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


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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
    - 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

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

Social Skills Training – How?

- Video Modeling
- Virtual Reality
- Instructional Software
- Mobile technology
- Robots
Video Modeling

- Based on concept of “observational learning”  
  \( (\text{Bobo Doll experiment, 1961}) \)

- Video portraying a model engaging in the target behavior
  - Self as model  \( (\text{Buggey, 2005}) \)
  - Peer as model  \( (\text{Nikopoulos & Keenan, 2004}) \)
  - Adult as model  \( (\text{Scheflen et al., 2012}) \)

- 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 al., 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

Lorenzo, Pomares, & Lledo, 2013
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
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; Kandalaft et 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, & Tuttas (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)
- Smartboard
  - Xin & Sutman, 2011
- Tangible user interface
  - Computer technology in graspable objects
    - Topobo (website)
  - Transporters (website)
    - Transports 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
References


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