



The Use of Technology in Social Skills Training for Individuals with Autism Spectrum Disorders

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Superheroes Social Skills Training, Rethink Autism Internet Intervention, Parent Training, Evidence-based Practices Classroom Training, Functional Behavior Assessment: An Autism Spectrum Disorder, Evidence-based Practices Training Track for School Psychologists

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+ Overview



- The need for social skills training
- Types of technology used
- Limitations of current methods

+ Social Skills Training – Why?



- Social skills deficits
 - Social competence ¹
 - Basic rules of social engagement and social interaction
 - Unrealistic expectations about social ability
 - Theory of Mind ([definition](#))
 - Reciprocal social interaction
 - Emotion recognition
 - Joint attention ([definition](#))
 - Empathy
- Consequences
 - Social isolation
 - Employment issues
 - Poor self-esteem



1. Goldberg, W. A., Jarvis, K. L., Osann, K., Laulhere, T. M., Straub, C., Thomas, E., Filipek, P., & Spence, M. A. (2005). Brief report: Early social communication behaviors in the younger siblings of children with autism. *Journal of Autism and Developmental Disorders*, 35, DOI: 10.1007/s10803-005-0009-6.

+ Technology – Why?



- Estimated cost of diagnosis and treatment of \$90 billion
- Multisensory interactions
 - Appeals to restricted, repetitive interests
- Controlled and structured environments
- Ease of individualization
- 3 of 4 students with ASD were more motivated to learn using computer based instruction ¹

1. Bernard-Opitz, V., Sriram, N., & Nakhoda-Sapuan, S. (2001). Enhancing social problem solving in children with autism and normal children through computer-assisted instruction. *Journal of Autism and Developmental Disorders*, 31, 377-384.

+ Social Skills Training – How?



Video Modeling



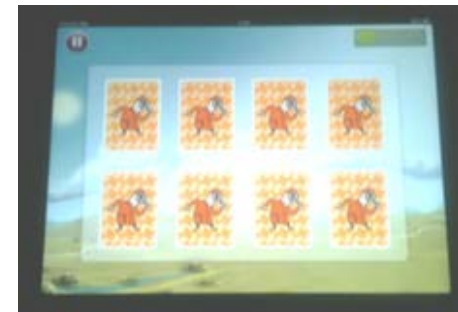
Instructional Software



Virtual Reality



Robots



Mobile technology

+ Video Modeling



- Based on concept of “observational learning” ([Bobo Doll experiment, 1961](#))
- Video portraying a model engaging in the target behavior
 - Self as model ([Buggey, 2005](#))
 - Peer as model ([Nikopoulos & Keenan, 2004](#))
 - Adult as model ([Schefflen et al., 2012](#))
- Video is edited to omit inappropriate behaviors and focus on desired behaviors
- Child is given the opportunity to engage in the target behaviors
- Cycle is repeated until the child consistently and independently demonstrates the target behavior



Video Modeling – Effectiveness



- Video modeling has been demonstrated to effectively increase:
 - Socially expressive behaviors (Charlop et al, 2010)
 - Play related verbalizations (MacDonald et a., 2009)
 - Compliments (Macpherson, Charlop, & Miltenberger, 2014)
 - Verbal initiations (Grosberg, 2014)
 - Conversation skills (Dupere et al., 2009)

- More effective than in-vivo modeling for children with autism Eliminates social context
 - Provides reinforcing sensory stimuli
 - Systematic repetition
 - Overselectivity
 - Minimizes the focus area and filters out extraneous stimuli
 - (Wang, Cui, & Parrila, 2011)

- Cost and time effective

- As participants get older, treatment effectiveness goes down (Wang, Cui, & Parrila, 2011)



Video Modeling – Generalization

- VM allows for several opportunities for generalization that are not possible with in-vivo modeling
 - Multiple models
 - Naturalistic settings
- VM has been shown to generalize skills
 - Length of play-related utterances
 - Developmental play level
 - (Corbett & Abdullah, 2005)
- Video modeling may be used in conjunction with another intervention to enhance generalization
 - Self-management (Apple, Billingsley, & Schwartz, 2005)



+ Video Modeling Programs



- Model Me Kids

- Social skills explained and modeled by a peer in the school context
- Introductory video

- Watch Me Learn

- Model social skills in home, outdoor, and school settings

+ Virtual Reality



- Interactive space in which users can learn about and practice social skills in a controlled environment
- Two types:
 - 3D learning environment
 - Immersive virtual environment
- Can be individual or collaborative
- Virtual reality programs should:
 - Look realistic
 - Be user-friendly
 - Be affordable
 - Allow for repetition and rote learning
 - Allow for fading and generalization
 - (Parsons & Mitchell, 2002)

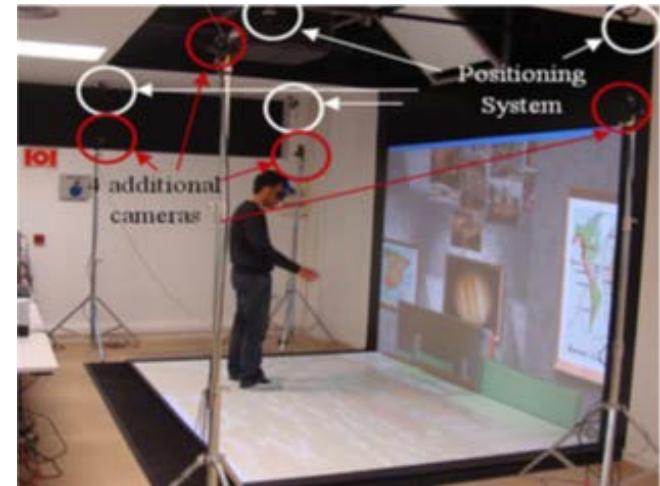
+ Virtual Reality – 3D Learning Environment

Kandalaft et al., 2013



Cheng et al., 2010

+ Virtual Reality – Immersive Virtual Environment



+ Virtual Reality – Effectiveness

- Virtual reality programs have been demonstrated to effectively increase:

- Emotion recognition
- Conversation skills
- Theory of Mind
- (Kandalaft et al., 2013)

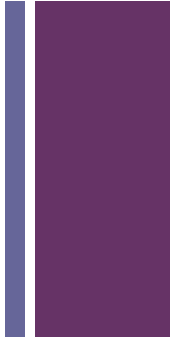
- Benefits of VR include:

- Active control of user
- Naturalistic, yet safe environment
- Realistic representation of real-world situations

- Future VR programs should incorporate facial tracking technology



+ Virtual Reality – Generalization



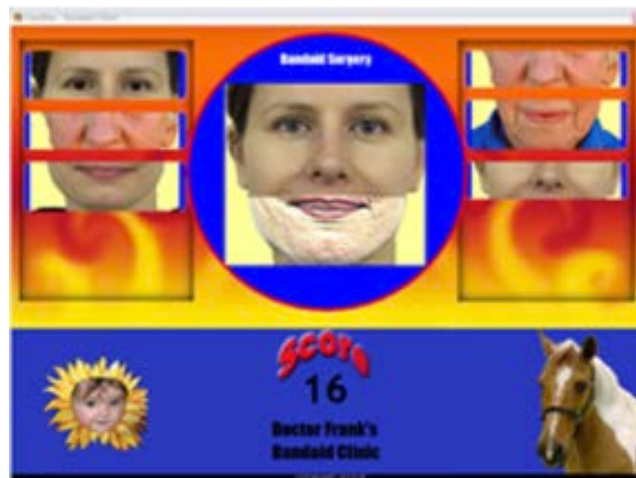
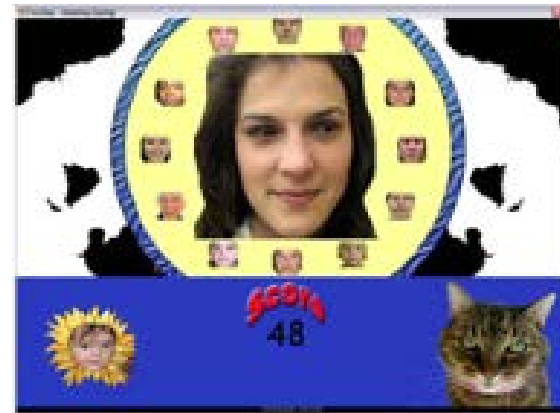
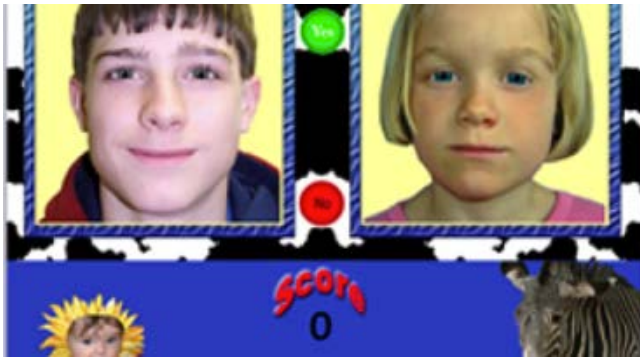
- Studies indicate that children can learn information from VR, and some are able to transfer their knowledge to the real world
 - Skills that are more procedural and less nuanced demonstrate greater levels of generalization
 - (Cheng, Chiang, Ye, & Cheng, 2010; Kandalaf t al., 2012)
- Overall, there is not much research surrounding the use of VR for social skills training
 - What does exist is promising

+ Instructional Software



- A large variety of social skills software exists targeting a range of behaviors
 - **Joint attention** (Hopkins et al., 2011)
 - **Language** (Bauminger-Zviely et al., 2013)
 - **Emotion and facial recognition** (Hopkins et al., 2011; Baron-Cohen et al., 2004)
 - **Collaboration** (Bauminger-Zviely et al., 2013)
 - **Social Problem Solving** (Bernard-Opitz, Sriram, & Nakhosa-Sapuan, 2001)
- 17 of 18 students with ASD preferred computer based instruction
 - Bernard-Opitz, Ross, & Tutas (1990)

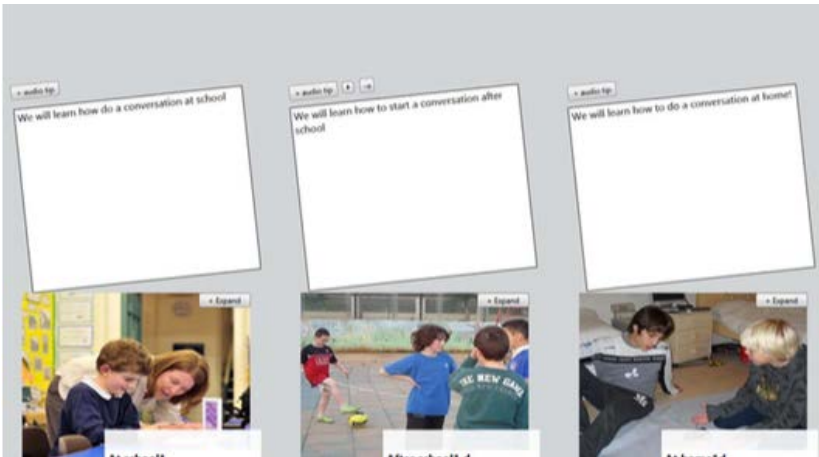
+ Instructional Software - Individual



FaceSay

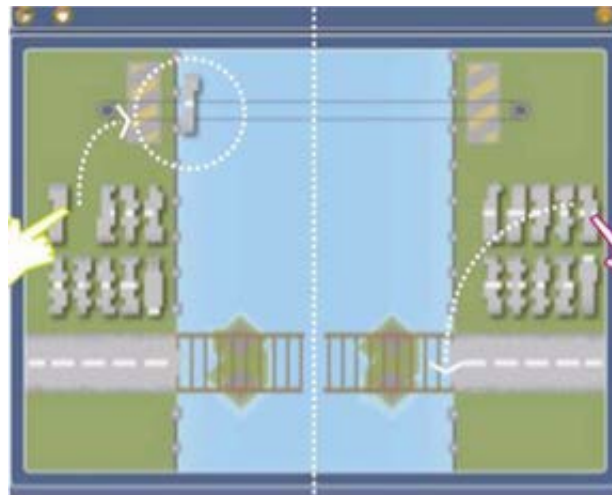
Hopkins et al.,
2011

+ Instructional Software – Collaborative



No Problem

Zancanaro et al.,
2014



Join In

Bauminger-Zviely,
2013

+ Robotics



- Remedial tool to encourage children to become engaged in a variety of different interactions important to human social behavior
- Structured and unstructured applications
- Shaping interactions with humans
- Therapeutic element of touch
- Fun “toy” element

+ Robotics



Milo,
Achievement
Center of Texas

Kaspar,
University of
Hertfordshire



Max & Ben,
University of
Birmingham

+ Robotics – Effectiveness



- Research demonstrates significant effects on:
 - Response time (Dautenhahn & Werry, 2004)
 - Joint attention (Robins, Dickerson, Stribling, & Dautenhahn, 2004)
 - Body awareness (Costa et al., 2014)
- Subjects tend to display high level of interest in interacting with robots
- “The use of robots as assistive tools in clinics and households, and in education will not become a reality before the robot’s control is intuitive to everybody.”

--Barakova et al., 2012

+ Robotics – Generalization



- Unclear whether or not therapy involving robots actually increases interaction time with the robot
 - Seifer & Mataric (2009) say yes
 - Pioggia et al (2005) say no
- Unclear whether or not robots lead to increased interactions with peers
- More research is necessary

+ Mobile Technology

- Adapting evidence-based interventions to mobile technology

- iPads have been used in general education classrooms

- Promote higher level thinking and problem solving through engaging apps

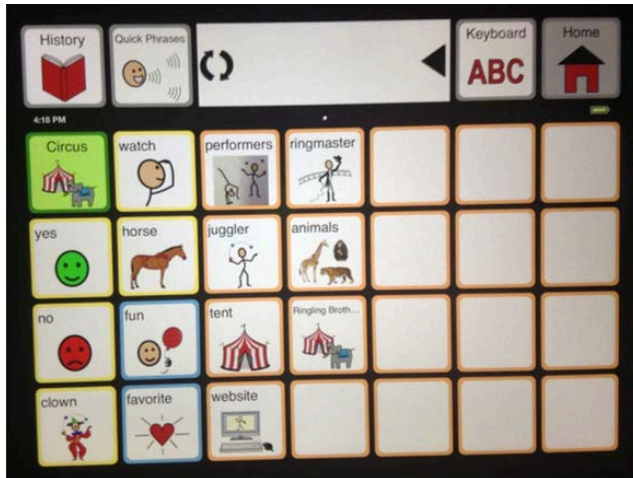
- Programs address a range of behaviors

- Functional communication ([Proloquo2go](#))

- Play dialogue (Murdock, Ganz & Crittendon, 2013)

- Emotion recognition (Alves, Marques, Oueiros, & Orvalho, 2013)

+ Mobile Technology



LIFEisGAME

Alves et al., 2013



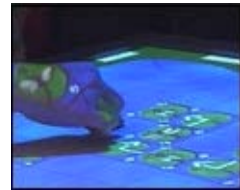
Mobile Technology – Effectiveness



- Research demonstrates moderate effects
 - Grosberg et al, 2014
- Further research is required to determine the efficacy of social skills programs utilizing mobile technology
 - Naturalistic setting
 - Multiple activities
 - Multiple platforms – not restricted to a specific device

+ Other Technology

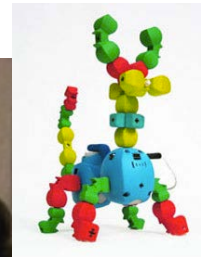
- Multitouch tabletop technology
 - [Shared Interfaces to Develop Effective Social Skills \(SIDES\)](#)



[SIDES](#)

[Piper et al., 2006](#)

- Smartboard
 - [Xin & Sutman, 2011](#)



[Topobo](#)

[Farr et al., 2010](#)

- Tangible user interface
 - Computer technology in graspable objects
 - [Topobo \(website\)](#)

- [Transporters \(website\)](#)

- [Trains that model social scenarios, emotional reactions, and explanations](#)

[Transporters](#)
[Golan et al., 2010](#)



+ Limitations



- Skills often do not generalize to real-world situations
 - Gap between safe therapeutic environment and unpredictable social behavior
- Statistical analysis of current literature
- Cost/benefit ratio
- Lack of recent research
 - Much of the existing research is from outside of the US
- Lack of program-specific research
 - Many widely used programs do not have sufficient evidence base



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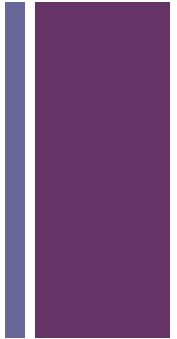
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