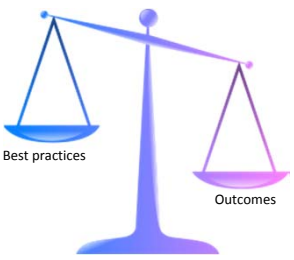
Using Technology to Promote Independence in Adults with Autism and Developmental Disabilities

Thomas Zane, Ph.D., BCBA-D
Chief Clinical Officer
Eden Autism Services

- Statistics on the growth of the population of adults with ASD/IDD
- Statistics on the lack of services available for this population
- Areas of need for this population (living alone; accessing community resources; independence; choice making, etc.)
- Overview of personal technology
- Possible benefits of it
- Examples of how it can be applied:
  - Using video cameras that detect movement to alert care providers if an individual leaves his bedroom, or house;
  - Smart phone schedules and alerts/alarms to notify an individual about a change in schedule
  - Reminders to reminder an individual to do or get something
  - Location app that sends a text message to an individual after the individual has traveled a set distance from home or work
  - Use of video modeling to teach skills
  - Use of credit cards for making purchases
- General comments about how to teach individuals to use such technology

Unfortunately, the current state of adult outcomes should not make us very happy…



- There are about 700,000 children in this country with autism. Eighty percent of the people with a diagnosis of autism [in the U.S.] are under the age of eighteen."
- By 2023, about 380,000 autistic children nationwide are expected to need extensive residential services as adults, according to the Department of Health and Human Services.

- In 2008, Easter Seals conducted a national study and found that 1.5 million Americans have an autism spectrum disorder. Twenty percent, or 300,000, of those people are age 22 or older.
- • 76 percent of teenagers with autism over the age of 16 have never looked for a job.
- • 79 percent of parents of children with autism are "extremely" or "very" concerned about their children's future independence. Of "typical" parents, by comparison, 32 percent are equally concerned.
- • 79 percent of adults with autism still live at home.

- Howlin, et al (2004) surveyed 68 adults with autism with an IQ of above 50 and found a majority (58%) were rated as having poor or very poor outcomes. With regards to employment status they found
  - 8 were competitively employed
  - 1 was self employed earning less than a living wage
  - 14 worked in supported, sheltered or volunteer employment
  - 42 had "programs" or chores through their residential provider.

The Outlook is Bleak……..

- 74% stated that they wanted to work but were currently unemployed;
- 19% of individuals with autism were employed at the time of the survey;
- 74% of those employed worked less than 20 hours per week; and
- 85% still lived with parents, siblings, or older relatives.
- 78% were unfamiliar with agencies or professionals that might assist in job development.

(Source: University of Miami/Nova Southeastern University CARD 2008)

Basic Survival vs. Complete Independence

Interdependent Functioning

in·de·pen·dent
Pronunciation: in-de-'pen-dent
Function: *adjective*
1 : not dependent: : not requiring or relying on others (as for care or livelihood) <*independent* of her parents>

interdependent
Pronunciation: In-ter-di-pen-duh nt
Function: *Adjective*
1. mutually dependent; 2. depending on each other.

Drive a car	Taking the bus
Cooking	Follow a recipe (TA)/frozen dinner
Appts/Recreation	Using a PDA (Schedule/Alarm)
Shopping	Asking for help/using a list

Adaptive Behavior is the key

Adaptive Behavior

- "Adaptive Behavior is defined as those skills or abilities that enable the individual to meet standards of personal independence and that would be expected of his or her age and social group. Adaptive behavior also refers to the typical performance of individuals without disabilities in meeting environmental expectations. Adaptive behavior changes according to a person's age, cultural expectations, and environmental demands." (Heward, 2005).

Criteria of Ultimate Functionality

According to Lou Brown (1983), the ultimate test of functionality for specific IEP goals is to ask:

"If the student does not learn to do the task, will someone else have to do it for them?"

Technology…..***what is it?***

Tech·nol·o·gy [tek-nol-uh-jee] *noun*

1. The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science. (emphasis added)
2. The terminology of an art, science, etc.; technical nomenclature.
3. A technological process, invention, method.
4. The sum of the ways in which social groups provide themselves with the material objects of their civilization.

- *Webster Collegiate Dictionary*

Technology Building Blocks To a Strong Foundation

- Principals of ABA
- Functional relevance
- Community immersion
- Teaching in the natural environments
- Community partnerships/Education
- Dyads / Triads: Reliance on Natural Supports
- Communication
- Environmental adaptations
- Electronics

Technology Can Be Used to Teach:

- Staff skills
- Production skills
- Navigation skills
- Social Skills
- Job competence
- Community safety
- Self Care skills
- Domestic skills
- Leisure skills

Technology Can Help in Training

- Technology such as
  - smart phones
  - tablets
  - wireless internet

Technology Can Make Training More Efficient

- Efficiency
  - save time
  - save resources

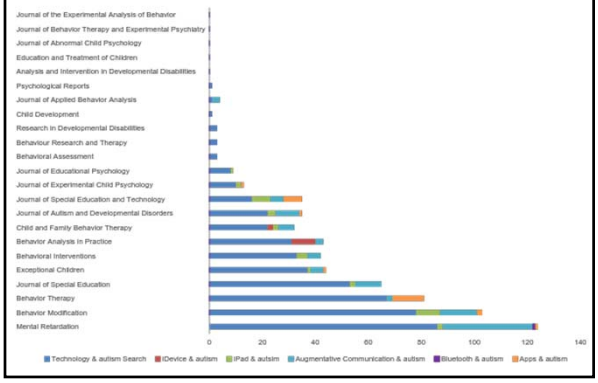
Using Technology to Teach Skills to:

- Individuals with Autism
- Staff

A Review of Technology in Education of Learners with Disabilities

Gloria Satriale, Cheryl Davis, Kari Anne Dunlop, Danielle LaFrance and Thomas Zane

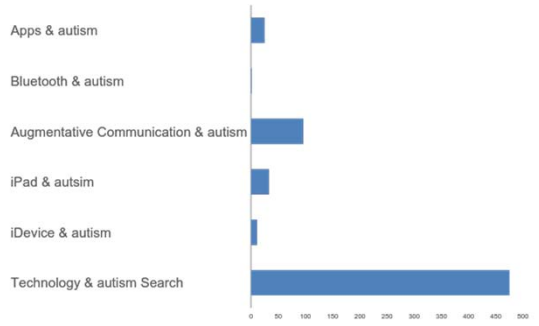
Results Across Journals



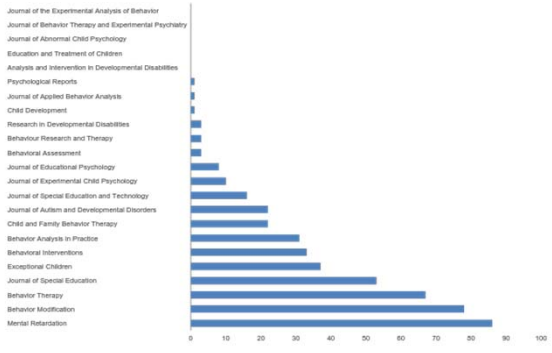
Results Across Journals

Journal	# studies
Mental Retardation	86
Behavior Modification	78
Behavior Therapy	67
Journal of Special Education	53
Exceptional Children	37
Behavioral Interventions	33
Behavior Analysis in Practice	31
Child and Family Behavior Therapy	22
Journal of Autism and Developmental Disorders	22
Journal of Special Education and Technology	16
Journal of Experimental Child Psychology	10
Journal of Educational Psychology	8

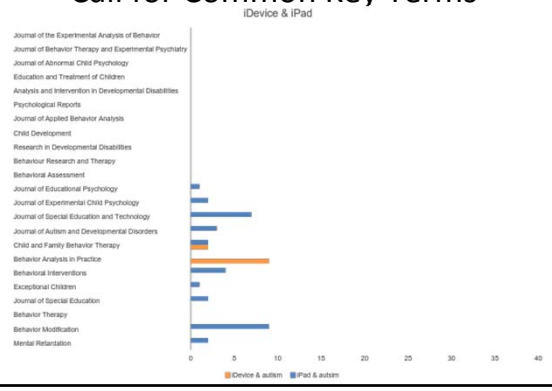
Search by Category



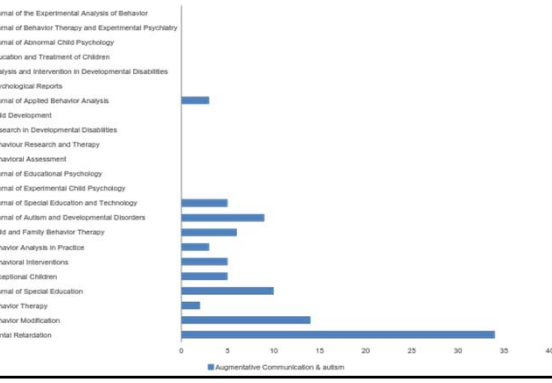
Technology and ASD



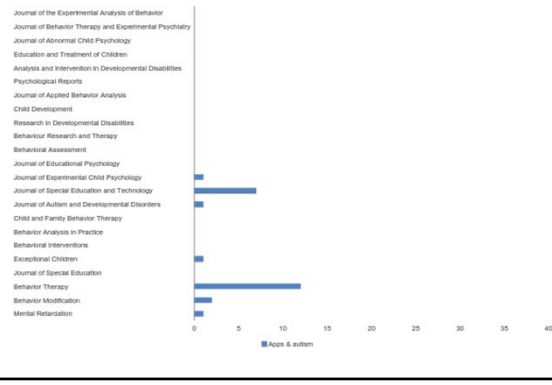
Call for Common Key Terms



AAC and ASD



Apps and ASD



Review of the literature

- Grynszpan, Weiss, Perez-Diaz and Gal (2014)

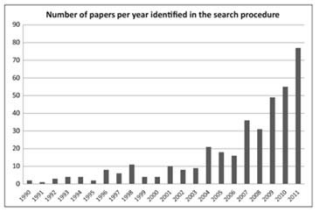


Figure 1. Number of articles per year that were retrieved in four online databases (PubMed, ERIC, IEEEXplore, and Web of Science) with the search query ((autism OR Asperger) AND (virtual OR computer OR robotics) AND (training OR rehabilitation OR education OR remediation)) between 1990 and 2011.
ERIC: Education Resources Information Center.

Review of the literature in DD

- Stephenson and Liberick, 2015
- Reviewed literature for:
  - What devices were used for and for what purposes?
  - How successful was device use?
  - If device use had to be taught, what were effective interventions
  - What was the evidence provided by the reviewed study?

Review of the literature in speech generating devices

- Lorah, Parnell, Whitby, & Hantula, (2015)
  - Evaluate the device on the acquisition of a mand repertoire
  - Evaluate the use of devices on the acquisition of other verbal operants (tacting, labeling)
  - Evaluate teaching discrimination
  - Comparison studies

Review of the literature with HS students with ASD

Odom, Thompson, Hedges, Boyd, Dykstra, Duda, Szidon, Smith and Bord (2015)

Evaluated the different forms of technologies across

- Academics
- Adaptive behavior
- Challenging behavior
- Communication
- Independence
- Social competence
- Vocational skills

Fig. 1 Conceptual framework for technology-use for adolescents with ASD

Beyond Self-Tracking and Reminders: Designing Smartphone Apps That Support Habit Formation

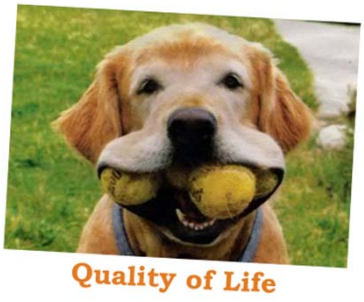
Katarzyna Stawarz
UCL Interaction Centre
Gower Street
London, WC1E 6BT, UK
k.stawarz@cs.ucl.ac.uk

Anna L. Cox
UCL Interaction Centre
Gower Street
London, WC1E 6BT, UK
anna.cox@ucl.ac.uk

Ann Blandford
UCL Interaction Centre
Gower Street
London, WC1E 6BT, UK
a.blandford@ucl.ac.uk

Because I Carry My Cell Phone Anyway: Functional Location-Based Reminder Applications

Pamela J. Ludford, Dan Frankowski, Ken Reily, Kurt Wilms, Loren Terveen
University of Minnesota, Department of Computer Science
4-192 EE/CS Building, 200 Union St. SE, Minneapolis, MN 55455, USA
{ludford, dfrankow, kreily, wilms, terveen}@cs.umn.edu



And now we need to figure out creative ways to use our technology to get around obstacles…

Technology: Environmental Adaptations

Technology: Environmental Adaptations

Technology….***What does it look like?***

Environmental Adaptations

Electronics

Technology….the “old”

Technology….recently new

Technology….REALLY new

Interesting findings

- Teachers may not be conducting research due to applied setting
- Ease of use and common in lives of educators
- Pragmatic!
- Perhaps not taking time to evaluate effectiveness
- Pressure from others
- Trial and error approach may be the most common method for educators
- Technology is ever changing, research could be outdated before it goes to press
- High interest
- Socially acceptable tool

Our Conceptualization of Behavior

A——-B——-C

Teaching Skills to Individuals with Autism

Bluetooth

Purpose:

To promote independence and increase social acceptance of adolescents with autism by reducing stigma associated with one-on-one instructions and physical prompts in the community

Technology: Electronics

Bluetooth ™

Purpose:

To promote independence and increase social acceptance of adolescents with autism by reducing stigma associated with one-on-one instructions and physical prompts in the community

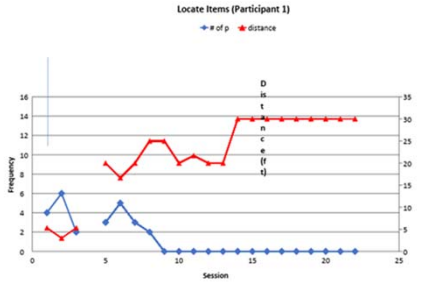
Technology: Electronics

Bluetooth™

- Used auditory prompts through Bluetooth earpiece for purchasing (locating items, waiting in line, and paying for items with a credit card).

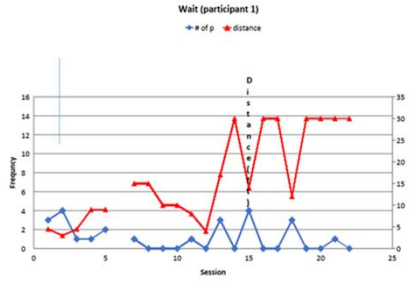

Technology: Electronics

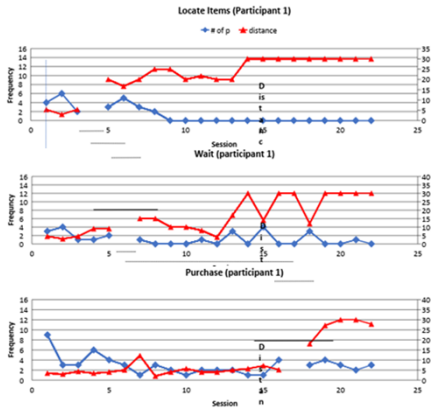
Bluetooth-Results



Technology: Electronics

Bluetooth - Results





Technology: Electronics

Bluetooth

Technology : Electronics

MP4 player/ IPod ™

- **Purpose:**

To reduce stigma associated with one-on-one instruction (close proximity and physical prompts) by providing auditory /visual cues via watch during the workout routines at a local fitness center.

Technology: Electronics

MP4 player/ IPod ™

- Baseline:
  - Participants wore the MP4 player watch or IPod ™ and earphones/headphones connected to the device.
  - Used written schedule and portable timer to follow the workout schedule (checking schedule, setting a timer).
  - Partial and full physical prompts were provided as needed.

Technology: Electronics

MP4 player/ IPod ™

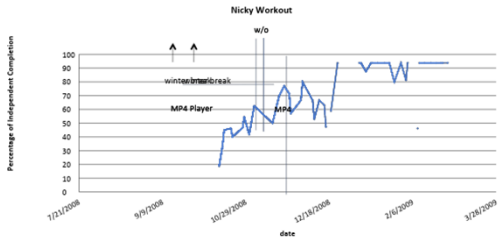
- Intervention:
  - Participants wore the MP4 player watch or IPod with earphones or headphones connected to the device
  - Verbal directions combined with highly preferred music were given via MP4 player or IPod
  - Partial/full physical prompts were provided as needed™

Technology: Electronics

MP4 player-video

Technology: Electronics

MP4 Player/IPod™ -Result



Technology: Electronics

Positive Outcome of MP4

Bluetooth®

Discussion

- Verbal prompts were able to be successfully faded.
- Distance from the participant was able to be increased in advance of skill mastery.
- Appearance of independence may help promote social acceptance and community integration.
- Wearing the device may help disguise/mask vocal stereotypy.
- Provides a safety net while providing greater independence.

Bluetooth®

Limitations

- The cost and maintenance of the device may be a limitation.
- Participants require some level of receptive language skills to benefit from this intervention.
- Participants may require some form of systematic desensitization to accept the Bluetooth® and reinforced instruction to carry a cell phone.

Bluetooth®

Future Considerations

- Expansion to a greater variety of skills across more diverse and complex environments.
- Research on implementing this strategy with more than one individual at a time.

Use of FaceTime to Remotely Traing Self-Care Skills

- In this case, technology allowed us to improve skill acquisition of a student who was prompt dependent upon staff providing instruction - we couldn't fade prompts to more independent performance because the student wouldn't make a response without a prompt
- let's review prompt dependency literature if there is any

Prompt Dependency

- Student unlikely to emit target response independently and instead does so only in the presence of instructional prompting

Prompt Dependency

- Student unlikely to emit target response independently and instead does so only in the presence of instructional prompting
- Differential Reinforcement

FT procedure

- Setup of the equipment:
  - In bathroom above sink
  - iPad to show video of how to shave face
  - iPhone - next to iPad for staff to watch Chris via FT

Technology: Electronics

Video Modeling

It has been proved through many research studies that "Video Modeling" is an effective tool to teach various skills

Technology: Electronics

Video Modeling

- Research
  - Social skills (Kimball, Kinney, Tayler, & Stromer, 2004)
  - Complex play sequences (D'Ateno, Mangiapanello, & Tayler, 2003)
  - Social language (Maione & Ayres, 2004)
  - Perspective taking (Charlop-Christy & Daneshvar, 2003)

Technology-Electronics

Video Modeling

- Variation on Video Modeling
  - Didactic teaching in the contrived settings
  - Variation on time between the video model and performance
  - Variation in models
  - Variation in instructions with video modeling

Technology: Electronics

Video Modeling

Benefits

- Rapid acquisition of skills
- Effective for both verbal and motor responses
- Effective for NT population and people with learning difficulties
- Fade one on one instructions
- Consistency of sequence/duration

Technology: Electronics

Video Modeling

- Technology-improved probabilities
  - MP4 player/IPOD
  - Portable DVD player
  - Digital Picture frames
  - Smart Phones/PDA devices
  - Accessible (YouTube)™

Technology: Electronics

Video Modeling

- Purpose:

  To improve independence of adolescents with autism during hygiene routines using video modeling via digital picture frames and portable DVD players.

Technology: Electronics
Video Modeling-Tooth Brushing

- Participants:
  1. A 17 years old female student with severe to moderate autism
  2. A 16 years old male student with severe to moderate autism
  3. A 13 years old male student with severe to moderate autism

Technology: Electronics
Video Modeling-Tooth Brushing

- Baseline
  - Priming
  - Textual (with pictorial for participant 1) prompts for showering routines
  - Partial and/or full physical prompts as needed
  - Verbal/social praise for attempt/completion of the steps
  - Delayed reinforcers upon completion of all TA

Technology: Electronics
Video Modeling-Tooth Brushing

- Interventions
  - Priming
  - Video Modeling-visual prompts
  - Full/Partial prompts from behind
  - Gestural prompts to attend to Video
  - Systematic prompt fading
  - Social praise for attempt/ completion of the steps
  - Delayed reinforcers upon completion of all TA

Technology: Electronics
Video Modeling-Tooth Brushing

Technology: Electronics
Video Modeling-Tooth Brushing

- Baseline Behaviors:
  - Participant 1: bite and suck on the tooth brush
  - Participant 2: depend on prompts, lack of thoroughness
  - Participant 3: starring the mirror and required repeated prompts to start the first step (up to 17 prompts)

Technology: Electronics
Video Modeling-Tooth Brushing

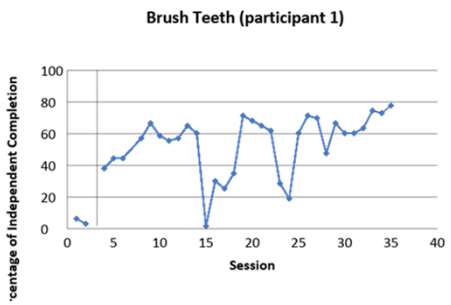
Technology: Electronics

Video Modeling-Tooth Brushing

- Result
  - Participant 1: slow and steady improvement on independent completion of the TA
  - Participant 2: significant improvement on independent completion of the TA
  - Participant 3:significant improvement on independent completion of the TA

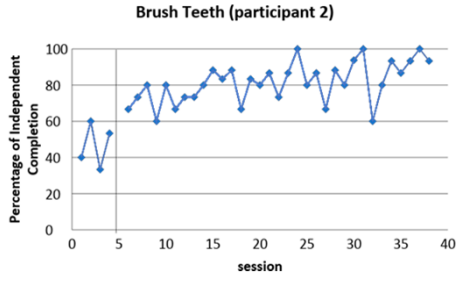
Technology: Electronics

Video Modeling - Results



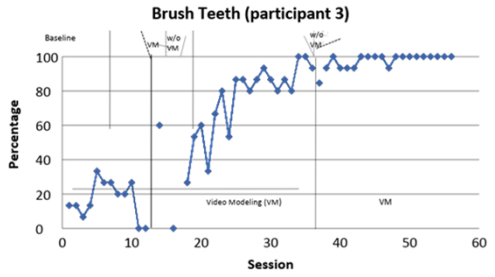
Technology: Electronics

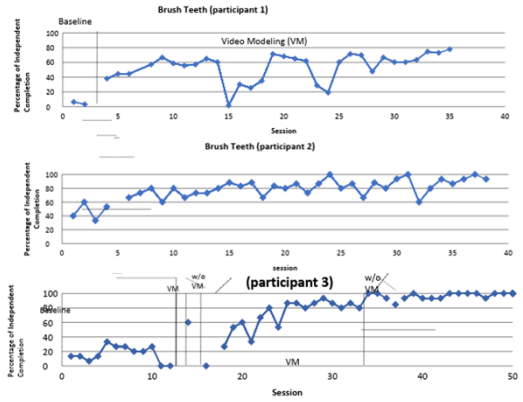
Video Modeling - Results



Technology: Electronics

Video Modeling - Results





Technology: Electronics

Video Modeling-Tooth Brushing

30 Second Smile ®
www.30secondsmile.com

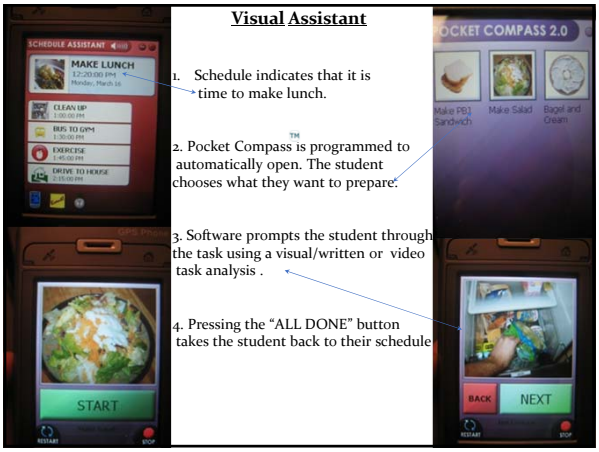
The Collis Curve Toothbrush®
http://www.colliscurve.co.uk

Technology: Electronics
PDA/Smartphone

- **Purpose**: Increase independence by reducing the need for constant support from others. Promote social acceptance by reducing stigma and replacing cumbersome augmentative communication systems.

Technology: Electronics
PDA/Smartphone

- Combines multiple prompting strategies to promote independence
  - Video modeling
  - Auditory prompts
  - Textual
  - Pictorial



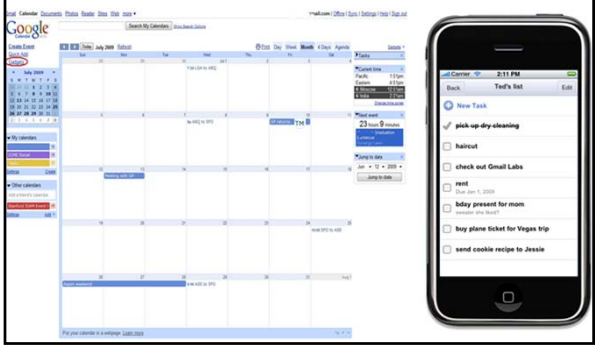
Visual Assistant

1. Schedule indicates that it is time to make lunch.
2. Pocket Compass™ is programmed to automatically open. The student chooses what they want to prepare.
3. Software prompts the student through the task using a visual/written or video task analysis .
4. Pressing the "ALL DONE" button takes the student back to their schedule

Technology: Electronics
PDA/Smartphone

Schedules

- Google Calendar/Gee Tasks ™



Visual Schedules

Stepstones ™

First then visual schedule

Picte

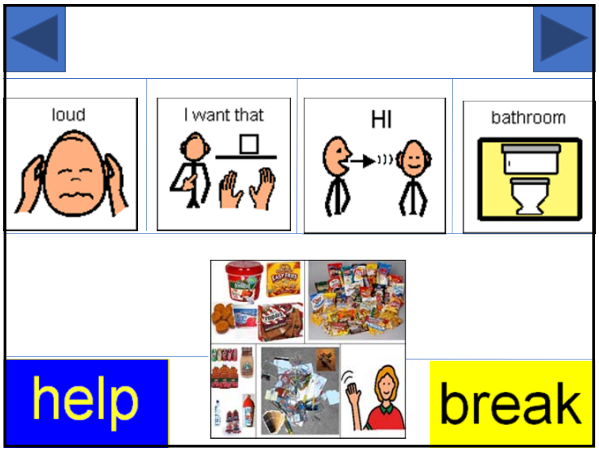
Communication

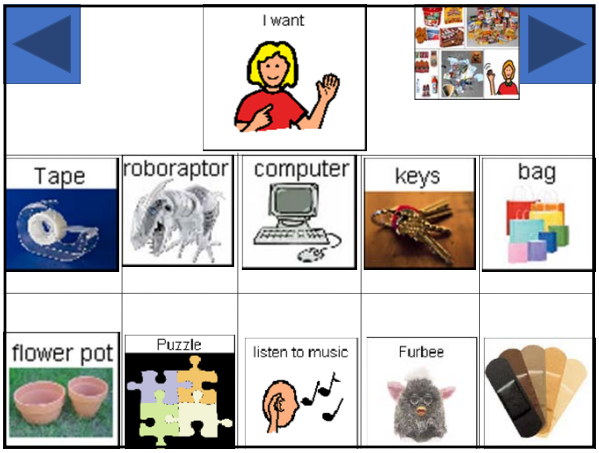
Technology: Electronics

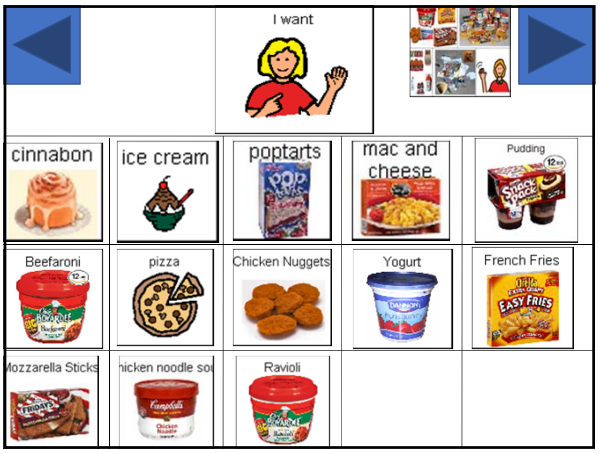
Communication

Proloquo2go ◦

Tap To Talk



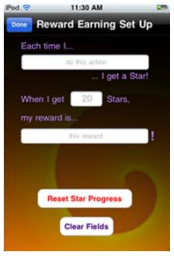




Self management

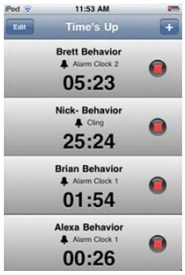
Token economies-

iReward ™ Earn it Stars ™



Time Management

Time Timer ™ *Times up* ™ *Time Calc* ™



Purchasing/Budgeting

Cash-Strapped ™

PicList ™

Navigation

GPS Alarm ™

iNap ™

Navigation

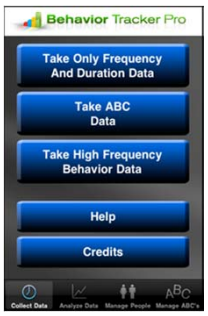
Breadcrumbz ® - android

Community Safety

- Hoch, H., Taylor, B.A., & Rodriguez, A. (2009). Teaching teenagers with autism to answer cell phones and seek assistance when lost. *Behavior Analysis in Practice, 2*(1), 14-20.

Data Collection

Behavior Tracker Pro ™



Skill Tracker Pro ™

Phone Calls

One Tap Dial ™

Pocket Ace ™

Remote Monitoring

Staff Performance

Remote Monitoring

Benefits

- Cost effective
- Minimally intrusive
- Increases frequency of supervision
- Improves staff awareness on performance
- Immediate feedback
- Easily utilized across community environments

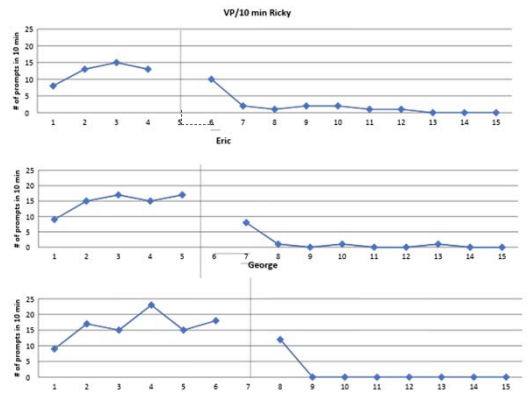
Remote Monitoring

Limitations

- Not applicable to other types of prompting (e.g., physical, gestural, etc.)
- Long term efficacy has not been assessed
- Self monitoring can be difficult at times
- Staff may perceive the intervention as intrusive
- Network connectivity

General Methodology

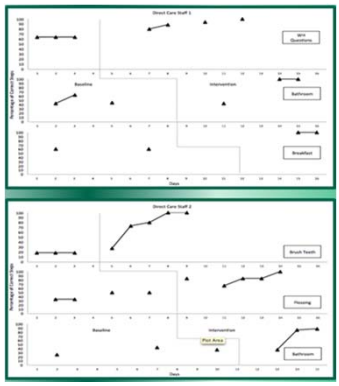
- 3 staff
- 3 students
- Training in community
- Each staff wore Bluetooth device
- Turned it on before leaving program
- Clinical administrator called the phone #; then muted; could listen in anytime she wanted
- At designated times, listened into training to count errors



Technology: Electronics
Bluetooth ™

Purpose:

To reduce implementation errors by staff running training programs



Staff Performance

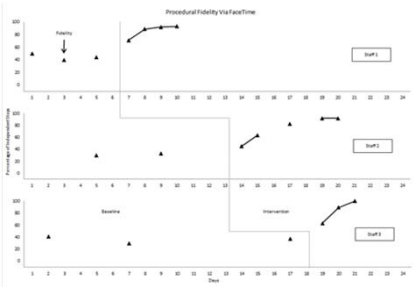
Results

- Bluetooth® technology can be used effectively to collect frequency data on verbal prompts and improve staff performance assessment
- The number of verbal prompts significantly decreased across participants with the introduction of the intervention
- Staff awareness of prompting procedures increased with intervention

Research Question

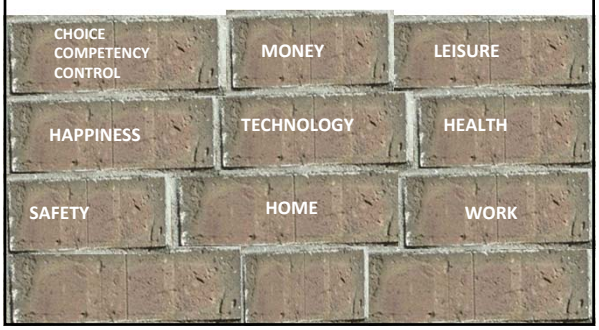
- Does the use of remote monitoring (via FaceTime) result in an increase in the fidelity of implementation of community-based instructional programs of direct care staff working one to one with an adult with Autism?

Results



Technology provides us the building blocks to break down skill barriers and build strong foundations for future competencies.

…And The Foundation for a Quality of Life



CAUTION

There is no silver bullet that meets the needs of all individuals on the spectrum. Technology is a tool that when used correctly, can be a valuable asset. When used incorrectly, you may end up with a very expensive paper weight.

Resources and Technology Tips

- **Insurance/Protection**
  - www.SquareTrade.com
  - Otterbox Cases- www.otterbox.com
- **Individual Program Back up**
- **Spare device**
  - Probing
  - Loss

APPLICATIONS

- **Able Link- http://www.ablelinktech.com**
- **Proloquo2go- http://www.proloquo2go.com/**
- **Tap to Talk- http://www.taptotalk.com/**
- **iReward-http://www.irewardchart.com/**
- **Earn it Stars- http://sites.google.com/site/reticentarts/earn-it-stars**
- **Time Timer- http://www.timetimer.com/products/software.php**
- **Times Up- http://www.softwarepotpie.com/TimesUp/**
- **Time Calc-http://www.marinoa.com/iphone/calc/en/**
- **Cash-Strapped-http://www.johngriffithsapps.com/**
- **PicList- http://www.appythought.com/**

Resources and Technology Tips

- **Wayfinder- http://ablelinktech.com**
- **Community Sidekick- http://ablelinktech.com**
- **iNap- http://moop.me/inap.php**
- **Breadcrumbz- http://www.bcrumbz.com/**
- **One Tap Dial- http://www.onetapdial.com/**
- **Pocket ace- www.ablelinktech.com**
- **Behavior Tracker Pro- http://www.behaviortrackerpro.com/**
- **Skill Tracker Pro- http://www.behaviortrackerpro.com/**
- **Stories2learn- http://www.look2learn.com**
- **Quick Cues- http://www.quickcues.com**
- **101 Conversation Starters- http://sites.google.com/site/susasoftx/home**