

# Computer Assisted Instruction for toddlers with disabilities

By Debbie Grant and George  
H.S. Singer

Over the last three years, we have had the opportunity to study the use of CAI with infants and toddlers with disabilities. The children were between the ages of 1.5 and 3 years and were served in four different infant centers and at home. There was very little guidance available in the research literature about what programs to use and how to work with such young children. Our primary goal was first to teach cause and effect and motivate the children to interact with the computer and then to promote language development. Our study evaluated what it took and how it worked. The project was funded by the Office of Special Education Programs in the US Dept. of Education as a grant to the Santa Barbara County Special Education Program in California and to researchers at the University of California at Santa Barbara.

During the course of the study we used many software programs. We began the study with many titles, but they were quickly narrowed down to eight. Some of the programs were rejected because they did not engage the babies, were too noisy, or didn't work with a touch screen. We initially planned on starting the babies with a touch screen, progressing to an IntelliKeys keyboard and eventually to a single switch. We found that very few of our babies were able to move from the touch screen to another alternate access mode. The following software titles were the most



*Juan selects a rabbit. Toddlers frequently selected pictures of familiar animals to activate via the touch screen.*

successful with our babies and they were all used with a touch screen and Macintosh computers.

When we put the babies on the computers, we usually started with Cause & Effect, Sights & Sounds (Simtech: 860-485-1052, <[www.hsj.com](http://www.hsj.com)>, \$35). When using the touch screen with this program, we got a wonderful cause and effect. They touched the screen; they got music, color and movement. They removed their finger from the screen and it went immediately to black. Very powerful! Within this one program we had three options for use, Flowers, Fireworks, and Lines and Designs. Within the Settings you could choose the type of music played (country, techno, rock, etc.), volume, switch mode (momentary, timed or latching),

and the shapes, line thickness, etc. of the lines and designs.

Once we established that they had mastered cause and effect, we moved to other software programs, such as BabyTime: <[http://165.229.203.98/youny/Files/Download/Macintosh\\_Classic/Academic/Kids%20Keyboard%20Bangers/](http://165.229.203.98/youny/Files/Download/Macintosh_Classic/Academic/Kids%20Keyboard%20Bangers/)> which is referred to as a "keyboard banger" and is a shareware program. This program would produce a shape, letter, and icon whenever a key was pressed. The babies quickly became bored with this program.

Other popular titles from Simtech that were used daily were New Frog and Fly (\$25) and Switch Kids (\$25). Within each one of these titles were multiple options for play. SwitchKids included Funny Sounds and Faces, Bubble Gum and Build-A-Kid. The babies loved

#### Address

526 Main St.  
P.O. Box 68  
Henderson, MN 56044

#### Phone

507-248-3294

#### Fax

507-248-3810

#### Web site

[www.closingthegap.com](http://www.closingthegap.com)

#### E-mail

[info@closingthegap.com](mailto:info@closingthegap.com)

This article originally appeared in the April/May 2004 issue of *Closing The Gap*, Vol. 23, No. 1.

Check us out on-line:

**[www.closingthegap.com/](http://www.closingthegap.com/)**

Copyright © Closing The Gap, Inc. All rights reserved.

popping the bubbles in Bubble Gum and making the frog burp in New Frog and Fly. We got sounds out of those babies we didn't know they had!

The next cognitive jump in software programs used was to provide them with the opportunity to make choices. We used Switch Basics, Old MacDonald's Farm, Teach Me To Talk, and Teach Me Phonemics-Initials (SoftTouch: 877-763-8868, <www.softtouch.com>, each one is \$99.). All of these programs allowed us to customize them to a student's needs. We could determine the number of choices provided on the screen.

We liked Switch Basics because it offered us multiple choices for the activity to play and multiple teacher options. Our babies really liked Cloud Cover. We could determine how many clouds it would take to uncover the animal and we could choose the type of music we wanted played. It was a fun game to guess which animal was under the clouds. The kids also enjoyed the school bus and the pumpkin in Celebrate.

Old MacDonald's Farm was probably the all time favorite of the babies. We liked it because we could choose between photographs or line drawings of the animals. This was a nice cognitive jump for the babies. The younger babies preferred listening to the song being sung and the older kids liked the dot-to-dot and the animal stories.

Teach Me To Talk was very popular at all of our sites. At one of our sites, the majority of our students were Spanish speaking and Teach Me To Talk was the only software program we found that supported Spanish speakers. The babies preferred the excited Spanish-speaking female to the normal speaking Spanish female. Our English-speaking babies preferred the excited male voice to the others. Teach Me To Talk also offered multiple options for the teachers, such as photos vs. line drawings, number of animals to choose from, "morphing" from photo to icon, sound on/off, movement on/off, and printed word on/off.

Within the Teach Me to Talk program there were also stories, puzzles and a single switch activity. This program allowed us to customize it for each of our student's needs.

Teach Me Phonemics-Initials engaged the babies because of the photographs used. It also allowed us to customize. Again we could determine which voice we wanted to use, what we wanted it to say (word or word

+ phoneme), movement on/off, morphing on/off, etc.

Another popular computer activity was listening to books on the computer. We scanned several children's books and put them into a multi-media authoring program, which allowed single switch access. We used IntelliPics Studio 3 (IntelliTools: 800-899-6687, <www.intellitools.com>, \$139.95) for this activity, but Build Ability (Don Johnston, 800-999-4660, <www.donjohnston.com>, \$99) and My Own Bookshelf (Softtouch; 877-763-8868, <www.softtouch.com>, \$130) will produce the same product. We introduced the use of the digital camera to the classrooms and the teachers made activities using photos of the students and objects in the classroom. This was very popular with the teachers.

We evaluated the project using both qualitative and quantitative research methods. The staff reported that they were hearing a lot more speech from children when they interacted with the computers than when they were engaged in other activities in the infant centers. They believed that the children were learning language from their interactions with the computer, touch screen and hardware. In order to try to verify these views, researchers from the University of California at Santa Barbara carried out four research studies.

In the first study, we used qualitative research methods to learn more about what the infants' interactions with the computers looked like. Before beginning the project, the evaluators imagined something like a teenager interacting with a computer game. Of course, after observing carefully, it was clear that the way infants and toddlers with disabilities used the computers was far different – it was primarily a social interaction between an adult teacher or paraprofessional who held the child in her lap and the toddler with the computer acting like a highly interacting game occasioning opportunities to name pictures and actively respond to activate new screens.

The teachers were very verbal, used lots of warm affect and enthusiastic tones of voice that sounded like the "motherese" that mothers typically use in speaking to infants and toddlers. One of the most striking things about the young children was how fascinated and motivated they were. However, it is really important to note that the highly responsive comments, shaping, and playfulness of the adults was essential to the mix. Although the children were facing the computer they

would make frequent eye gaze contact with the teachers, touch them, turn around to see the adults reactions, and smile at them a lot. This study led us to believe that critics of computer use with young children are incorrect in believing that it will draw them away from social interaction if instruction is set up in the way the teachers in this project did.

The next study asked the question: Can pivotal response training (PRT) be used on the computer to increase language and communication skills?

PRT, developed by Bob and Lynn Koegel at the University of California, Santa Barbara is similar to milieu teaching and includes the following steps: a) the child is provided with a choice of highly motivating toys or objects, in this case it was a choice of pictures and the computer-touch screen-software-teacher combination; b) the child learns to activate or obtain the motivating object (touching the screen sets the pictures in motion, turns on sound, and changes size or shape); c) the teacher or parent then starts to interrupt the child when the child is in motion to activate the computer (reaching for the touch screen) and blocks the child from activating it (gentle hand holding); d) the teacher asks the student to say the name of the picture or to make whatever response has been selected from the IFSP; e) the teacher accepts any approximation of the words or phonemes; f) the child gets to touch the screen and the teacher gives enthusiastic praise; and, g) the criterion for touching the screen is gradually increased until the child is saying the full word correctly (shaping the speech response).

To answer our question, we conducted a multiple baseline study across three infants between the ages of 1.5 and 3 years. Each had a language goal: for Juan it was to increase his spontaneous (unprompted) labeling of pictures, for Alahandra it was to increase his use of picture labeling in response to the question "What is this?", and for Aracelli it was to increase her imitation of speech sounds. During baseline, the children did not activate the screen but were shown the pictures on it and asked to say their names or produce phonemes. During baseline, the children had only a few correct responses.

After the teacher began using PRT, correct responses increased steadily. By the end of the study, all three children had increased their language skills on the targeted pictures.

We did not formally examine generalization in this study, although the teacher

reported a few examples of spontaneous generalization with one child. This study indicates that when a teacher uses PRT in computer assisted instruction, children of this age can benefit by increasing language skills.

It is important to know that for one of the students, a child who only made growl sounds and whose goal was to make appropriate phonemes, the commercial software did not attract his interest. The researchers then developed their own interactive program using Intellipics. They entered digitized photos of the child's favorite animals and added roaring and growling sounds. This individualized program caught his attention and interest so that he was able to learn to produce correct phonemes.

All of the instruction for the three children was done in Spanish.

For a second study we wanted to know how important the teacher's interpersonal style, particularly affect, was for getting the students to interact with the computer. In this study, we measured how long the children worked at the computer. In our qualitative study and in previous research, we noted that the teacher's affective style made a difference in whether or not children engaged with tasks. We used an alternating treatment design; half of the time the teacher used enthusiastic highly responsive affect and voice tone, the other half she spoke in a flat tone of voice with no affect (we asked her to act like she was tired or her mind was elsewhere). Interestingly, we found that her affect did not make a difference for responding to the computer but two of the children changed their social interactions with her. They tried to comfort the teacher and tried to get the teacher to be more engaging. Again the study points out that CAI for infants and toddlers is very much an adult-child social interaction.

In a third study, we asked the question: What works better for picture object matching – hard copy photographs or computer mounted digital photos. Again, we used an alternating treatment design across seven children. In one condition, children looked at the computer and watched a picture of a classroom object (e.g. toy, cup, stuffed animal, blocks, crayons). The teacher asked them to go find the object in the classroom. In the other condition, children were given laminated photographs that they hand carried while looking for the objects. The reason for asking this question is a practical one. If

photographs work as well as the computer, why bother with CAI?

The results of the study showed that for four of the seven children they responded better in the computer condition, for two they got equal numbers correct in both conditions, and one child did better with the photos. We concluded that there are clear advantages in mounting touch screen activated photos on computers for teaching this form of matching. For most of the children it was as good as or better than laminated photos.

At the beginning of the project we had some reservations about the effectiveness of CAI with such young children. However, our qualitative observations over a three year period and our single subject design studies changed our minds. We are now enthusiastic about the possibilities. Although more research is needed, based on our experience and studies, we believe CAI in the context of structured adult-child social interactions holds real promise for early childhood special education programs serving children ages 1.5 to 3 years.

For more information, contact the authors:

Debbie Grant, AAC/AT Specialist, Santa Barbara County Education Office, 565 Atterdag Road, Solvang, CA 93463; Phone: 805-688-1849; E-mail <debgrant@sbceo.org>.

George H.S. Singer, Ph.D., Professor of Special Education, Givertz Graduate School of Education, University of California Santa Barbara.

### **For more information contact:**

SoftTouch, Inc., 4300 Stine Road, Suite 401, Bakersfield, CA 93313; Phone: 877-763-8868; Web site: <www.softtouch.com>

Simtech Publications, 22 Spring Hill Road, Harwinton, CT 06791; Phone: 860-485-1052; Web site: <www.hsj.com>

IntelliTools, Inc., 1720 Corporate Circle, Petaluma, CA 94954-6924; Phone: 800-899-6687; Web site: <www.intellitools.com>

Don Johnston, 26799 W. Commerce Dr., Volo, IL 60073; Phone: 800-999-4660; Web site: <www.donjohnston.com>

### **Also contributing to this article:**

Lisa Draper, Elizabeth Grace, Sungho Park, Tracy Gershwin-Meuler, Hannah Montague, Nicky Nedft and Vickie Yancy.