


Exchange-based Communication, Speech-generating Devices (SGDs) and Tablets: An Evidence-based Review


Miriam Boesch, Ph.D.
Department of Educational Psychology
University of North Texas

Ravi Nigam, Ph.D.
Department of Communication Disorders
Governors State University




Exchanged-based Communication

Miriam Boesch, Ph.D.
University of North Texas



Picture Exchange Communication System (PECS)

- Structured behavioral intervention program to teach use of visual-graphic symbols for communication (Bondy & Frost, 1994)
- Teaches to make requests by handing/ exchanging symbols for desired items



Picture Exchange Communication System (PECS, cont.)

- Picture Exchange Communication System (PECS) protocol (Bondy & Frost, 1994)
 - **Phase I:** Physical Exchange
 - **Phase II:** Expanding Spontaneity
 - **Phase III:** Picture Discrimination
 - **Phase IV:** Sentence Structure
 - **Phase V:** Responding to "What do you want?"
 - **Phase VI:** Responsive and Spontaneous Commenting

Why Choose PECS?

- Requires very few prerequisites
 - Only prerequisite is for the individual to clearly indicate wants and needs
- First skill taught in PECS is requesting
 - Often targeted in early instruction of individuals with developmental disabilities due to motivational considerations (Reichle & Sigafoos, 1991)

Why Choose PECS? (cont.)

- Systematically targets spontaneous communication acts, a particular deficit in autism
- PECS graphic symbols are highly iconic
 - Can be easily recognized by the learner
 - Are more recognizable by communicative partners

PECS: Empirical Evidence



- Systematic reviews (particularly meta-analyses) are preferred evidence to document empirical support:
 - **Flippin, Reszka, and Watson (2010)**
 - “Promising but not yet established evidence-based intervention for facilitating communication in children with ASD ages 1–11 years”

PECS: Empirical Evidence (cont.)



- **Ganz, Davis, Lund, Goodwyn, & Simpson (2012)**
 - Promising practice
 - Increases in functional communication skills
 - Inconclusive findings for non-targeted variables (e.g., speech, problem behavior, social skills)
 - Preschool children & autism had strongest training effects
 - Best outcomes for participants who mastered most PECS phases

PECS: Empirical Evidence (cont.)



- **Hart and Banda (2010)**
 - Increases in functional communication skills in all but 1 subject
- **Preston and Carter (2009)**
 - Increase in communication skills in most learners
 - Effects on problem behavior reduction
 - Increases on natural speech is less clear

PECS Summary



- Considerable empirical support for using PECS as a beginning communication strategy
- Overall, research shows strong effectiveness for teaching initial requesting skills
- Some evidence exists to indicate PECS is more effective than manual signing in increasing requesting skills

PECS Summary (cont.)



- Effect is less clear for other outcome variables such as:
 - Speech production
 - Social skills
 - Challenging behavior
- When treatment goals is speech production ⇒ no sufficient evidence to inform practice in favor of PECS or manual signing
 - In general, mixed results on this outcome measure

PECS Summary (cont.)



- Methodological issues in PECS studies
 - Often lack investigation of maintenance
 - Skill generalization sometimes reported, but what counts as generalization varies greatly
 - Participant descriptions lack detail
 - Sparse reports of treatment integrity
- ⇒ PECS appears as a promising intervention that presents with emerging empirical support, but critical questions are still to be answered!

Speech-generating Devices (SGDs) and Tablets

Ravi Nigam, Ph.D., CCC-SLP
 Governors State University



Speech-Generating Devices (SGDs)

- Portable, computerized devices producing synthetic or digitized speech output when activated
- Graphic symbols are used to represent messages, activated by finger, switch, head stick, etc., selecting a symbol from the display
- LightWRITER
- BIGmack



SGDs (cont.)



SGDs (cont.)

- | | |
|--|--|
| <p>Fixed Display</p> <ul style="list-style-type: none"> • Graphic symbols located in separate squares of a grid, organized into rows and columns • Limited vocabulary | <p>Dynamic Display</p> <ul style="list-style-type: none"> • Selection from a display results in a new array of graphic symbols • Larger vocabulary sets |
|--|--|



SGDs (cont.)

Visual Scene Displays

- Language concepts are embedded into contextual scenes
- Objects and events within the photograph are then used as symbols for communication
- May be used in a dynamic display system



⇒ Not ideal for learners with severe autism due to sensory processing difficulties



Why Choose SGDs?

- Allows composing more detailed messages
 - Enable user to communicate very precise requests and prevent communication breakdown
- Voice output (aka speech output) may facilitate acquisition and maintenance of communication skills
- Producing speech can be perceived as more natural
 - Better intelligibility
- Easier to get attention
 - Higher likelihood of receiving a listener response



Why Choose SGDs? (cont.)

- iPads and other tablet devices are
 - Lightweight and portable
 - Cost-efficient compared to dedicated SGDs
 - Easy to program
 - Highly motivating to use
 - Socially appealing (peer acceptance)



SGDs: Empirical Evidence

- Ganz, J. B., Earles-Vollrath, T. L., Heath, A. K., Parker, R. I., Rispoli, M. J., & Duran, J. B. (2012). A meta-analysis of single case research studies on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 42, 60-74.
- Van der Meer, L. A. J., & Rispoli, M. (2010). Communication interventions involving speech-generating devices for children with autism: A review of the literature. *Developmental Neurorehabilitation*, 13, 294-306

SGDs: Empirical Evidence

- Van der Meer, & Rispoli (2010), systematic review:
 - Found 23 studies with a total of 51 children aged 3-16 years
 - Positive outcomes reported for 86% of studies, most commonly targeting requesting skills
 - ⇒ Potentially effective option for teaching communication skills in ASD
- Ganz et al. (2012), meta-analysis:
 - Included 8 studies on SGDs, 9 studies on PECS, 7 other graphic symbols
 - Effect size estimates were 99% each for SGDs and PECS, 61% for others
 - ⇒ SGD or PECS use yields significantly higher effects

SGDs: Empirical Evidence (cont.)

- Schlosser et al. (2009): "...SGDs represent a viable and effective AAC option for individuals with ASD"
- Empirical evidence speaks a clear message, effectiveness of SGDs no longer a question
- Wendt and Golinker (2012): "SGDs are one part of the standard of care to improve the functional communication and other outcomes for clients with ASD"
⇒ Important when applying for SGD funding from insurance agencies!

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- Ganz, J. B., Davis, J. L., Lund, E. M., Goodwyn, F. D., & Simpson, R. L. (2012). Meta-analysis of PECS with individuals with ASD: Investigation of targeted versus non-targeted outcomes, participant characteristics, and implementation phase. *Research in Developmental Disabilities*, 33, 406-418.

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- Preston, D., & Carter, M. (2009). A review of the efficacy of the Picture Exchange Communication System intervention. *Journal of Autism and Developmental Disorders*. DOI 10.1007/s10803-009-0763-y
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- Wendt, O., & Golinker, L. (2012, August). *Applying Evidence-based Practice principles to support SGD funding for individuals with autism spectrum disorders*. Paper presented at the Biennial Conference of the International Society for Augmentative and Alternative Communication (ISAAC), Pittsburgh, PA.