activity where it is one of the stations through which the children rotate. The goals of this phase would be to identify emergent (unexpected) uses of the system and iterate prototype design to support those patterns of use. Though the researcher should remain actively involved in this phase to provide technology support, the teacher and the members of the retirement community will begin to drive the partnership as they shape how the system is used.

Phase 2: Expanding to Multiple System and Classrooms

Once phase 1 is achieved to some level of satisfaction, additional tables would be added to the classroom and the retirement home so that all the children could participate in Show Me Station activities at the same time. Additionally, other classrooms within the preschool would also be asked to participate. The goals of this phase would be observing and evaluating how the Show Me Station can be integrated into real classroom lessons and activities. Expanding to multiple classrooms would allow getting a better understanding and measures of the system's impact. At this point, the researcher should no longer participate in the day-to-day use of the system, but rather shift focus to observing and evaluating its use. Additionally, the researcher would work directly with the administration of the school to gradually integrate Show Me Station technical support into the school's administration.

Phase 3: Connecting Multiple Schools

Once success is achieved within a single school in phase 2, steps can be taken to integrate additional schools into the program. Here, an appropriate goal would be creating partnerships with special needs classrooms. This stage

would require cooperation between the classrooms, the school administration, and policy makers, while the researcher would recede farther from the everyday management of the Show Me Stations. The goals at this stage are to begin generating a network of resources that can be connected with Show Me Stations and made available to the teachers. The researcher will support teachers in connecting to create classroom content, but will otherwise act as an independent observer to evaluate the impact of the system on the people involved.

Phase 4: Developing Targeted Educational Content

In phase 4, education experts will be asked to step in and continue the work to develop a network of Show Me Station resources, to develop educational content specifically targeted to the opportunities afforded by the system, and to continue integrating the system into new environments. Policy makers and school administrators will set up workshops educating teachers on particular aspects of the system's use and encouraging networking. In this phase, the evaluation of the system's impact can continue on a clinical scale by the appropriate experts.

CONCLUSION

Show Me Stations have the potential to connect preschool children with valuable learning experiences available in their community. A Show Me Station integrates audio/video communication with a projected shared workspace to support learning and play together at a distance. After the initial kick-off, the success of the Show Me Stations will depend upon the passion and resourcefulness of the teachers, administrators, and community volunteers. We are confident that with proper support communities will succeed in leveraging the interaction afforded by the Show Me Stations to create powerful resources for educating preschool children.

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APPENDIX A: FIGURES



Figure 1. An artist sketch of a scenario of three Show Me Stations in use in a preschool classroom.

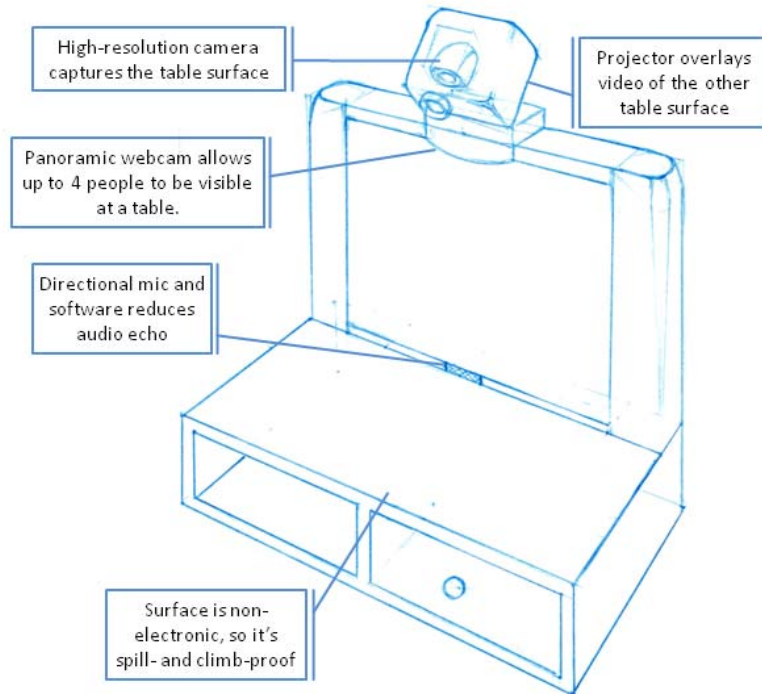


Figure 2. Description of the components of a single Show Me Station.

APPENDIX B: AUTHOR BIOS

The following are the short biographies of the authors.

Svetlana Yarosh

Svetlana “Lana” Yarosh is a Ph.D. student in the Human-Centered Computing program at Georgia Institute of Technology, advised by Prof. Gregory D. Abowd. She received degrees in Computer Science and in Psychology from University of Maryland, College Park. She has participated in industry-driven research through positions with AT&T and IBM research branches and she is the recipient of AT&T Labs Fellowship and the Anita Borg Google Scholarship.

S. Yarosh’s Ph.D. thesis focuses on designing, implementing, and empirically investigating technologies to connect young children and parents who live apart. She is an active member of the IDC, CHI, and CSCW communities. Recently, she has co-coordinated a special interest group on Designing for Families at CHI 2009 and she serves as an assistant director of a cross-discipline research center for domestic technologies at Georgia Tech (Aware Home). Her work has been featured in the *International Journal of Human-Computer Studies* and she is the first author of a chapter in *Mobile Technologies for Children*. The conceptual work for the Show Me Station system was done under the mentorship of Prof. Panos Markopoulos during her semester as a visiting researcher at Eindhoven University of Technology.

For more information, please refer to her web page: <http://home.cc.gatech.edu/lana/>.

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Panos Markopoulos

Panos Markopoulos is an Associate Professor at TU/e, with the User Centred Engineering Group in the Department of Industrial Design. He has held research positions at Queen Mary, University of London and Philips Research Laboratories in Eindhoven. He holds a Masters in Electrical Engineering from the National Technical University of Athens (1989), a Masters in Human Computer Interaction

from Queen Mary University of London (1990) and a Ph.D. from Queen Mary, University of London (1996) awarded on the thesis “A formal compositional model for user interface software.”

P. Markopoulos has authored more than 150 refereed publications and is a regular reviewer for conferences and journals. He has been general co-chair or program chair for five conferences (including IDC 2002 and 2006). He is the first author of a book on Evaluating Interactive Products for Children and editor of a forthcoming volume on Awareness Systems, in Springer’s HCI series. He has co-edited 5 proceeding volumes and 3 journal special issues.

P. Markopoulos is currently leading a team of researchers, working on Ambient Intelligence, context sensing for Awareness Systems, and design methodology for children’s interactive products. Examples of technologies developed by this team are: awareness system for supporting awareness regarding the daily activities of elderly living alone, software for experience sampling using PDAs, pervasive games for children, extending awareness systems with privacy preferences negotiation interfaces. He has supervised 4 completed Ph.D. projects, and is currently supervising 7 in-progress Ph.D. projects.

For more information, please refer to his web page: <http://www.idemployee.id.tue.nl/p.markopoulos/>.

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