Practical Evaluation Reports
Volume 5, Number 1 March 2013

Systematic Review of Studies Promoting the Use of Assistive Technology Devices by Young Children with Disabilities

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Abstract

Findings from a meta-analysis of studies investigating the use of five different assistive technology devices (switch interfaces, powered mobility, computers, augmentative communication, weighted/pressure vests) with young children with disabilities are reported. One hundred and nine studies including 1342 infants, toddlers, and preschoolers were the focus of analysis. Results showed that the use of all the assistive technology devices except weighted and pressure vests were related to improvements in the child outcomes regardless of type of child disability or severity of child intellectual delay. The importance of the use of evidence-based training methods for promoting practitioners' and parents' use of assistive technology is described.

Assistive technology includes devices that are used by individuals with disabilities, including infants, toddlers, and preschoolers, in order for them to participate in typically occurring everyday activities and to perform functions that otherwise would be difficult or impossible without the use of the technology (Judge & Parette, 1998; Mistrett, 2004). According to Campbell, Milbourne, Dugan, and Wilcox (2006), assistive technology includes both adaptations to readily available items (e.g., spoons, car seats) and the use of specialized devices (e.g., switch interfaces, power wheelchairs). The effectiveness of different types of adaptations on child behavior was the focus of another research synthesis (Trivette, Dunst, Hamby, & O'Herin, 2010). The research synthesis described in this paper specifically examined the effectiveness of the use of specialized devices on changes or improvements in child behavior and development.

More than a half dozen reviews and syntheses of studies investigating the use of assistive technology with young children with disabilities have been published (e.g., Campbell et al., 2006; Daniels, Sparling, Reilly, & Humphry, 1995; Dunst, Trivette, & Hamby, 2012; Floyd, Canter, Jeffs, & Judge, 2008; Mistrett et al., 2001). With only a single exception (Dunst et al., 2012), all the reviews have been narrative analyses of infants, toddlers, and preschoolers with disabilities use of different assistive technology devices. Several of these as well as other reviews have been criticized on methodological grounds where the review of assistive technology studies have concluded that the efficacy of the devices has yet to be established (e.g., Nicolson, Moir, & Millsteed, 2012; Ryan, 2012; Wendt, 2007). The conclusions of the investigators, however, were made without empirical analyses of whether methodological differences account for variations in study outcomes. This was one focus of investigation as part of the research synthesis described in this paper.

The research synthesis described in this paper was a systematic review of studies of the use of assistive technology devices with young children with disabilities where the effec-

Preparation of the research synthesis was supported, in part, by a subcontract from the Tots N Tech Project (Phillippa Campbell, Principal Investigator), Thomas Jefferson University, Philadelphia, PA, to the Orelena Hawks Puckett Institute, Asheville, NC, from the U.S. Department of Education, Office of Special Education Programs (H327X070003). The opinions expressed, however, are those of the authors and do not necessarily reflect those of the Thomas Jefferson University or the U.S. Department of Education.

Practical Evaluation Reports are electronic publications of the Center for Practical Evaluation, an organizational unit of the Orelena Hawks Puckett Institute, Asheville, and Morganton North Carolina.

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tiveness of the devices was estimated using effect sizes as the metrics for ascertaining which types of devices with which children were associated with discernible changes or improvements in child outcomes (Dunst & Hamby, 2012). The research synthesis was both an update and extension of the Campbell et al. (2006) review of assistive technology studies. The types of devices that were the focus of investigation included: (1) Switch interface devices, (2) powered mobility devices, (3) computer devices, (4) augmentative communication devices, and (5) weighted and pressure vests. Table 1 includes descriptions of each of the devices which were used to categorize the different types of assistive technology for data analysis purposes. All of the devices except weighted or pressure vests were the focus of the Campbell et al. (2006) review. Weighted and pressure vests were investigated because of their recommended use with young children with disabilities (e.g., Judge & Parette, 1998).

Search Strategy

Studies were located using *assistive technology** OR *assist* technology** OR *assist* n2 technology** OR *assistive device* OR *adaptive equipment* OR *adapt* technology* OR *adapt* n2 technology** OR *adaptive technology* OR *adaptive device** OR *powered mobility* OR *powered device* OR *mobility aid* OR *switch interface* OR *contingency device* OR *adapt* switch* OR *adapt* toy* OR *computer interface** OR *computer software* OR *computer access* OR *augmentative communicat** OR *weighted vest* OR *pressure vest* AND *infant** OR *infancy* OR *toddler* OR *preschool** AND *disability** OR *impair** OR *handicap** OR *disorder** as search terms. PsychInfo, ERIC, MEDLINE, Rehabdata, Education Research Complete, Academic Search Premiere, CINAHL, ACM Digital Library, CIRRIE, and IEExplore were search for studies. These were supplemented by Google Scholar, Scirus, Ingenta Connect, and Google searches as well as a search of an EndNote library maintained by our Institute. Hand searches of the reference sections of existing literature reviews and all retrieved journal articles, book chapters, books, dissertations, and unpublished papers were made to locate additional studies.

Studies were included if the majority of children were six years of age or younger and had identified disabilities, the use of one of the five devices listed in Table 1 was the focus of investigation, and effect sizes for the relationships between the assistive technology devices and child outcomes could be computed from information in the research reports. Eight studies in the Campbell et al. (2006) review were excluded from the research synthesis because effect sizes could not be calculated or estimated from information in the primary research reports (Behrmann & Lahm, 1983; Butler, Okamato, & McKay, 1984; Butler, Okamoto, & McKay, 1983; Cook, Liu, & Hoseit, 1990; Hetzroni & Tannous, 2004; McCormick, 1987; Meehan, Mineo, & Lyon, 1985; O'Connor & Schery, 1986).

Search Results

One hundred and nine studies were located that met the inclusion criteria. The studies included 1,342 children 3 to 105 months of age (Mean = 45). Appendix A includes the background characteristics of the children. Sixty-five percent of the children were male and 35% were female.

The largest majority of the children had identified disabilities while some had non-specified developmental disabilities or delays. The identified conditions of the children included pervasive developmental disorders (e.g., Autism), chromosomal aberrations (e.g., Down syndrome), physical disabilities (e.g., Cerebral palsy), spinal cord aberrations (e.g., Spina bifida), speech and language disabilities (e.g., phonological processing disability), sensory disabilities (visual or hearing impairments), non-specified developmental disabilities, and multiple disabilities (any combination of two or more of the above or other conditions). Information in each of the primary studies was used to code the children's severity of intellectual delay as severe/profound, mild/moderate, developmentally delayed (with identified disabilities), or at-risk for poor outcomes because of identified disabilities but without any intellectual delay at the time that the primary studies were conducted.

Table 1
Descriptions of the Five Types of Assistive Technology Devices That Were the Focus of the Research Synthesis

Type of Device	Description
Switch Interface	Use of electromechanical or mechanical switches to allow a child to activate or deactivate a connection between a child's actions and a toy or object to produce an interesting or reinforcing effect.
Powered Mobility	Use of a battery operated wheelchair, riding toy or other type of mobility device that allows a child to move about as independently as possible.
Computer	Use of adapted or non-adapted keyboards, touch screens, a modified mouse and/or computer software that enables children to use a computer for play or learning.
Augmentative Communication	Electronic or non-electronic devices that permit a child to communicate without the use of speech.
Weighted/Pressure Vests	Use of a weighted or pressure vest to provide a child sensory input and to alleviate inattentiveness or stereotypic behavior and to increase child engagement.

Forty-two of the studies employed some type of group research designs and 67 studies used some type of single participant research designs. Three types of group design studies were used: one-group pretest-post test, one-group between conditions (e.g., contingent vs. noncontingent arm movements), or two between group intervention vs. nonintervention experimental or quasi-experimental designs. Four types of single participant designs were used: AB baseline-intervention or pretest-post designs, ABA (ABAB, ABA-CAB, etc.) designs, multiple baseline designs, or alternating treatment designs. The group design studies included 1211 child participants and the single participant design studies included 131 child participants. The specific types of group and single participant designs used in each study are listed in Appendix B.

Appendix B also shows the assistive technology devices that were the focus of investigation and the categorization of the devices according to the types described in Table 1. Forty-three studies were investigations of computer devices, 31 were investigations of switch interface devices, 22 were investigations of augmentative communication devices, 10 were investigations of powered mobility devices, and 7 were investigations of weighted or pressure vests.

The outcome measures in the studies included *in vivo* assessments of child behavior while using the assistive technology devices or changes or improvements on independently administered scales or instruments (e.g., Dunn & Dunn, 1997; Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992; Newborg, 2005). The outcomes were categorized as follows for purposes of data analysis: Cognitive, social, communication (including language), literacy (e.g., reading), motor, adaptive, and behavior engagement. The outcome measures used in the studies and the domains for which they were assigned are shown in Appendix B.

Cohen's *d* effect sizes were used to estimate the influences of the use of the assistive technology devices on the child outcomes. The comparative conditions that were used to evaluate the effects of the technology devices on the child outcomes are shown in Appendix B. The average effect sizes and 95% confidence intervals for the averages were used for substantive interpretation of the synthesis results. The effect sizes for the group design studies were the weighted averages taking into consideration differences in the study sample sizes where more weight was given to results in studies with larger sample sizes. The effect sizes for the single participant design studies were the unweighted averages since all the analyses were for N = 1 study participant. The *Z*-test was used to estimate the strength of the relationships between the independent and dependent variables.

Synthesis Findings

Table 2 shows the average effect sizes, confidence intervals, and *Z*-test results for the relationships between the use of the five types of assistive technology devices and the child outcomes for the group and single participant design studies separately. All the assistive technology devices were associated with changes or improvements in the child outcomes except for weighted or pressure vests. The sizes of effects for the switch interface devices, computer devices, and augmentative communication devices were all large or very large and ranged between $d = 1.03$ and $d = 1.77$ in the group design studies, and ranged between $d = 1.63$ and $d = 2.71$ in the single participant design studies. The sizes of effect for powered mobility devices were medium for the group design studies ($d = .49$) and the single participant design studies was larger ($d = 1.20$). Studies of weighted or pressure vests were excluded from all further analyses since they were not found to be effective devices.

The influences of the assistive technology devices on the

Table 2
Average Effect Sizes, 95% Confidence Intervals (CI), and the Z-Test Results for the Use of the Assistive Technology Devices on the Child Outcomes

	Number					
Type of Device	Studies	Effect Sizes	Mean Effect Sizes	95% CI	*Z*-Test	*p*-value
Group Design Studies						
Switch Interface	5	9	1.04	.79-1.29	8.07	.0000
Computer	32	65	1.03	.96-1.11	26.96	.0000
Augmentative Communication	4	13	1.77	1.41-2.14	9.48	.0000
Powered Mobility	2	7	.49	.22-.75	3.53	.0004
Single Participant Design Studies						
Switch Interface	26	65	1.63	1.38-1.87	13.13	.0000
Computer	11	37	2.07	1.75-2.40	12.62	.0000
Augmentative Communication	18	75	2.71	2.48-2.93	23.46	.0000
Powered Mobility	6	36	1.20	.87-1.53	7.20	.0000
Weighted/Pressure Vests	7	25	.12	-.27-.51	0.59	.5525

different child outcomes for all studies combined are shown in Table 3. The use of the devices was associated with observed changes or improvements in all seven child outcome domains. The average effect sizes were all large or very large except for the child social behavior outcome measures which was nonetheless statistically significant at the p = .0000 level. In all the analyses, the children's use of assistive technology was associated with positive child outcomes.

To be assured that the sizes of effect for the use of the assistive technology devices on the child outcomes were not influenced by combining the data for the group and single participant design studies, we performed the same analyses for the two groups of investigations for outcomes that were examined in at least three studies and for which there were at least three effect sizes. The average effect sizes for the group design studies ranged between d = .64 for child social development and engagement and d = 1.40 for child literacy development, Z_s = 4.39 to 19.51, p_s = .0000. The average effect sizes for single participant design studies ranged between d = .64 for child social development and d = 2.30 for child communication development, Z_s = 2.78 to 22.09, p_s = .0054 to .0000. In both sets of analyses, use of the assistive technology devices was associated with better outcomes in all areas of child functioning.

Figure 1 shows the effectiveness of the use of the assistive technology devices for children at different ages. The results showed, regardless of child age, that the use of the devices was associated with improvements or changes in the child outcomes. The average effect sizes ranged between d = .92 (55-72 months) and d = 1.32 (19-36 months) in the group design studies and ranged between d = 1.24 (19-36 months) and d = 2.48 (55-72 months) in the single participant design studies. All of the effect sizes were large or very large in all eight sets of analyses.

Table 4 shows the relationships between the use of assistive technology for children with different disabilities and the study outcomes. The average effect sizes were medium to very large for the children in the group design studies except for children with speech and language disorders and were very large for the children in the single participant design studies except for children with vision or hearing disabilities. In all of the analyses except for the five children with sensory disabilities in the single participant design studies, the average effect sizes were significant at the p = .0001 to .0000 levels. The results, taken together, showed that the use of the assistive technology devices was effective in terms of changes or improvements in the child outcomes for almost all the children.

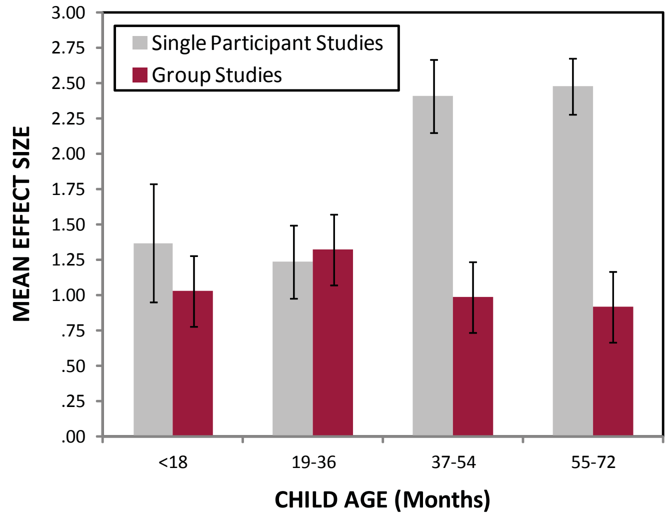

Figure 1. **Average effect sizes and 95% confidence intervals for the relationships between the use of the assistive technology devices and the study outcomes at different child ages.**

The extent to which the effectiveness of the use of the assistive technology differed as a function of severity of child intellectual delay is shown in Figure 2 for the group design studies and in Figure 3 for the single participant design studies. The average effect sizes for the group design studies ranged between d = .60 for the children with severe delays to those at-risk for developmental delays, Z = 3.53, p = .0004, and d = 1.15 for the children with severe and profound delays, Z = 8.39, p = .0000. The average effect sizes for the single participant design studies ranged between d = .95 for

Table 3
Average Effect Sizes, 95% Confidence Intervals (CI) and the Z-test Results for the Relationships Between the Use of the Assistive Technology Devices and the Different Child Outcome Domains

	Number					
Outcome Domain	Studies	Effect Sizes	Mean Effect Size	95% CI	*Z*-Test	*p*-value
Cognitive Development	49	78	1.16	1.06-1.26	22.85	.0000
Social Development	11	28	.64	.45-.82	6.74	.0000
Communication Development	43	123	1.50	1.37-1.63	22.58	.0000
Literacy Development	13	14	1.40	1.26-1.54	19.54	.0000
Adaptive Development	5	10	1.75	1.30-2.19	7.67	.0000
Motor Development	8	24	1.63	1.27-1.99	8.85	.0000
Behavior Engagement	13	30	.84	.60-1.08	6.85	.0000

Table 4
Average Effect Sizes and 95% Confidence Intervals (CI) for the Relationships Between the Use of the Assistive Technology Devices and the Child Outcomes for Children with Different Identified Conditions

Child Condition	Number: Studies	Number: Effect Sizes	Mean Effect Sizes	95% CI	*Z*-Test	*p*-value
Group Design Studies						
Pervasive Developmental Disorders	4	12	.90	.54-1.25	4.94	.0000
Chromosomal Aberrations	2	7	1.77	1.23-2.30	6.47	.0000
Physical Disabilities	4	10	.61	.35-.87	4.59	.0000
Speech/Language Disorders	9	18	.44	.22-.67	3.87	.0001
Sensory Disabilities	2	6	1.64	1.37–1.92	11.72	.0000
Developmental Delay	11	24	.90	.79-1.01	16.50	.0000
Multiple Disabilities	11	17	1.29	1.17-1.41	20.91	.0000
Single Participant Design Studies						
Pervasive Developmental Disorders	10	38	2.11	1.80-2.43	13.03	.0000
Chromosomal Aberrations	9	16	2.59	2.10-3.08	10.37	.0000
Physical Disabilities	17	65	1.67	1.43-1.91	13.48	.0000
Spinal Aberrations	5	17	1.02	.54- 1.49	4.19	.0000
Speech/Language Disorders	3	12	2.78	2.22-3.35	9.63	.0000
Sensory Disabilities	4	5	.64	-.24 -1.52	1.43	.1524
Developmental Delays	9	27	2.86	2.49-3.24	114.87	.0000
Multiple Disabilities	20	33	2.04	1.70 -2.38	11.73	.0000

the children who were at-risk for developmental delays, $Z = 4.86$, $p = .0000$, and $d = 2.26$ for the children with mild and moderate delays, $Z = 11.73$, $p = .0000$. The results, taken together, indicate that the use of the devices was effective for children with any degree of intellectual delay and was especially effective for children demonstrating the most pronounced delays.

Table 5 shows the sizes of effects for the relationships between the use of the assistive technology devices and the child outcomes for the different types of research designs used in the primary research studies. All of the average effect sizes except for the one-group between-conditions comparison studies were large or very large, whereas average effect size for the one-group between-conditions group design studies was medium but nonetheless statistically significant at the $p = .0000$ level. The results showed that regardless of the research design used by the primary study investigators, use of the assistive technology devices were associated with improvements or changes in the child outcomes.

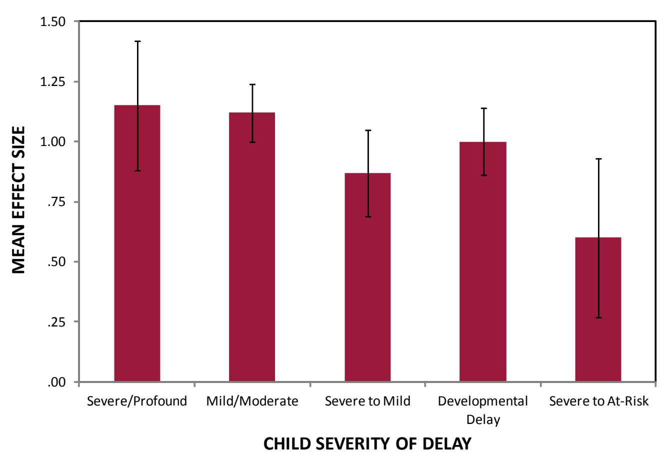

Figure 2. **Average effect sizes and 95% confidence intervals for the relationship between the assistive technology and the child outcomes for different levels of child severity of delay in the group design studies.**

Discussion

Findings from the research synthesis described in this paper indicated that except for weighted or pressure vests, the use of switch interface devices, powered mobility devices, computer devices, and augmentative communication devices with infants, toddlers, and preschoolers with developmental disabilities was associated with changes and improvements in the children's cognitive, social, communication, literacy, adaptive, and motor behavior and development as well as increases in child behavior engagement in different types of learning activities. The influences of the use of assistive technology devices on the child outcomes were manifested

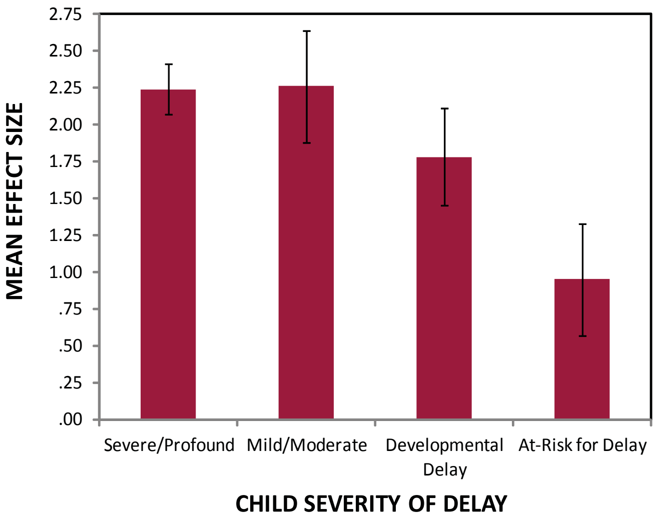

Figure 3. **Average effect sizes and 95% confidence intervals for the relationship between the assistive technology and the child outcomes for different levels of child severity of delay in the single participant design studies.**

for children with different identified disabilities and different severities of intellectual delays. Moreover, the sizes of effects between the use of the devices and changes and improvements in child behavior and development were all medium to very large regardless of the type of research design used by the primary study investigators.

The findings, taken together, indicate that the use of assistive technology devices with young children with disabilities is warranted, and that available evidence indicates that the devices are likely to promote child engagement in typically occurring learning activities and permit children to perform functions that otherwise might prove difficult or even impossible without the use of the devices (Campbell et al., 2006; Mistrett, 2004). Moreover, the disaggregation of the results showed that the sizes of effects between the use of the devices and the child outcomes were maintained regardless of any of the moderator variables. This bolsters the contention that the assistive technology devices were effective when used with infants, toddlers, and preschoolers with disabilities.

Establishing the effectiveness of assistive technology devices, however, is no guarantee that they will be routinely used by either practitioners or parents with young children with disabilities (Wessels, Dijcks, Soede, Gelderblom, & De Witte, 2003). A number of different factors have been identified for nonuse or abandonment of the use of assistive technology with young children with disabilities (e.g., Copley & Ziviani, 2004; Hider, 2000; Lahm & Sizemore, 2002; Moore & Wilcox, 2006). One of these is the failure to use evidence-based training methods to promote practitioners' and parents' understanding of and skills in using different types of assistive technology devices. This was demonstrated in a research synthesis described in Dunst and Trivette (2011) where the failure to use certain training-related practices was associated with nonuse of the assistive technology devices that were the focus of training. One focus of this research synthesis was the extent to which different practices for six different adult learning characteristics (Dunst, Trivette, & Hamby, 2010) were incorporated into training opportunities for promoting practitioners' or parents' use of assistive technology and adaptations with young children with disabilities. Findings showed that large numbers of investigators failed to use evidence-based training procedures. This included a failure of a trainer to adequately demonstrate the use of the devices, insufficient practitioner and parent opportunities to use the devices and receive trainer feedback, and trainer-facilitated practitioner and parent reflection on and self-assessment of their mastery of use of the assistive technology. In contrast, practitioners' and parents' adoption and use of assistive technology was more likely to be demonstrated when at least 4 of the 6 evidence-based practices were explicitly used as part of training afforded end-users.

Recent advances in implementation sciences research

Table 5
Average Effect Sizes and 95% Confidence Intervals (CI) for the Relationships Between the Use of the Assistive Technology Devices and the Child Outcomes for Studies Using Different Research Designs

	Number					
Type of Design	Studies	Effect Sizes	Mean Effect Sizes	95% CI	*Z*-Test	*p*-value
Group Design Studies						
One Group Pre-Post Test	26	57	1.08	1.01-1.16	26.66	.0000
One Group Between Conditions	10	26	.47	.30-.65	5.29	.0000
Between Group Comparisons	7	11	1.34	1.14-1.54	13.19	.0000
Single Participant Design Studies						
AB Designs	25	57	2.11	1.85-2.37	15.95	.0000
ABA Designs	10	32	1.57	1.22-1.91	8.85	.0000
Multiple Baseline Designs	13	66	2.24	2.00-2.48	18.21	.0000
Alternating Treatment Designs	12	58	1.91	1.65-2.16	14.51	.0000

and practice indicate that as much attention needs to be paid to the methods and procedures used by trainers, coaches, and other implementation agents as to the methods and procedures used by intervention agents (e.g., practitioners and parents) if intervention practices (e.g., assistive technology) are to be adopted and used as intended to influence changes or improvements in child outcomes (Dunst, 2012). Future research on promoting the use of assistive technology with young children with disabilities would therefore benefit from explicit attention being paid to the differences between implementation and intervention practices, and how the two are conceptually and procedurally related and in turn would be expected to influence outcomes of interest (Dunst & Trivette, 2012).

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(The studies in the research synthesis are indicated by asterisks)

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Appendix A

Background Characteristics of the Study Participants

Study	Number	Mean Child Age (Months)	Age Range (Months)	Males	Females	Condition	Severity
Alessandri et al. (1993)	36	6	4-8	NR	NR	Developmentally Disabled	DD
Arends et al. (1991)	24	63	48-71	NR	NR	Deaf	S/P
Bernard-Opitz et al. (1999)	3	55	36-65	2	1	P6: Autism P7: Autism P10: Autism	P6: DD P7: DD P10: DD
Binger & Light (2007)	3	49	41-54	1	2	P1: Prader-Willi syndrome P2: DiGeorge syndrome P3: Down syndrome	P1: DD P2: DD P3: DD
Binger et al. (2008a); Binger et al. (2008b)	2	42	49-35	1	1	P1:Phonological process disorder P3: Subpalatal cleft, profound velopharygeal insufficiency	P1: S/P P3: S/P
Binger et al. (2008a); Binger et al. (2009)	1	68	-	0	1	P3: Dysarthria, cerebral palsy	S/P
Blischak (1999)	3	58	55-65	2	1	P2: Speech impairment P4: Down syndrome, speech impairment P5: Speech impairment	P2: S/P P4: S/P P5: S/P
Bottos et al. (2001)	13	63	45-72	4	9	Cerebral palsy	TD, DD, M/M, S/P
Butler (1986)	6	31[a]	23-38	2	4	Myelomeningocele, cerebral palsy, malformation of limbs, arthogryposis multiplex congentia, osteogenesis imperfect (physical disabilities)	TD
Chen et al. (2011)	1	24	-	1	0	Spina bifida	DD
Cosbey & Johnston (2006)	2	49	42-55	0	2	P2: Cerebral palsy, motor and communication delays P3: Cerebral palsy, Pierre-Robin syndrome, agenesis of corpus callosum	P1: S/P P2: S/P
Cyrulik-Jacobs et al. (1975)	10	20	10-27	5	5	Cerebral palsy	S/P
Daniels et al. (1995)	2	32	24-40	1	1	P1: Hydranencephaly, intellectual disability, unqualified visual loss P2: Multicystic encephalomalaia, cerebral palsy, intellectual disability	P1: S/P P2: M/M
Deitz et al. (2002)	2	60	60-60	1	1	P1: Spastic quadriplegia, developmental delay P2: Spastic quadriplegia, developmental delay	P1:DD P2:DD
Deris et al. (2006)	1	48	-	1	0	Autism	M/M
DiCarlo & Banajee (2000)	2	26	24-28	2	0	P1: Chromosomal abnormality P2: Angelman syndrome	P1: S/P P2: S/P
Durand (1999) (Studies 2 & 3)	2	54	42-66	2	0	P1:Cerebral Palsy P3:Cognitive impairment	P1:M/M P3:S/P
Ferrier et al. (1996)	1	5	-	1	0	Motor disability	M/M
Fertel-Daly et al. (2001)	5	34	31-37	3	2	P1,2,3,4,5: Pervasive developmental disorder P5: Autism	M/M
Friedlander et al. (1967)	2	34	30-42	2	0	P1: Down syndrome P2: Developmental delays	S/P
Friedlander & Whitten (1970)	1	18	-	0	1	Profoundly hearing impaired, Rubella	M/M
Friedlander et al. 1975	1	11	-	0	1	Perinatal asphyxia, suspected hearing/ language disability	DD

Appendix A, continued

Study	Number	Mean Child Age (Months)	Age Range (Months)	Males	Females	Condition	Severity
Glenn & Cunningham (1983)	10	19	-	5	5	Down syndrome	S/P
Glenn & Cunningham (1984)	2	60	57-63	2	0	P2: Cerebral palsy P7: Fahr's syndrome	P2: S/P P7: S/P
Hanson & Hanline (1985) (Study 1)	1	19	-	0	1	Spastic quadriplegia, seizure disorder	S/P
Hanson & Hanline (1985) (Study 2)	1	8	-	1	0	Down syndrome, visual impairment, auditory impairment	S/P
Harris et al. (1996)	1	60	-	1	0	Developmental verbal apraxia, language and motor delay	M/M
Horn & Warren (1987)	2	21	17-24	2	0	(Multiply disabled) P1: Methlymalonic academia P2: Cerebral hypotonia	P1: S/P P2: S/P
Horn et al. (1992)	6	40	16-60	5	1	(Multiply disabled) P1: Cerebral palsy P2: Cerebral palsy P3: Cerebral palsy P4: Cerebral palsy P5: Cerebral palsy P6: Cerebral palsy	P1: S/P P2: S/P P3: S/P P4: S/P P5: S/P P6: S/P
Howard et al. (1996) (Group 1, Toddler)	8	27	18-36	NR	NR	Speech/language delays, physical impairments, and/or cognitive disability	M/M
Howard et al. (1996) (Group 2, Preschooler)	29	48	36-60	NR	NR	Speech/language delays, physical impairments, and/or cognitive disability	M/M
Hutinger et al. (1998)	151	48	36-72	95	56	Mild to moderate disabilities	M/M
Hutinger et al. (2000); Hutinger & Johanson (2000)	15	48	36-60	NR	NR	Multiple systems disorder (MSD), pervasive developmental disorder, learning disabled, speech impaired, visually impaired, cognitive disability	M/M S/P
Hutinger et al. (2002a) (Year 2, Early Childhood/ Special Education)	33	36	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002a) (Year 2, Pre-Kindergarten)	72	48	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002a) (Year 2, Inclusive)	28	48	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002a) (Year 2, Pre-Kindergarten/ Kindergarten)	16	60	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002a) (Year 2, Pre-Kindergarten/ 1st Grade)	12	66	NR	NR	NR	Mild to moderate disabilities/typically developing	M/M TD
Hutinger et al. (2002a) (Year 3, Early Childhood/ Special Education)	42	36	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002a) (Year 3, Pre-Kindergarten)	41	48	NR	NR	NR	Mild to moderate disabilities	M/M
Hutinger et al. (2002b) (Year 2)	36	48	36-60	NR	NR	Developmental delay, speech and language impairment	DD
Huntinger et al. (2002b) (Year 3)	36	48	36-60	NR	NR	Developmental delay, speech and language impairment	DD
Hutinger et al. (2002b) (Year 4)	58	48	36-60	NR	NR	Developmental delay, speech and language impairment	DD
Hutinger et al. (2002b) (Year 5)	68	48	36-60	NR	NR	Developmental delay, speech and language impairment	DD

Appendix A, continued

Study	Number	Mean Child Age (Months)	Age Range (Months)	Males	Females	Condition	Severity
Hutinger et al. (2005); Hutinger et al. (2006) (Year 1, Disabled)	41	42	36-48	NR	NR	Developmental delay, speech and language impairment, autism, cerebral palsy, Down syndrome, learning disabilities, social emotional conditions	DD
Hutinger et al. (2005); Hutinger et al. (2006) (Year 2, Disabled)	55	42	36-48	NR	NR	Developmental delay, speech and language impairment, autism, cerebral palsy, Down syndrome, learning disabilities, social emotional conditions	DD
Hutinger et al. (2005); Hutinger et al. (2006) (Year 3, Disabled)	60	42	36-48	NR	NR	Developmental delay, speech and language impairment, autism, cerebral palsy, Down syndrome, learning disabilities, social emotional conditions	DD
Iacono et al. (1993)	2	48	42-54	2	0	P1: Intellectual disability P2: Down syndrome	P1: M/M P2: M/M
Iacono & Duncum (1995)	1	56	-	0	1	Down syndrome, mild hearing impairment	DD
Johnston et al. (2003)	2	47	39-54	1	1	P2: Cerebral palsy, developmental delays P3: Multiple disabilities	P2: M/M P3: S/P
Jones et al. (2003)	1	20	-	0	1	Spinal muscular atrophy	S/P
Kennedy & Haring (1993) (Study 2)	1	71	-	0	1	P4: Spastic quadriparesis, hydrocephalus	S/P
Kent-Walsh et al. (2010)	3	65	60-71	2	1	P2: Down syndrome P3: Cerebral palsy P6: Down syndrome	P2: S/P P3: S/P P6: S/P
Koppenhaver et al. (2001a); Koppenhaver (2001b); Skotko et al. (2004)	4	63	43-84	0	4	Rett syndrome	S/P
Lancioni et al. (2008)	1	36	-	1	0	Intellectual disability, spastic tetraparesis, visual impairment, lack of speech	S/P
Lancioni & Lems (2001)	1	48	-	1	0	West syndrome, cortical dysplasia, epilepsy, hypotonia, generalized psychomotor delay, intellectual disability	S/P
Lancioni et al. (2004) (Study 2)	1	62	-	1	0	Cerebropathy, minimal residual vision, spastic tetraparesis, lack of speech, intellectual disability	S/P
Lancioni et al. (2007a)	1	62	-	0	1	Encephalopathy, motor impairment, epilepsy, absence of speech, visual impairment	S/P
Lancioni et al. (2007b)	1	48	-	0	1	Congential cerebropathy with pervasive motor impairment, lack of speech, intellectual disability	S/P
Lancioni et al. (2010a)	1	67	-	1	0	Encephalopathy, spastic tetraparesis, dystonic movements, intellectual disability	S/P
Lancioni et al. (2009)	1	49	-	1	0	Intellectual disability, epilepsy	S/P
Lancioni et al. (2010b)	1	67	-	1	0	Encephalopathy, intellectual disability, visual impairment, epilepsy, spastic tetraparesis	S/P
Lehrer et al. (1986) (Samples 1 and 2)	72	47	31-57	NR	NR	Speech or language impaired, language delayed	DD
Lehrer & deBernard (1987) (Study 2) (Samples 1 and 2)	26	47	31-57	18	8	Speech or language impaired, language delayed	DD
Lehrer & deBernard (1987) (Study 2) (Samples 1 and 3)	25	47	31-57	17	8	Speech or language impaired, language delayed	DD

Appendix A, continued

Study	Number	Mean Child Age (Months)	Age Range (Months)	Males	Females	Condition	Severity
Light (1993)	1	59	-	0	1	Cerebral palsy, language delay, seizure disorder	S/P
Lynch et al. (2009)	1	7	-	1	0	Spina bifida	DD
Mar & Sall (1993)	1	40	-	1	0	Cerebral palsy, cortical visual impairment, bilateral hearing impairment	S/P
Mistrett et al. (1994)	5	48	48-48	2	3	P1: Physical disabilities P2: Physical disabilities P3: Physical disabilities P4: Muscular dystrophy P5: Developmental delay	P1: TD P2: TD P3: TD P4: TD P5: DD
Myles et al. (2004)	2	63	59-67	1	1	P1: Autism P3: Autism	M/M
Moore & Calvert (2000)	14	54[a]	36-72	12	2	Autism	DD
O'Brien et al. (1994)	7	28	3-48	5	2	P1: Cerebral palsy, visual impairment, motor impairment P2: Killian Pallister's syndrome, motor impairment, visual impairment P3:Down syndrome P4: CHARGES syndrome, motor, visual, and auditory impairment P5: Cornelia de Lange syndrome, motor impairment P6: Neonatal encephalopathy, motor impairment P7:Mild auditory impairment	P1: S/P P2: S/P P3:S/P P4: S/P P5: S/P P6: S/P P7:S/P
Olive et al. (2007)	3	53	45-66	3	0	P1: Pervasive developmental disorder not otherwise specified P2: Autism P3: Autism	P1: S/P P2: S/P P3: S/P
Olive et al. (2008)	1	48	-	0	1	Autism	S/P
Parsons & La Sorte (1993)	3	62	56-68	3	0	P1: Autism P2: Autism P3:Autism	P1: S/P P2: M/M P3: M/M
Prinz et al. (1985)	30	64	38-81	18	12	Hearing impairment	MM-S/P
Quigley et al. (2011)	2	60	48-72	2	0	P1: Aspergers/ADHD P3: Autism	M/M
Ragonesi et al. (2010)	1	36	-	1	0	Cerebral Palsy	S/P
Ramey et al. (1972)	2	11	7-14	1	1	Failure to thrive	M/M
Reichow et al. (2009)	1	57	-	1	0	Developmental delay, cognitive, language, and fine motor impairments,	M/M
Reichow et al. (2010)	2	5	48-60	2	0	P2:Developmental delays, neurological abnormalities P3:Autism, neurological abnormalities	P2:M/M P3:S/P
Romski et al. (2009) (Sample 2)	3	32	24-38	3	0	Autism, pervasive developmental disorder not otherwise specified	M/M S/P
Romski et al. (2010)	41	30	21-40	28	13	Down syndrome, seizure disorder, cerebral palsy	M/M
Ruscello et al. (1993) (Sample 2)	6	61	49-68	4	2	Phonological processing disability	M/M
Schepis et al. (1996; 1998)	4	48	36-60	3	1	P1: Autism P2: Autism P3: Autism P4: Autism	P1: S/P P2: S/P P3: S/P P4: S/P
Schweigert & Rowland (1992)	1	36	-	1	0	P1: Cerebral palsy, seizure disorder, visual impairment suspected hearing loss	P1: S/P
Sevcik et al. (2004)	1	48	-	1	0	Developmental delay, seizure disorder	S/P

Appendix A, continued

Study	Number	Mean Child Age (Months)	Age Range (Months)	Males	Females	Condition	Severity
Shimizu & McDonough (2006)	3	48	48-48	2	1	Developmental disabilities	DD
Shimizu et al. (2010)	5	52	46-62	5	0	Developmental disabilities (moderate-severe language delays, intellectual disability, and/ or autistic like tendencies)	P1: DD P2: S/P P4: M/M P6: S/P P7: S/P
Shriberg et al. (1989) (Study 1)	9	58	44-101	8	1	Speech/language impairment	M/M S/P
Shriberg et al. (1989) (Study 2)	9	70	42-105	6	3	Speech/language impairment	M/M S/P
Shriberg et al. (1990) (Study 1)	9	52	35-77	7	2	Speech delayed	M/M S/P
Shriberg et al. (1990) (Study 2)	6	63	50-89	5	1	Speech delayed	M/M S/P
Shull et al. (2004)	1	72	-	0	1	Multiply disabled, intellectual impairment, spastic quadriplegia, cortical blindness	S/P
Sigafoos et al. (2003)	2	42	36-48	2	0	P1: Leber's Congential Amaurosis, blindness, autistic-like behaviors P3: Autism	P1: S/P P3: S/P
Son et al. (2006)	3	48	36-65	2	1	P1: Autism P2: Autism P3: Pervasive developmental disorder	P1: DD P2: DD P3: DD
Spiegel-McGill et al. (1989)	4	59	55-62	3	1	P1: Multiple impairments (speech, orthopedic) P2: Multiple impairments (speech, orthopedic) P3: Orthopedic impairment P4: Orthopedic impairment	P1: S/P P2: S/P P3: TD P4: TD
Sullivan & Lewis (1990) (Participant 1)	1	NA	NA	NA	NA	Down syndrome	S/P
Sullivan & Lewis(2000)	2	11	10-11	1	1	P1: Spastic, blind, highly irritable P2: Severely cystic spinal cord	P1: M/M P2: S/P
Tefft et al. (2011)	23	40	18-72	NR	NR	Cerebral palsy, Orthopedic disabilities	S/P
Thomas-Stonell et al. (1991)	1	60	-	1	0	Dysarthria, myotonic dystrophy	S/P
Thunberg et al. (2009)	2	63	59-66	2	0	P3: Pervasive developmental disorder, dyspraxia P4: Pervasive developmental disorder, hyperactivity syndrome, dyspraxia	P3: DD P4: DD
Tjus et al. (1998)	1	59	-	1	0	Autism	DD
Tota et al. (2006)	1	56	-	1	0	Abnormalities of the pons, facial asymmetry, mandible hypoplasia, deformity of left ear, agenesis of the external right ear, hearing loss, spastic tetraparesis with pervasive motor impairment, gastrostomy tube	S/P
Trembath et al. (2009)	3	48	36-60	3	0	P1: Autism P2: Autism P3: Autism	DD
Van Acker & Grant (1995)	1	62	-	0	1	Rett syndrome	S/P
VandenBerg (2001)	1	69	-	1	0	Attention deficit disorder with hyperactivity	M/M
Whalen et al. (2010)	24	42[a]	36-48	NR	NR	Autism	M/M S/P
Williams et al. (2002)	8	55	37-69	NR	NR	Autism	M/M

[a] = Median.
NR= Not reported.

Appendix B

Research Designs, Types of Assistive Technology, Outcome Measures, and Cohen's d Effect Sizes for the Relationships Between Use of the Assistive Technology Devices and the Child Outcomes

Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison	Effect Size
Alessandri et al. (1993)	One group ABCB	Switch operated by arm-pull	Switch interface device	Number of arm-pulling behaviors	Cognitive	Pretest vs. post-test	1.76
				Composite frequency of emotional behaviors: interest, joy, surprise	Social	Pretest vs. post-test	1.00
				Composite frequency of emotional behaviors: sadness, anger, fear, crying/fussing	Social	Pretest vs. post-test	-.02 (reversed)
Arends et al. (1991)	Experimental vs. control	Computer controlled visual speech apparatus and computer games to develop basic speech skills related to voice control	Computer	Scores on subtests I (voice and breath control) of the CID Phonetic Inventory	Communication	Post-test difference	.96
				Scores on subtests II (vowels and diphthongs) of the CID Phonetic Inventory	Communication	Post-test difference	1.05
Bernard-Opitz et al. (1999)	Single participant simultaneous treatment	Computer assisted instruction	Computer	Mean percentage of imitation when performing tasks with trainer	Communication	Between conditions	P6 -.16 P7 1.43 P10 1.06
				Mean percentage of imitation when performing tasks with mother	Communication	Between conditions	P6 .24 P7 1.81 P10 1.16
Binger & Light (2007)	Single participant multiple probe	Voice output communication aids	Augmentative and alternative communication device	Frequency of multi-symbol messages within set A play scenarios	Communication	Baseline vs. intervention	P1 5.66 P2 3.39 P3 1.79
Binger et al. (2008a); Binger et al. (2008b)	Single participant multiple probe	Voice output communication aids	Augmentative and alternative communication device	Frequency of multi-symbol messages produced with set A books	Communication	Baseline vs. intervention	P1 4.76 P3 2.28
				Frequency of aided ACC symbols selected	Communication	Baseline vs. intervention	P1 4.54 P3 3.31
				Frequency of spontaneous aided AAC symbols selected	Communication	Baseline vs. intervention	P1 4.61 P3 2.06
				Frequency of symbols vocalized	Communication	Baseline vs. intervention	P1 2.45 P3 -.05
Binger et al. (2008a); Binger et al. (2009)	Single participant multiple probe	Voice output communication aides	Augmentative and alternative communication device	Frequency of different multi-symbol messages produced	Communication	Baseline vs. intervention	P3 2.09
				Frequency of aided AAC symbols selected	Communication	Baseline vs. intervention	P3 2.42
				Frequency of spontaneous aided AAC symbols selected	Communication	Baseline vs. intervention	P3 1.89
				Frequency of syllables vocalized	Communication	Baseline vs. intervention	P3 -.13

Appendix B, continued

Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison	Effect Size
Blischak (1999)	One group pre-post	Synthetic speech (graphic symbols with VOCA)	Augmentative and alternative communication device	Percentage of natural speech productions	Communication	Pretest vs. post-test	2.41
Bottos et al. (2001)	One group pre-post	Powered wheelchair	Powered mobility device	Changes in IQ Performance score (Leiter International Performance Scale)	Cognitive	Pretest vs. post-test	.12
				Changes in Verbal IQ score (Peabody Development Verbal Scale)	Communication	Pretest vs. post-test	.14
				Change in gross motor behavior score (Gross Motor Functional Measure)	Motor	Pretest vs. post-test	-.10
				Changes in performance of activities of daily life score (Canadian Occupational Performance Measure)	Adaptive Behavior	Pretest vs. post-test	1.41
				Changes in parents satisfaction with their child's activities of daily life score (Canadian Occupational Performance Measure)	Adaptive Behavior	Pretest vs. post-test	.73
Butler (1986)	Single participant multiple baseline	Powered mobility device	Powered mobility device	Frequency of self-initiated movement	Motor	Baseline vs. intervention	P1 2.30 P2 5.82 P3 1.43 P4 1.85 P5 2.45 P6 2.50
				Frequency of self-initiated communication	Communication	Baseline vs. intervention	P1 -1.36 P2 1.34 P3 -1.94 P4 .87 P5 -3.40 P6 .74
Butler (1986), continued				Frequency of self-initiated interaction with objects	Engagement	Baseline vs. intervention	P1 1.58 P2 2.43 P3 -1.43 P4 -.04 P5 .63 P6 2.23
Chen et al. (2011)	Single participant ABAB	Powered mobility device with force field detection training	Powered mobility device	Frequency of errors from the reference path	Motor	Baseline vs. intervention	.81 (reversed)
				Duration of travel through reference path	Motor	Baseline vs. intervention	.46 (reversed)
Cosbey & Johnston (2006)	Single participant multiple baseline	Voice output communication aids	Augmentative and alternative communication device	Frequency of independent unprompted VOCA use	Communication	Baseline vs. intervention	P2 2.80 P3 1.17
Cyrulik-Jacobs et al. (1975)	One group between conditions	Playtest contingency toy	Switch interface device	Response duration in seconds for contingency preference of music vs. hum	Cognitive	Between conditions	3.14

Appendix B, continued

Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Daniels et al. (1995)	Single participant alternating treatment with baseline	Switch-activated computer programs	Switch interface device	Composite frequency of independent switch activations	Cognitive	Baseline vs. intervention	P1 P2	2.47 2.16
				Composite frequency of orientation and attention to stimulus	Engagement	Baseline vs. intervention	P1 P2	4.71 2.02
		Switch-activated toys	Switch interface device	Composite frequency of independent switch activations	Cognitive	Baseline vs. intervention	P1 P2	1.36 1.13
				Composite frequency of orientation and attention	Engagement	Baseline vs. intervention	P1 P2	1.67 .82
Deitz et al. (2002)	Single participant ABAB	Powered mobility device	Powered mobility device	Frequency of child-initiated movement	Motor	Baseline vs. intervention	P1 P2	5.61 4.30
Deris et al. (2006)	Single participant AB	"Huggie" pressure vest	Pressure vest	Percentage of observed intervals with self-stimulatory behaviors	Adaptive	Baseline vs. intervention		.05 (reversed)
				Percentage of observed intervals with attention to task	Engagement	Baseline vs. intervention		1.01
		"Weighted" pressure vest	Pressure vest	Percentage of observed intervals with self-stimulatory behaviors	Adaptive	Baseline vs. intervention		-.12
				Percentage of observed intervals with attention to task	Engagement	Baseline vs. intervention		1.33
DiCarlo & Banajee (2000)	Single participant multiple baseline	Voice output communication aid	Augmentative and alternative communication device	Percentage of intervals with specific initiated communicative behavior	Communication	Baseline vs. intervention	P1 P2	2.21 2.80
				Percentage of intervals of unprompted communication in the classroom	Communication	Baseline vs. Intervention	P1 P3	3.17 2.91
				Percentage of intervals of non-challenging behavior in the community	Adaptive	Baseline vs. Intervention	P1 P3	6.17 3.04
				Percentage of intervals of unprompted communication in the community	Communication	Baseline vs. Intervention	P1 P3	2.25 3.02
Ferrier et al. (1996)	Single participant AB	Baby-babble-blanket switch interface	Switch interface device	Frequency of switch activations per minute	Cognitive	Baseline vs. intervention		1.22
Fertel-Daly et al. (2001)	Single participant ABA	Weighted vest	Pressure vest	Duration of focused attention	Engagement	Baseline vs. intervention	P1 P2 P3 P4 P5	.38 .33 1.22 1.03 1.15
				Duration of self stimulatory behaviors	Adaptive	Baseline vs. intervention	P1 P2 P3 P4 P5	.84 -.65 -1.19 -2.08 -1.17
Friedlander et al. (1967)	Single participant AB	Playtest contingency toy Organ scale sound vs. chime sound	Switch interface design	Duration of responses	Cognitive	Between conditions	P1 P2	.87 .87

Appendix B, continued

Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison	Effect Size
Friedlander & Whitten (1970)	Single participant AB	Playtest contingency toy High level vs. low level	Switch interface design	Average listening response time	Cognitive	Between conditions	.44
Friedlander et al. (1975)	Single participant AB	Playtest contingency toy High redundancy vs. Low redundancy	Switch interface design	Average response duration	Cognitive	Between conditions	.60
Glenn & Cunningham (1983)	One group between conditions	Manipulative devices, contingent with children's rhyme vs. contingent with tone	Switch interface device	Average duration per response	Cognitive	Between conditions	4.67
		Manipulative devices, contingent with baby talk vs. contingent with adult talk	Switch interface device	Average duration per response	Cognitive	Between conditions	1.07
Glenn & Cunningham (1984)	One group between conditions	Switch Non-contingent vs. contingent	Switch interface device	Response frequency	Cognitive	Between conditions	1.14
				Response duration	Cognitive	Between conditions	1.13
Hanson & Hanline (1985) (Study 1)	Single participant ABA reversal	Kick switch	Switch interface device	Frequency of kicking responses	Cognitive	Baseline vs. intervention	1.21
		Frequency of vocalizing	Social			Baseline vs. intervention	-1.37
Hanson & Hanline (1985) (Study 2)	Single participant ABABA reversal	Hand-depressed switch	Switch interface device	Frequency of panel depressions	Cognitive	Baseline vs. intervention	1.99
				Frequency of vocalizing	Social	Baseline vs. intervention	.28
				Frequency of smiling	Social	Baseline vs. intervention	1.52
Harris et al. (1996)	Single participant AB design	Computer software with a book reading activity and a guessing game	Computer	Percentage of correct constituents per trial in book reading context	Communication	Baseline vs. intervention	3.60
				Percentage of correct constituents per trial in guessing game context	Communication	Baseline vs. intervention	3.14
Horn & Warren (1987)	Single participant multiple probe	Computer with multiple switches and devices	Switch interface device	Percentage of sitting (4-position mercury switch activation), pulling (pull switch activation), kneeling (light beam switch activation) in experimental situation	Motor	Baseline vs. intervention	P1 3.05
						Baseline vs. intervention	P2 3.39
Horn et al. (1992)	Single participant ABAB multi-treatment design	Computer with multiple switches and devices	Switch interface device	Percentage of intervals during which child was engaged	Engagement	Baseline vs. intervention	P1 1.04 P2 2.09 P3 1.96 P4 1.69 P5 1.32 P6 .85

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Study	Study Design	Engagement rating	Engagement	Child Outcomes	Domain	Comparison		Effect Size
Horn et al. (1992), continued		Positive affect rating	Social	Percentage of intervals during which child was performing target motor behavior	Motor	Baseline vs. intervention	P1 P2 P3 P4 P5 P6	1.45 1.60 1.92 1.02 1.03 1.64
Howard et al. (1996) (Group 1, Toddler)	One group between conditions	Computer	Computer	Social play rating	Social	Between conditions		1.62
				Communication scale rating	Communication	Between conditions		-2.69
				Engagement rating	Engagement	Between conditions		2.6
				Positive affect rating	Social	Between conditions		.96
Howard et al. (1996) (Group 2, Preschooler)	One group between conditions	Computer	Computer	Social play rating	Social	Between conditions		.47
				Communication scale rating	Communication	Between conditions		-.65
				Engagement rating	Engagement	Between conditions		1.27
				Positive affect rating	Social	Between conditions		.93
Hutinger et al. (1998)	Experimental vs. control	Interactive Technology Literacy Curriculum (ITLC) Focused on computers with switches, touch tablets, adaptive keyboards, AAC devices, alternative input devices, amplified sound, visual reinforcement	Computer	Behavior Interaction Tool scores	Cognitive	Post-test difference		1.76
				Informal Literacy Assessment scores	Literacy	Post-test difference		1.79
Hutinger et al. (2000); Hutinger & Johanson (2000)	One group pre-post	ECCTS project- Focused on computers with touch screens, switches, switch holders and mounts, adaptive keyboards, and other assistive device + interactive software	Computer	Brigance Diagnostic Inventory of Early Development	Cognitive	Pretest vs. Post-test		1.10
Huntinger et al. (2002a) (Year 2, Early Childhood/ Special Education)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Early Childhood/Special Education	Literacy	Pretest vs. post-test		1.90
				Behavior Interaction Tool-modified Early childhood/Special Education	Cognitive	Pretest vs. post-test		1.16
Huntinger et al. (2002a) (Year 2, Pre-Kindergarten)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Pre-Kindergarten	Literacy	Pretest vs. post-test		.82
				Behavior Interaction Tool-modified Pre-Kindergarten	Cognitive	Pretest vs. post-test		.80

Appendix B, continued

Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison	Effect Size
Huntinger et al. (2002a) (Year 2, Inclusive)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Inclusive	Literacy	Pretest vs. post-test	1.31
				Behavior Interaction Tool-modified Inclusive	Cognitive	Pretest vs. post-test	2.58
Huntinger et al. (2002a) (Year 2, Pre-Kindergarten/ Kindergarten)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Pre-Kindergarten/ Kindergarten	Literacy	Pretest vs. post-test	1.35
Huntinger et al. (2002a) (Year 2, Pre-Kindergarten/ 1st Grade)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Behavior Interaction Tool-modified Pre-Kindergarten/ 1st Grade	Cognitive	Pretest vs. post-test	2.00
Huntinger et al. (2002a) (Year 3, Early Childhood/ Special Education)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Early Childhood/Special Education	Literacy	Pretest vs. post-test	1.17
				Behavior Interaction Tool-modified Early Childhood/Special Education	Cognitive	Pretest vs. post-test	1.10
Huntinger et al. (2002a) (Year 3, Pre-Kindergarten)	One group pre-post	LitTECH Interactive Outreach project- Focused on teaching how to use technology to promote early literacy	Computer	Informal Literacy Assessment-modified Pre-Kindergarten	Literacy	Pretest vs. post-test	.97
				Behavior Interaction Tool-modified Pre-Kindergarten	Cognitive	Pretest vs. post-test	1.06
Huntinger et al. (2002b) (Year 2)	One group pre-post	Interactive Technology Literacy Curriculum (ITLC) Focused on computers with switches, touch tablets, adaptive keyboards, AAC devices, alternative input devices, amplified sound, visual reinforcement	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test	.99
Huntinger et al. (2002b) (Year 3)	One group pre-post	Interactive Technology Literacy Curriculum (ITLC) Focused on computers with switches, touch tablets, adaptive keyboards, AAC devices, alternative input devices, amplified sound, visual reinforcement	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test	1.20
				Informal Literacy Assessment	Literacy	Pretest vs. post-test	3.35

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Huntinger et al. (2002b) (Year 4)	One group pre-post	Interactive Technology Literacy Curriculum (ITLC) Focused on computers with switches, touch tablets, adaptive keyboards, AAC devices, alternative input devices, amplified sound, visual reinforcement	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test		1.06
				Informal Literacy Assessment	Literacy	Pretest vs. post-test		1.32
Huntinger et al. (2002b) (Year 5)	One group pre-post	Interactive Technology Literacy Curriculum (ITLC) Focused on computers with switches, touch tablets, adaptive keyboards, AAC devices, alternative input devices, amplified sound, visual reinforcement	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test		1.05
				Informal Literacy Assessment	Literacy	Pretest vs. post-test		1.58
Huntinger et al. (2005); Hutinger et al. (2006) (Year 1, Disabilities)	One group pre-post	EliteC model- Focused on teaching how technologies can provide access to literacy activities	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test		.31
Huntinger et al. (2005); Hutinger et al. (2006) (Year 2, Disabilities)	One group pre-post	EliteC model- Focused on teaching how technologies can provide access to literacy activities	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test		.34
Huntinger et al. (2005); Hutinger et al. (2006) (Year 3, Disabilities)	One group pre-post	EliteC model- Focused on teaching how technologies can provide access to literacy activities	Computer	Behavior Interaction Tool	Cognitive	Pretest vs. post-test		.62
Iacono et al. (1993)	Single participant multiple baseline alternating treatments	Voice output communication aid	Augmentative and alternative communication device	Frequency of correct spontaneous/ manded productions of two-word combinations (Possessor + object possessed)	Communication	Baseline vs. intervention	P1 P2	1.62 .93
				Frequency of correct spontaneous/ manded productions of two-word combinations (Attribute and entity)	Communication	Baseline vs. intervention	P1 P2	2.22 1.22
				Frequency of correct spontaneous/ manded productions of two-word combinations (Action and object)	Communication	Baseline vs. intervention	P1	1.85
				Frequency of correct spontaneous/ manded productions of two-word combinations (Entity and location)	Communication	Baseline vs. intervention	P2	1.35
Iacono & Duncum (1995)	Single participant alternating treatments	Voice output communication aid Sign language	Augmentative and alternative communication device	Frequency of spontaneous and responsive words and word combinations produced	Communication	Baseline vs. intervention		1.51

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Iacono & Duncum (1995), continued				Frequency of different spontaneous and responsive words and word combinations produced	Communication	Baseline vs. intervention		2.08
Johnston et al. (2003)	Single participant multiple probe	Voice output communication aid	Augmentative and alternative communication device	Percent correct use of symbolic communication using VOCA or verbal language	Communication	Baseline vs. intervention	P2 P3	3.35 .94
Jones et al. (2003)	Single participant AB	Powered mobility device	Powered mobility device	Battelle Developmental Inventory score (Personal-social)	Social	Pretest vs. post-test		1.00
				Battelle Developmental Inventory score (Adaptive)	Adaptive	Pretest vs. post-test		.38
				Battelle Developmental Inventory score (Motor)	Motor	Pretest vs. post-test		.38
				Battelle Developmental Inventory score (Communication)	Communication	Pretest vs. post test		1.56
				Battelle Developmental Inventory score (Cognitive)	Cognitive	Pretest vs. post test		.92
				Pediatric Evaluation of Disability Inventory score (Self-care)	Adaptive	Pretest vs. post test		.23
				Pediatric Evaluation of Disability Inventory score (Mobility)	Motor	Pretest vs. post test		1.25
				Pediatric Evaluation of Disability Inventory score (Social Function)	Social	Pretest vs. post test		.55
Kennedy & Haring (1993) (Study 2)	Single participant alternating treatments multiple probe	Micro-switch device	Switch interface device	Frequency of switch activations with stimulus item present	Cognitive	Baseline vs. intervention	P4	1.19
				Percentage of time engaged with stimuli	Engagement	Baseline vs. intervention	P4	-.34
Kent-Walsh et al. (2010)	Single participant AB	Speech-generating device	Augmentative and alternative communication device	Number of communicative turns	Communication	Baseline vs. intervention	P2 P3 P6	22.42 10.21 4.07
				Number of different semantic concepts used	Communication	Baseline vs. intervention	P2 P3 P6	7.08 7.67 6.01
Koppenhaver et al. (2001a); Koppenhaver et al. (2001b); Skotko et al. (2004)	One group pre-post	Speech-generating device	Augmentative and alternative communication device	Frequencies of children's successful symbolic communication acts per phase with unfamiliar storybooks	Communication	Pretest vs. post-test		2.29
				Frequencies of children's successful symbolic communication acts per phase with unfamiliar storybooks	Communication	Pretest vs. post-test		1.91
				Frequencies of children's labels and comments per phase with familiar storybooks	Communication	Pretest vs. post-test		1.57

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Koppenhaver et al. (2001a); Koppenhaver et al. (2001b); Skotko et al. (2004), continued				Frequencies of children's labels and comments per phase with unfamiliar storybooks	Communication	Pretest vs. post-test		1.13
				Percentage of VOCA during communication exchange use	Communication	Pretest vs. post-test		1.75
Lancioni et al. (2008)	Single participant AB	Optic micro-switch activated by walking	Switch interface device	Mean frequencies of step responses	Cognitive	Baseline vs. intervention	P1	2.47
Lancioni & Lems (2001)	Single participant AB	Vocalization activated switch	Switch interface device	Mean frequency of vocalization responses per minute	Communication	Baseline vs. intervention	P2	3.37
Lancioni et al. (2004) (Study 2)	Single participant AB	Pressure-activated and vocalization-activated micro-switches	Switch interface device	Mean frequencies of responding with hand	Cognitive	Baseline vs. intervention	P1	8.13
Lancioni et al. (2007a)	Single participant AB	Hand closure activated switch	Switch interface device	Mean frequency of hand responses	Cognitive	Baseline vs. intervention	P1	1.86
Lancioni et al. (2007b)	Single participant AB	Upward eyelid movement-activated switch	Switch interface device	Mean frequency of eyelid responses	Cognitive	Baseline vs. intervention	P2	1.99
Lancioni et al. (2010a)	Single participant AB	Switch detecting pushing, pulling, or turning objects with both hands (recognized manipulation of objects and both of participants' hands on objects via magnetic sensors)	Switch interface device	Mean frequency of object manipulation responses	Cognitive	Baseline vs. intervention	P1	8.25
Lancioni et al. (2009)	Single participant AB	Hand push and on wheelchair microswitch	Switch interface device	Mean frequency of hand-pushing responses	Cognitive	Baseline vs. intervention	P1	8.19
				Mean session time free from problem behavior	Adaptive	Baseline vs. intervention	P1	2.48
Lancioni et al. (2010b)	Single participant AB	Microswitches affixed to walkers (to sense children's steps)	Switch interface device	Mean frequency of step responses	Cognitive	Baseline vs. intervention	P1	4.35
Lehrer et al. (1986)	Experimental vs control	Skills development software	Computer	Problem-solving score	Cognitive	Post-test difference		.41
Lehrer & DeBernard (1987) (Study 2, Samples 1 and 2)	Experimental vs control	Skills development software	Computer	Preschool Language Assessment Instrument score	Communication	Post-test difference		1.42
Lehrer & DeBernard (1987) (Study 2, Samples 1 and 3)	Experimental vs control	Logo environment with robot	Computer	Preschool Language Assessment Instrument score	Communication	Post-test difference		2.88
Light (1993)	Single participant AB	Automatic linear scanning with a head-mounted single switch to access a computer	Computer	Frequency of correct responses	Cognitive	Baseline vs. intervention		1.56

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Lynch et al. (2009)	Single participant AB	Powered mobility device	Powered mobility device	Frequency of joystick activation	Cognitive	Baseline vs. intervention		1.13
				Average path length	Motor	Baseline vs. intervention		1.43
				Total sum of distance traveled in a session	Motor	Baseline vs. intervention		1.36
				Percentage of successful (goal-oriented) driving	Motor	Baseline vs. intervention		1.64
				Bayley III Composite score (cognition, receptive language, fine motor)	Cognitive	Baseline vs. intervention		.70
Mar & Sall (1993)	Single participant AB	Computer, switches, adaptive keyboards, software	Computer	Ratings of level of achievement of communication goals	Communication	Baseline vs. intervention	P1	1.96
Mistrett et al. (1994)	Single participant multiple treatment reversal ABACAD	Computer	Computer	Percent intervals of interaction	Social	Baseline vs. intervention	P1 P2 P3 P4 P5	.84 1.96 2.83 .70 .69
Moore & Calvert (2000)	Two group comparative	Computer vs. behavioral treatment	Computer	Duration of attention	Engagement	Between groups		2.02
				Recollection of nouns	Cognitive	Between groups		1.83
Myles et al. (2004)	Single participant ABAB	Weighted vest	Pressure vest	Duration of attending behaviors, one-on-one	Engagement	Baseline vs. intervention	P1	.64
				Duration of attending behaviors, In group	Engagement	Baseline vs. intervention	P1	.10
				Decreased deep pressure seeking behaviors	Adaptive	Baseline vs. intervention	P3	3.64 (reversed)
O'Brien et al. (1994)	Single participant AB	Arm or leg-activated infrared switch	Switch interface device	Average responding during leg contingent sessions	Cognitive	Baseline vs. intervention	P1 P3 P4 P5 P6 P7	1.16 .47 1.56 .42 -.50 -.25
				Average responding during arm contingent sessions	Cognitive	Baseline vs. intervention	P2	.16
	One group between conditions	Arm or leg-activated infrared switch	Switch interface device	Smiles per minute	Social	Between conditions		1.22
Olive et al. (2007)	Single participant multiple probe	Voice output communication aids	Augmentative and alternative communication device	Frequency of independent VOCA use	Communication	Baseline vs. intervention	P1 P2 P3	2.44 2.12 2.51
				Frequency of prompted VOCA use	Communication	Baseline vs. intervention	P1 P2 P3	1.35 2.94 1.90
				Frequency of independent total requests (gestures, vocalizations, and VOCA use)	Communication	Baseline vs. intervention	P1 P2 P3	3.92 2.51 1.23

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Olive et al. (2008)	Single participant multiple baseline	Voice output communication aid	Augmentative and alternative communication device	Frequency of challenging behavior during art activity, book reading, memory activity, and puzzle activity	Adaptive	Baseline vs. intervention		3.51 (reversed)
				Frequency of attention requesting during art activity, book reading, memory activity, and puzzle activity	Engagement	Baseline vs. intervention		1.96
Parsons & La Sorte (1993)	Single participant AB	Computer with synthesized speech turned on	Computer	Frequency of utterances per session	Communication	Baseline vs. intervention	P1 P2 P3	2.33 .98 3.17
Prinz et al. (1985)	One group pre-post	Computer-assisted reading instruction with adapted computer	Computer	Generalized vocabulary reading scores	Literacy	Pretest vs. post-test		2.90
				Sentence Imitation Task	Communication	Pretest vs. post-test		.93
				Referential Communication Test (Number of pictures correctly identified)	Communication	Pretest vs. post-test		1.84
				Referential Communication Test (Number of relevant features correctly identified)	Communication	Pretest vs. post-test		2.14
Quigley et al. (2011)	Single participant AB	Weighted vest at 10%	Pressure vest	Percent of intervals with problem behavior	Adaptive	Between conditions	P1 P3	-.99 -2.24
		Weighted vest at 5%	Pressure vest	Percent of intervals with problem behavior	Adaptive	Between conditions	P3	-1.16
Ragonesi et al. (2010)	Single participant AB	Powered mobility device	Powered mobility device	Percentage of time during 30 most active minutes that child interacted with teacher or peers	Social	Baseline vs. intervention		.75
Ramey et al. (1972)	Single participant ABAC	Voice activated visual stimulation	Switch interface device	Mean number of vocal responses per minute	Cognitive	Baseline vs. intervention	P1 P2	1.25 1.41
Reichow et al. (2009)	Single participant AB	Pressure vest	Pressure vest	Percentage of intervals coded engaged	Engagement	Baseline vs. intervention		-.30
				Percentage of intervals coded problem behavior	Adaptive	Baseline vs. intervention		-.97 (reversed)
Reichow et al. (2010)	Single participant AB	Weighted vest	Pressure vest	Percentage of intervals child was engaged	Engagement	Baseline vs. intervention	P2 P3	.38 -.57
Romski et al. (2009) (Sample 2)	One group pre-post	Speech-generating devices	Augmentative and alternative communication devices	Mean length of utterance	Communication	Pretest vs. post-test		.00
				Type-token ratio (vocabulary variation)	Communication	Pretest vs. post-test		2.89
				Percentage of intelligible utterances	Communication	Pretest vs. post-test		3.06
				Utterance rate	Communication	Pretest vs. post-test		1.39

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison	Effect Size
Romski et al. (2009) (Sample 2), continued				Mean length of turn in utterances	Communication	Pretest vs. post-test	1.50
				Total number of turns	Communication	Pretest vs. post-test	1.54
Romski et al. (2010)	One group pre-post	Speech-generating devices	Augmentative and alternative communication devices	Number of augmented words used per 30 minutes	Communication	Pretest vs. post-test	1.92
Ruscello et al. (1993) (Sample 2)	One group pre-post	Computer-assisted instruction	Computer	Mean percent correct on probes on final consonant, initial voicing, or stopping probe	Communication	Pretest vs. post test	1.94
				Khan-Lewis Phonological Analysis score	Communication	Pretest vs. post test	4.33
Schepis et al. (1996; 1998)	Single participant multiple baseline	Microcomputer-based speech-output communication device	Augmentative and alternative communication device	Rate per minute of communicative interactions during child snack time	Communication	Baseline vs. intervention	P1 4.03 P2 3.12 P3 3.61 P4 3.25
				Mean rate per minute of communicative interactions	Communication	Baseline vs. intervention	P1 6.28 P2 4.74
Schweigert & Rowland (1992)	Single participant ABA single session	Switches	Switch interface device	Frequency of switch activations per interval	Cognitive	Baseline vs. intervention	P1 1.74
Sevcik et al. (2004)	Single participant A-B	Wolf speech output device	Augmentative and alterative communication device	Percent of the time child is engaged in activities or communicating in an activity in therapy at home	Engagement	Baseline vs. intervention	.41
				Frequency of child utterance attempts per minute	Communication	Baseline vs. intervention	1.41
Shimizu & McDonough (2006)	One group pre-post	Computer mouse, touch panel to use for pointing on computer screen	Computer	Frequency of mouse clicks	Cognitive	Pretest vs. post test	1.47 (reversed)
				Length of time taken to click on all 15 black rectangles	Cognitive	Pretest vs. post test	7.97 (reversed)
				Length of on-screen cursor movement	Cognitive	Pretest vs. post test	1.47
Shimizu et al. (2010)	Single participant multiple baseline	Computer mouse	Computer	Frequency of mouse clicks	Cognitive	Baseline vs. intervention	P1 2.64 (reversed) P2 4.79 (reversed) P4 5.38 (reversed) P6 2.60 (reversed) P7 2.80 (reversed)

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Shimizu et al. (2010), continued				Length of time taken to click on all 15 black rectangles	Cognitive	Baseline vs. intervention	P1 P2 P4 P6 P7	4.91 (reversed) 2.10 (reversed) 4.54 (reversed) 2.79 (reversed) 3.01 (reversed)
Shriberg et al. (1989) (Study 1)	One group repeated measures	Computer-assisted speech management	Computer	Mean percent occurrence of attention focused on materials, facial expression, or body posture	Engagement	Between conditions		.75
				Mean percent occurrence of positive verbal expression	Engagement	Between conditions		-.92
				Mean percent occurrence of acceptable speech targets on first try	Communication	Between conditions		-.77
Shriberg et al. (1989) (Study 2)	One group repeated measures	Computer-assisted speech management	Computer	Mean percent occurrence of attention focused on materials, facial expression, or body posture	Engagement	Between conditions		.86
				Mean percent occurrence of positive verbal expression	Engagement	Between conditions		-.56
				Mean percent occurrence of acceptable speech targets on first try	Communication	Between conditions		-.24
Shriberg et al. (1990) (Study 1)	One group repeated measure	Computer-assisted speech management	Computer	Mean percent occurrence of acceptable speech targets on first try	Communication	Between conditions		.10
				Mean percent occurrence of attention focused on materials, facial expression	Engagement	Between conditions		.90
				Mean percent occurrence of positive verbal expression	Engagement	Between conditions		-.13
Shriberg et al. (1990) (Study 2)	One group repeated measure	Computer-assisted speech management	Computer	Mean percent occurrence of acceptable speech targets on first try	Communication	Between conditions		-.12
				Mean percent occurrence of attention focused on materials, facial expression	Engagement	Between conditions		1.05
				Mean percent occurrence of positive verbal expression	Engagement	Between conditions		-.63
Shull et al. (2004)	Single participant ABA	Pressure-activated switch (head), string switch (wrist)	Switch interface device	Number of pressure switch activations at 9am and 10:30am combined	Cognitive	Baseline vs. intervention		1.55
				Number of string switch activations at 9am and 10:30am combined	Cognitive	Baseline vs. intervention		1.12
Sigafoos et al. (2003)	Single participant alternating treatment	Speech-generating device	Augmentative and alternative communication device	Percentage of intervals with the use of the SGD for requesting	Communication	Baseline vs. intervention	P1 P3	2.77 2.94
				Percentage of intervals with a vocalization	Communication	Baseline vs. intervention	P1 P3	1.34 -.39

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Son et al. (2006)	Single participant Multiple baseline AB	Voice output communication aid	Augmentative and alternative communication device	Percentage of opportunities with a correct request	Communication	Baseline vs. intervention	P1 P2 P3	1.76 1.25 1.47
Spiegel-McGill et al. (1989)	Single participant alternating treatment	Computer	Computer	Percentage of intervals with socially directed behaviors	Social	Between conditions	P1 P2 P3 P4	.78 2.32 -.34 .82
		Remote controlled robot	Switch interface device	Percentage of intervals with socially directed behaviors	Social	Between conditions	P1 P2 P3 P4	-.15 -.33 -.57 -.16
Sullivan & Lewis (1990) (Participant 1)	Single participant alternating treatment	Arm and leg controlled switches	Switch interface device	Arm contingency responses per minute	Cognitive	Baseline vs. intervention	P1	1.16
				Leg contingency responses per minute	Cognitive	Baseline vs. intervention	P1	2.11
Sullivan & Lewis (2000) (Participant 1)	Single participant AB	Arm and leg controlled switches	Switch interface device	Arm contingencies Sessions 2,5 vs 25	Cognitive	Between conditions		1.14
				Leg contingencies Session 2,5 vs 25	Cognitive	Between conditions		1.27
Sullivan & Lewis (2000) (Participant 2)	Single participant AB	Switch activated toy	Switch interface device	Pulling contingencies	Cognitive	Between conditions		2.76
Tefft et al. (2011)	One group pre-post	Powered mobility device	Powered mobility device	Parental rating of social interactions with the family	Social	Baseline vs. intervention		.57
				Parental rating of child's social/play skills	Social	Pretest vs. post-test		.59
Thomas-Stonell et al. (1991)	Single participant multiple baseline	Computer-based speech training systems	Computer	Voice onset time for voiceless plosives	Communication	Baseline vs. intervention	P3	1.91
				Speaking rate, vowel duration	Communication	Baseline vs. intervention	P3	1.29 (reversed)
				Speaking rate, sentence duration	Communication	Baseline vs. intervention	P3	1.46 (reversed)
Thunberg et al. (2009)	Single participant AB	Speech-generating devices	Augmentative and alternative communication device	Topic segment length during sharing experiences	Communication	Baseline vs. intervention	P3 P4	1.83 2.21
				Topic segment length during mealtime	Communication	Baseline vs. intervention	P4	-.89
Tjus et al. (1998)	Single participant AB	Computer-assisted instruction using Deltamessages	Computer	Response time index (reading speed)	Literacy	Pretest vs. post test	P9	1.03 (reversed)
Tota et al. (2006)	Single participant ABAB	Optic micro-switch	Switch interface device	Mean frequency of contingent responses	Cognitive	Baseline vs. intervention	P1	3.57
Trembath et al. (2009)	Single participant multiple baseline	Speech-generating device	Augmentative and alternative communication device	Number of successful communicative behaviors	Communication	Baseline vs. intervention	P1 P2 P3	1.26 1.44 2.97

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Study	Study Design	AT Device	Type of Device	Child Outcomes	Domain	Comparison		Effect Size
Van Acker & Grant (1995)	Single participant multiple baseline	Computer with touch screen and voice synthesizer	Computer	Number of independent requests	Communication	Baseline vs. intervention	P3	2.64
VandenBerg (2001)	Single participant AB	Weighted vest	Pressure vest	Percent of time on task	Engagement	Baseline vs. intervention	P4	2.31
Whalen et al. (2010)	Experimental vs. control	Computer-assisted learning (Teach Town: Basics)	Computer	Peabody Picture Vocabulary Test III	Communication	Post-test difference		.98
				Expressive Vocabulary Test	Communication	Post-test difference		.34
Williams et al. (2002)	One group crossover design	Computer-assisted instruction	Computer	Number of words read correctly—computer group (15 minutes)	Literacy	Pretest vs. post-test		.21
				Words recorded during two 30-minute direct observations—computer group	Literacy	Pretest vs. post-test		.13