Teaching Play Skills Through the Use of Assistive Technology and Instructional Strategies: A National Survey

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Abstract

Play is often considered the main occupation of early childhood. Despite the importance of play, young children with disabilities may not achieve the same experiences as their typically developing counterparts. Literature supports the use of specific instructional strategies to promote the acquisition of play skills. In addition to utilizing specific instructional strategies to teach play skills, assistive technology (AT) can support positive outcomes. The authors conducted a survey study in order to advance our understanding of early childhood special education professionals' knowledge and use of instructional strategies and AT to teach play skills to young children with disabilities. The participants' reported knowledge and use of instructional strategies to teach play skills to young children with disabilities was high relative to their knowledge and use of AT. Furthermore, early childhood special education professionals reported that they did not vary their use of instructional strategies based on the AT tool. Implications of these finding for research and practice are discussed.

Teaching Play Skills Through the Use of Assistive Technology and Instructional Strategies: A National Survey

Play is often considered the main occupation of early childhood and has been acknowledged as a human right of every child by the Office of the United Nations High Commission for Human Rights (1989). Researchers, theorists, and educators promote play and social interaction as essential components of healthy child development (Ginsburg, 2007; Heidemann & Hewitt, 2010; Samuelsson & Johansson, 2006). As children play, they practice and become proficient at a range of skills and roles needed for later life (Mistrett, Lane, & Goetz, 2000; Parham, 2008). It is through play that children learn about human relationships, explore objects in the environment, learn to solve problems, make decisions, persevere, acquire pre-literacy skills, lead and follow others, and experience acceptance (e.g., Knox, 2010; Parham, 2008; Terpstra, Higgins, & Pierce, 2002).

Despite the importance of play, young children with disabilities may not achieve the same experiences as their typically developing counterparts. Researchers have described the range of play skills seen in children with disabilities as limited and passive, with rates of play less frequent than typically developing peers (e.g., Florey, 1971; Lane & Mistrett, 1996; Li, 1981; Missiuna & Pollock, 1991; Mistrett et al., 2000). Given that children with disabilities may experience physical, cognitive, and social delays and may therefore struggle to participate in play and social interactions, it is important that early childhood educators utilize differentiated

methods to teach play and social interaction skills (Knox, 2010; McCormick, 2003; O'Brien, 1997; Peterson & McConnell, 1993; Terpstra, Higgins, & Pierce, 2002).

Instructional Strategies to Support the Acquisition of Play Skills

Literature supports the use of specific instructional strategies to promote the acquisition of play skills. These strategies include embedding learning opportunities into naturally occurring events (e.g., Girard, Girolametto, Weitzman, & Greenberg, 2011; Horn, Lieber, Li, Sandall, & Schwartz, 2000), developing activities that are meaningful to a child (e.g., McCormick, 2003; Terpstra et al., 2002), modifying the environment to incorporate games, songs, peers, and siblings (e.g., Chandler, 1998; Peterson & McConnell, 1993), peer and teacher modeling (e.g., McCormick, 2003; Terpstra et al., 2002), teaching the use of substitute and imaginary play objects (e.g., Heidemann & Hewitt, 2010; Peterson & McConnell, 1993), incorporating the use of prompting techniques (e.g., Barton & Pavilanis, 2012; Barton & Wolery, 2010), adults joining but letting children direct play (e.g., Berk, 2012; Heidemann & Hewitt, 2010), and using Social Stories™ (Gray, 2010; Test, Richter, Knight, & Spooner, 2011). Despite strong evidence regarding the use of specific instructional strategies to support the acquisition of play skills in early childhood learning environments, there is limited research to date examining what instructional strategies educators are familiar with, and how often these strategies are implemented in early childhood special education settings.

In addition to utilizing specific instructional strategies to teach play and social interaction skills, assistive technology (AT) can support positive outcomes if teachers understand, use, and integrate the technology into the curriculum (Council for Exceptional Children, 2010).

Assistive Technology to Support Play

The Technology-Related Assistance for Individuals with Disabilities Act of 1998 defines AT as "any item, piece of equipment or product system whether acquired commercially off the shelf, modified, or customized that is used to increase or improve functional capabilities of individuals with disabilities" (Tech Act; Public Law 100-407). AT includes both low-tech objects (i.e., graphic symbols, communication boards, adapted books, adapted play materials, positioning devices, and self-regulation objects) and high-tech objects (i.e., switch operated toys, video, tablet computers, computer peripherals, computers, and speech generating devices (SGD). In addition to being identified as high or low tech, AT can also be described according to its functional use, including; dedicated AT to support communication, dedicated AT to support access/engagement, and non-dedicated AT.

Dedicated AT devices that have been used in early childhood environments to support communication include graphic symbols (e.g., Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007; Skau & Cascella, 2006), communication boards (e.g., Lane & Mistrett, 1996; Nunes & Hanline, 2007), and speech generating devices (e.g., Campbell, Milbourne, Dugan, & Wilcox, 2006; Evans Cosbey & Johnston, 2006; Skau & Cascella, 2006; van der Meer et al., 2012). Dedicated AT devices that have been used in early childhood environments to support access and/or engagement include positioning devices (e.g., Costigan & Light, 2010; Lane & Mistrett, 1996), self-regulation objects (e.g., Hodgetts, Magill-Evans, & Misiaszek, 2011; Thompson & Johnston, 2013), adapted play materials (Hamm, Mistrett, & Goetz Ruffino, 2006; Lane & Mistrett, 1996), adapted books (e.g., Hamm et al., 2006), single switch operated toys

(e.g., Hamm et al., 2006; Lane & Mistrett, 1996), and computer peripherals (e.g., Campbell et al., 2006). Non-dedicated AT devices that have been used in early childhood environments include video (e.g., Buggey, Hoomes, Sherberger, & Williams, 2011), tablet computers (e.g., Aronin, 2013; Couse & Chen, 2010), and laptop and desktop computers (e.g., Campbell et al., 2006; More, 2008).

In summary, many of the challenges experienced by children with disabilities can be addressed through the use of AT (Parette & Stoner, 2008). However, despite promising evidence supporting the use of AT in early childhood learning environments, research examining what AT tools early childhood special education professionals are familiar with, and how often these tools are used in early childhood special education settings is lacking.

Assistive Technology Tools Used in Combination with Instructional Strategies

In addition to considering the use of instructional strategies and AT separately, it is important to consider the extent to which AT is used in combination with evidence based instructional strategies to achieve positive outcomes. This is particularly important in light of research demonstrating that the use of AT in conjunction with specific instructional strategies can be a successful method for increasing learning. For example, Nelson et al. (2007) demonstrated that the combined use of specific instructional strategies (i.e., modeling, least to most prompting) and a low-tech visual-graphic symbol (i.e., a laminated paper key that symbolized a request to enter a play situation) resulted in an increase in play initiations, as well as an increase in the amount of time spent in higher levels of play for four preschool aged children with autism. Similarly, van der Meer et al. (2012) successfully used specific instructional strategies (i.e., modeling, least to most prompting) in combination with AT (i.e., speech generating devices) to teach four children with disabilities to request desired snacks, toys, and social interaction. Finally, Evans Cosbey and Johnston (2006) demonstrated the effectiveness of a specific instructional strategy (i.e., most to least prompting) in conjunction with a single message speech generating device to teach three young students with multiple disabilities to engage in social interactions.

Despite research suggesting the effectiveness of using evidence based instructional strategies in conjunction with AT to support the development of play skills for young children with disabilities, comprehensive information related to early childhood professionals' use of instructional strategies in conjunction with AT is unknown.

In order to advance our understanding of early childhood professionals' knowledge and use of instructional strategies and AT to teach play skills to young children with disabilities, the authors conducted a survey study to address the following questions:

1. What evidence based instructional strategies do early childhood special education professionals know about and use to teach play skills to young children with disabilities?
2. What AT tools do early childhood special education professionals know about and use?
3. What instructional strategies do early childhood special education professionals use in conjunction with AT to teach play skills to young children with disabilities?

Methods

Participants and Sampling Procedures

Surveys were mailed to a random sample of 500 Division of Early Childhood (DEC) members, a division of the Council for Exceptional Children (CEC). The 500 names and addresses of DEC members were purchased from the CEC through the American List Counsel, Inc. (ALC), a company that manages, maintains, fulfills orders, and handles invoicing for the CEC direct mail file. The sample of 500 DEC members was obtained through a computer program used by ALC for the purpose of randomly selecting member names and addresses. The sampling procedure included dividing all available member names of DEC (approximately 5,259 in March 2012) by an nth number. The nth number was computed by dividing the number of DEC members (5259) by the desired sample size (500). This computation produced the number 10.59 (e.g., 5269/500 = 10.59). This number was used by ALC to randomly select every 10^{th} record from the file of DEC member names.

Instrumentation

A 12-page survey was developed to obtain information regarding participants' (a) knowledge and use of strategies to teach play skills to children with disabilities, (b) knowledge and use of AT, and (c) use of specific instructional strategies in conjunction with AT. The survey was developed based on a review of literature regarding (a) instructional strategies for teaching play skills, and (b) the use of AT in early childhood settings. Based upon the review of literature, the researchers identified 25 strategies for teaching play skills and 16 AT tools used in early childhood special education settings. This list of strategies and AT tools was used to create the questions posed in the context of the survey.

The survey consisted of four sections. In the first section, participants were asked specific questions related to their background and professional experiences. Questions were designed to obtain information regarding the participants' highest educational degree received, years of professional experience, current professional position, and types of children with disabilities served in their employment setting(s).

In the second section, participants were asked to indicate their level of knowledge ("very knowledgeable", "knowledgeable", "somewhat knowledgeable", and "do not know this strategy") for each of 25 strategies to teach play skills. Then, participants were asked to indicate their level of use ("very frequently", "frequently", "occasionally", "never use(d) this strategy") for each of the 25 strategies.

In the third section, participants were asked to indicate their level of knowledge ("very knowledgeable", "knowledgeable", "somewhat knowledgeable," or "do not know this tool") for each of 16 AT tools. The participants were then asked to indicate their level of use ("very frequently", "frequently", "occasionally," or "never use(d) this tool") for each of the 16 AT tools.

In the fourth section, participants were asked to provide information regarding their use of each instructional strategy in combination with each AT tool. Specifically, for each of the 16 identified AT tools, participants were asked to indicate whether they had used the AT and, if yes,

whether they had used each of the 25 specified instructional strategies in conjunction with that AT tool.

Following the initial design and development phase, a field test was conducted during which 10 professionals who currently work or have worked in the field of early childhood special education completed the draft survey. The main purpose of the field-testing was to (a) guide revisions that would improve clarity and facilitate completion of the survey, (b) acquire information regarding whether obtained results would answer the research questions, and (c) obtain an estimate of the time required to complete the survey. Based upon the feedback provided, changes were made in the format of questions and wording of directions. Field test results revealed that the estimated time for completion of the survey was 20-30 minutes. A copy of the survey is available upon request.

Mailing and Follow-up Procedures

An initial mailing and two follow-up mailings were conducted in accordance with the procedures outlined as part of the Total Design and Tailored Design Methods (Dillman, 1978; Dillman, Smyth, & Christian, 2009). Survey packets were mailed to the randomly selected DEC members. One address was invalid and was returned to the researchers via the postal service.

The initial mailing consisted of a survey booklet that included an introductory letter describing the purpose of the study and encouraging the individual to participate; a copy of the survey; a "consent to participate" letter with information from the researchers' university Institutional Review Board (IRB); and a self-addressed stamped return envelope.

The follow-up mailings were sent after the original mailing. The first follow-up mailing was sent one week after the original mailing and consisted of a post card thanking those who had already completed and returned the survey, and encouraging those who had not done so to do so promptly. The final mailing was sent four weeks after the original mailing to individuals from whom a reply had not been received. This mailing consisted of a letter stressing the importance of their response and encouraging their participation; a new copy of the survey; a "consent to participate" letter with information from the researchers' university Institutional Review Board (IRB), and a self-addressed, stamped envelope for returning the questionnaire.

Survey Processing and Data Analysis

A total of 108 of the 499 surveys were returned (approximately 22%). One returned survey was incomplete and therefore was not coded for data analysis. The responses to the surveys were recorded and entered on an Excel spreadsheet for analysis. In order to assess inter-rater reliability of data entry, a graduate student assistant recoded 10% of the surveys. The data entry on the recoded surveys was then compared to the original data entry. The comparison revealed an inter-rater reliability of 98.8% for data entry.

Results

The following sections provide information related to the responses obtained from survey participants. This includes data related to (a) professional background of participants, (b) participants' knowledge and use of identified instructional strategies, (c) participants' knowledge

and use of specified AT tools, and (d) participants' use of specified instructional strategies in conjunction with identified AT tools.

Background Information of Participants

Data related to respondents' background information was obtained from the returned surveys and was coded for data analysis (see Table 1). As noted in Table 1, the largest percentage of participants indicated that a "Master's degree" was their highest educational degree (70.1%, n=75). In terms of years of professional experience, the largest group of individuals (55.1%, n=59) reported "16+ years" of experience working in the field of early childhood special education. Among the respondents, 46.2% (n=54) indicated their current professional position as an "Early Interventionist/Early Childhood Special Educator."

Participants were also asked to indicate the types of disabilities that children were diagnosed with in their current employment settings (i.e., intellectual disability, cerebral palsy, autism spectrum disorder, Down syndrome, apraxia of speech, CVA, degenerative neurological disorders, traumatic brain injury, developmental delay, dyspraxia, sensory processing disorder, and other). The highest percentages of disability types served in participants' employment settings were "autism spectrum disorder" (17.2%, n=76), "developmental delay" (16%, n=71), and "intellectual disability" (12.6%, n=56).

Table 1
Background Information of Questionnaire Participants (n-107)

Characteristic	%	n
Degree:		
High School diploma	0	0
Associate's degree	1.9	2
Bachelor's degree	18.7	20
Master's degree	70.1	75
Doctorate degree	9.3	10
Years of professional experience in a field that serves children with disabilities:		
1-5	14.0	15
6-10	21.5	23
11-15	9.3	10
16+	55.1	59
Current Professional Positions (n=117):		
Early interventionist/ Early childhood special educator	46.2	54
Administrator in public/private education	15.4	18

Instructor in higher education program	5.1	6
Tenure track professor in higher education program	3.4	4
Early intervention/School-related service provider: Speech therapist	3.4	4
Early intervention/School-related service provider: Physical therapist	0.9	1
Early intervention/School-related service provider: Occupational therapist	0	0
Not currently working	3.4	4
Other	22.2	26

Characteristic	%	n
Disability types of individuals served in current employment settings (n=443):		
Autism spectrum disorder	17.2	76
Developmental delay	16.0	71
Intellectual disability	12.6	56
Sensory processing disorder	11.1	49
Down syndrome	9.5	42
Cerebral palsy	8.1	36
Apraxia of speech	7.4	33
Dyspraxia	3.4	15
Traumatic brain injury	5.4	24
Degenerative neurological disorders	3.8	17
CVA (stroke)	1.8	8
Currently not serving	3.6	1

Knowledge and Use of Instructional Strategies to Teach Play Skills

Table 2 summarizes participants' reported knowledge of each of 25 strategies used to teach play skills in early childhood settings. The range of responses in each of the four ranking categories across all instructional strategies was: "very knowledgeable" (range=37-73%); "knowledgeable" (range=25-52%); "somewhat knowledgeable" (range=1-25%); "do not know" (0-3%).

The instructional strategies that received the highest percentage of responses in the category of "very knowledgeable" were "encourage turn taking and sharing of play materials" (73%),"facilitate child-to-adult and child-to-child verbal interactions by talking about what you

are doing while engaged in activities" (69%), and "develop activities that are meaningful to a child" (67%). The instructional strategies that received the lowest percentage of responses in the category of "very knowledgeable" were "teach play and social interaction skills through a Social Story™" (37%), "teach a child to join a playgroup"(38%) and "teach children to use substitute or imaginary objects during play scenarios" (38%).

Table 2 also summarizes participants' reported use of each teaching strategy. The range of responses in each of the four ranking categories across all instructional strategies was: "very frequently" (range=23-69%); "frequently" (range=24-45%); "occasionally" (range=3-45%); "never use(d) this strategy" (0-10%).

The instructional strategies that received the highest percentage of responses in the category of "very frequently" were "develop activities that are meaningful to a child" (69%), "encourage turn taking and sharing of play materials" (60%), and "facilitate child-to-adult and child-to-child verbal interactions by talking about what you are doing while engaged in activities" (58%). The instructional strategies that received the lowest percentage of responses in the category of "very frequently" were "teach play and social interaction skills through a Social Story" (23%), "teach a child to join a playgroup" (27%), and "teach children to use substitute or imaginary objects during play scenarios" (27%).

Table 2
Knowledge and Use of Instructional Strategies to Teach Play and Social Interaction Skills to Children with Disabilities

STRATEGY	Knowledge of Strategy				Use of Strategy			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Strategy
Encourage communication within and outside of children's play roles.	58%	30%	10%	3%	51%	33%	9%	8%
Provide verbal, gestural or physical supports to encourage a child's own attempts to join a play group.	57%	31%	8%	3%	46%	30%	19%	5%
Give a child the highest level of prompt necessary for successful completion of a skill. Decrease the level of prompting to none as quickly as possible.	57%	33%	8%	2%	50%	28%	17%	7%

STRATEGY	Knowledge of Strategy				Use of Strategy			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Strategy
Encourage communication within a play scenario by making comments that connect one child to another within the play scenario.	56%	31%	12%	1%	46%	29%	21%	4%
Encourage new play skills by playing next to a child with the same materials, but not playing with the child directly.	55%	30%	16%	0%	37%	31%	28%	4%
Facilitate play skills by joining the on-going play of children, but let them direct the control of play.	54%	30%	14%	2%	46%	27%	24%	3%
When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills.	52%	44%	4%	0%	44%	45%	10%	1%
Encourage children to resolve conflicts during play in ways that are mutually acceptable to all players.	52%	37%	12%	0%	40%	38%	21%	2%
Teach children to take on play roles.	46%	43%	11%	1%	31%	27%	34%	7%
Teach peers to demonstrate or model desired play behaviors.	45%	33%	21%	1%	31%	36%	27%	6%
Begin a play scenario, assume partial control, and teach new play behaviors inside outside of the play scenario.	42%	38%	17%	3%	33%	32%	27%	8%
Teach skills for developing positive, accepting friendships.	42%	45%	12%	1%	39%	35%	23%	3%
Encourage turn taking and sharing of play materials.	73%	26%	1%	0%	60%	31%	8%	1%
Facilitate child-to-adult and child-to-child verbal interactions by talking about what you are doing while engaged in activities.	69%	25%	6%	0%	58%	29%	10%	2%

STRATEGY	Knowledge of Strategy				Use of Strategy			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Strategy
Develop activities that are meaningful to a child.	67%	29%	4%	0%	69%	27%	3%	0%
Change or modify the environment to encourage play and social interaction.	65%	31%	4%	1%	52%	33%	15%	1%
Model or demonstrate desired play behaviors.	63%	33%	4%	0%	55%	30%	15%	0%
Develop goals that can be addressed in naturally occurring classroom or home activities.	62%	32%	6%	0%	51%	36%	12%	1%
Allow a child to attempt a skill before intervening with prompts. Give only the amount of prompting needed for the child to be successful in skill.	61%	33%	5%	1%	48%	33%	18%	1%
Modify or expand an activity to encourage the development of a specific skill.	58%	37%	5%	0%	56%	32%	12%	1%
Modify games and songs to increase opportunities for social interaction.	58%	36%	6%	0%	48%	37%	16%	0%
Teach typically developing peers and siblings strategies for interacting with a child who has disabilities.	39%	46%	12%	3%	31%	28%	32%	10%
Teach children to use substitute or imaginary objects during play scenarios.	38%	52%	10%	1%	27%	33%	32%	7%
Teach a child to join a playgroup.	38%	44%	15%	3%	27%	40%	24%	8%
Teach play and social interaction skills through a Social Story™.	37%	37%	25%	2%	23%	24%	45%	7%

Note. Not all totals equal 100%, due to rounding errors.

Knowledge and Use of Assistive Technology

Table 3 summarizes the participants' reported knowledge for each of 16 different AT tools. The range of responses in each of the four ranking categories across all AT tools were: "very

knowledgeable" (range=9-57%); "knowledgeable" (range=22-39%); "somewhat knowledgeable" (range=5-43%); "do not know this tool" (0-27%).

The AT tools that received the highest percentage of responses in the category of "very knowledgeable" were "Graphic Symbols: Photographs, picture symbols, or printed words used to support communication" (57%), and "Desk Top Computer: Personal computer stationed at one location that is mainly operated by a keyboard, mouse, or touch screen" (51%). The AT that received the lowest percentage of responses in the category of "very knowledgeable" were "Greater than [32] Message Speech Generating Device (SGD): Electronic communication system that enables individuals to communicate more than 32 messages using pre-stored or self-generated messages (i.e., dedicated SGDs: digitized and/or synthesized speech, tablet computers with software that allows for speech output)" (9%), "Computer Peripherals: Devices attached to a host computer (e.g., alternate keyboards, interface devices, joysticks, optical pointing devices, typing aids, track balls, touch screens)" (18%), and "Video: Electronically capture, record, process, store, and transmit a series of images" (20%).

Table 3 also summarizes participants' reported use of each of the identified AT tools. The range of responses in each of the four ranking categories across all AT was: "very frequently" (range=6-50%); "frequently" (range=14-32%); "occasionally" (range=17-46%); "never use(d) this tool" (2-56%).

The AT that received the highest percentage of responses in the category of "very frequently" were "Graphic Symbols: Photographs, picture symbols or printed words, used to support communication" (50%), and "Communication Boards, Books, Charts, Cards: Boards, books, charts or cards arranged with graphic symbols to support communication" (39%). The AT that received the lowest percentage of responses in the category of "very frequently" were "Greater Than [32] Message Speech Generating Device (SGD): Electronic communication system that enables individuals to communicate more than 32 messages using pre-stored or self-generated messages (i.e., dedicated SGDs: digitized and/or synthesized speech, tablet computers with software that allows for speech output)" (6%), "Video: Electronically capture, record, process, store, and transmit a series of images" (7%), "Tablet Computer: A mobile, hand-held computer with a flat touch screen that is mainly operated by touching the screen (e.g., iPad)" (13%), and "[2-32] Message Speech Generating Device (SGD): Electronic communication system that enables individuals to communicate 2-32 messages" (13%).

Table 3
Knowledge and Use of Assistive Technology

TOOL	Knowledge of Tool				Use of Tool			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Tool
Graphic Symbols: Photographs, picture symbols or printed words, used to support receptive and/or expressive communication.	57%	38%	5%	0%	50%	30%	17%	2%
Desk Top Computer: Personal computer stationed at one location, and is mainly operated by a keyboard, mouse, or touch screen.	51%	39%	7%	3%	36%	27%	25%	12%
Lap Top Computer: Personal computer that is mobile, and is mainly operated by a keyboard and touch pad.	49%	37%	10%	3%	31%	22%	25%	21%
Communication Boards, Books, Charts, and Cards: Boards, books, charts or cards arranged with graphic symbols to support communication.	44%	46%	7%	3%	39%	32%	26%	3%
Self-Regulation Objects: Objects that promote self-regulation to help a child participate in classroom activities (e.g. weighted vest, sit-n-move cushion).	36%	33%	29%	2%	26%	25%	36%	14%
Adapted Books: Books altered to meet the needs and abilities of a child (e.g., pager turners, reads to student, Braille, enlarged pictures/print).	33%	29%	33%	5%	23%	17%	39%	22%
Single Switch Operated Toys: Toys activated by a single switch or button.	31%	34%	30%	4%	18%	14%	46%	23%
Single Message Speech Generating Device (SGD): Electronic communication system	30%	25%	28%	17%	16%	18%	36%	31%

TOOL	Knowledge of Tool				Use of Tool			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Tool
that enables individuals to communicate a single, recorded message.								
Adapted Play Materials**:** Toys/Materials that are modified with visual, tactile, or auditory features; stabilized, built- up, mounted to a surface, or confined in an area in order to be made easier to manipulate/operate.	28%	35%	34%	3%	14%	23%	44%	19%
Tablet Computer: A mobile, hand-held computer with a flat touch screen that is mainly operated by touching the screen (e.g., iPad).	27%	36%	29%	8%	13%	17%	37%	34%
Positioning Devices: Assistive equipment used to help assume and/or maintain positions so that a child can explore or manipulate objects in their environment.	25%	33%	35%	8%	20%	21%	33%	27%
[2-32] Message Speech Generating Device (SGD): Electronic communication system that enables individuals to communicate 2-32messages.	23%	24%	34%	19%	13%	16%	35%	37%
Video: Electronically capture, record, process, store, and transmit a series of images.	20%	39%	32%	9%	7%	15%	44%	34%
Computer Peripherals: Devices attached to a host computer (e.g., alternate keyboards, interface devices, joysticks, optical pointing devices, typing aids, track balls, touch screens).	18%	31%	40%	12%	15%	14%	41%	30%
Greater Than [32] Message Speech Generating Device (SGD): Electronic communication system that	9%	22%	43%	27%	6%	14%	24%	56%

TOOL	Knowledge of Tool				Use of Tool			
	Very Knowledgeable	Knowledgeable	Somewhat Knowledgeable	Do Not Know This Strategy	Very Frequently	Frequently	Occasionally	Never Use(d) This Tool
enables individuals to communicate more than 32 messages using pre-stored or self-generated messages (i.e., dedicated SGDs: digitized and/or synthesized speech, tablet computers with software that allows for speech output).								

Note. Not all totals equal 100%, due to rounding errors.

Instructional Strategies Used in Combination with AT

Table 4 lists the five instructional strategies that were reported as being used most frequently in conjunction with each AT tool. When all AT tools were combined, the five most used instructional strategies were "change or modify the environment to encourage play and social interaction", "develop activities that are meaningful to a child", "modify or expand an activity to encourage the development of a specific skill", "when preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills", and "modify games and songs to increase opportunities for social interaction", respectively.

Table 4 also illustrates the most commonly used instructional strategies when the AT tools were sub-divided according to functional use (i.e., dedicated AT to support communication, dedicated AT to support access/engagement, non-dedicated AT). Although the rankings varied, the top five strategies used in combination with dedicated AT tools to support communication (i.e., gestures, graphic symbols, communication boards, SGDs) were the same as the top five strategies used across all AT tools. Similarly, four of the five most frequently used strategies across all AT tools were also among the five most frequently used strategies used in conjunction with dedicated AT tools designed to support access/engagement (i.e., positioning devices, self-regulation objects, adapted play materials, adapted books, single switch operated toys, computer peripherals). However, "modify games and songs to increase opportunities for social interactions" was replaced by "develop goals that can be addressed in naturally occurring classroom or home activities" as the fifth most used instructional strategy in combination with dedicated AT tools to support access or engagement. Finally, although the ranked order was slightly different, the top five instructional strategies used across all AT tools were also the top five instructional strategies used in conjunction with AT tools related to non-dedicated computers and technology (i.e., video, tablet computer, lap top computer, desk top computer). However, two additional instructional strategies (i.e., "modify games and songs to increase opportunities for social interaction", "develop goals that can be addressed in naturally occurring

classroom or home activities") were tied with "when preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills" as the 5th most used instructional strategy that was utilized in conjunction with non-dedicated computer and technology AT tools.

Table 4
Top Five Instructional Strategies Used in Conjunction with Each Assistive Technology Tool

Function of AT	AT Tool	Top Five Most Frequently Used Strategies
Dedicated AT to Support Communication	Graphic Symbols	1. Develop activities that are meaningful to a child. 2. Change or modify the environment to encourage play and social interaction. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify or expand an activity to encourage the development of a specific skill. 5. Modify games and songs to increase opportunities for social interaction.
	Communication Boards	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify or expand an activity to encourage the development of a specific skill. 5. Modify games and songs to increase opportunities for social interaction.

Function of AT	AT Tool	Top Five Most Frequently Used Strategies
Dedicated AT to Support Communication	Single Message Speech Generating Device	1. Change or modify the environment to encourage play and social interaction. 2. Modify or expand an activity to encourage the development of a specific skill. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify games and songs to increase opportunities for social interaction. 5. Develop activities that are meaningful to a child.
	[2-32] Message Speech Generating Device	1. Change or modify the environment to encourage play and social interaction. 2. Modify or expand an activity to encourage the development of a specific skill. 3. Develop activities that are meaningful to a child. 4. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 5. Modify games and songs to increase opportunities for social interaction.
	Greater than [32] Message Speech Generating Device	1. Change or modify the environment to encourage play and social interaction. 2. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 3. Modify or expand an activity to encourage the development of a specific skill. 4. Develop goals that can be addressed in naturally occurring classroom or home activities. 5. Modify games and songs to increase opportunities for social interaction.
Dedicated AT to Support Access/Engagement	Positioning Devices	1. Develop activities that are meaningful to a child. 2. Change or modify the environment to encourage play and social interaction. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify or expand an activity to encourage the development of a specific skill. 5. Develop goals that can be addressed in naturally occurring classroom or home activities.

Function of AT	AT Tool	Top Five Most Frequently Used Strategies
Dedicated AT to Support Access/Engagement	Self-Regulation Objects	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. Develop goals that can be addressed in naturally occurring classroom or home activities. 4. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 5. Modify or expand an activity to encourage the development of a specific skill.
	Adapted Play Materials	1. Develop activities that are meaningful to a child. 2. Change or modify the environment to encourage play and social interaction. 3. Modify or expand an activity to encourage the development of a specific skill. 4. Modify games and songs to increase opportunities for social interaction. 5. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills.
	Adapted Books	1. Develop activities that are meaningful to a child. 2. Change or modify the environment to encourage play and social interaction. 3. Modify or expand an activity to encourage the development of a specific skill. 4. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 5. Teach play and social interaction skills through a Social Story (e.g., a story that follows guidelines, and describes a circumstance, skill, or concept with social cues, perspectives, and common responses for a specific situation).
	Single Switch Operated Toys	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. Modify or expand an activity to encourage the development of a specific skill. 4. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 5. Modify games and songs to increase opportunities for social interaction.

Function of AT	AT Tool	Top Five Most Frequently Used Strategies
Non-Dedicated AT	Computer Peripherals	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify or expand an activity to encourage the development of a specific skill. 5. Develop goals that can be addressed in naturally occurring classroom or home activities.
	Video	1. Modify games and songs to increase opportunities for social interaction. 2. Change or modify the environment to encourage play and social interaction. 3. Develop activities that are meaningful to a child. 4. Teach play and social interaction skills through a Social Story (e.g., a story that follows guidelines, and describes a circumstance, skill, or concept with social cues, perspectives, and common responses for a specific situation). 5. Model or demonstrate desired play behaviors.
	Tablet Computer	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. Modify or expand an activity to encourage the development of a specific skill. 4. Develop goals that can be addressed in naturally occurring classroom or home activities. 5. Teach typically developing peers or siblings strategies for interacting with a child who has disabilities.
	Laptop Computer	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. Develop goals that can be addressed in naturally occurring classroom or home activities. 4. Modify or expand an activity to encourage the development of a specific skill. 5. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills.

Function of AT	AT Tool	Top Five Most Frequently Used Strategies
Non-Dedicated AT	Desktop Computers	1. Change or modify the environment to encourage play and social interaction. 2. Develop activities that are meaningful to a child. 3. When preparing to teach new skills, initially select tasks that are low effort for the child, progressing to higher effort skills. 4. Modify or expand an activity to encourage the development of a specific skill. 5. Modify games and songs to increase opportunities for social interaction.

Discussion

Knowledge and Use of Instructional Strategies

The participants' reported knowledge of instructional strategies to teach play skills to young children with disabilities was highest in the categories of "very knowledgeable" and "knowledgeable". If these two categories are combined, the reported knowledge across all instructional strategies ranged from 74%-99%. While a large percentage of participants identified themselves as "very knowledgeable" or "knowledgeable" with regard to the identified instructional strategies, it is noteworthy to examine trends across the different types of instructional strategies. Specifically, it is interesting to note that the verb "teach" was included in the description for all instructional strategies that received less than 50% of responses indicating "very knowledgeable". Conversely, none of the instructional strategies that received greater than 50% of the responses indicating "very knowledgeable" included the verb "teach". Instead, instructional strategies that received greater than 50% of the responses indicating "very knowledgeable" included verbs such as; "encourage", "facilitate," or "demonstrate." This finding may suggest that educators feel less knowledgeable about instructional strategies that involve teaching a child a specific behavior (e.g., "teach a child to join a play group") and more knowledgeable about instructional strategies that involve manipulating the environment (e.g., "develop activities that are meaningful to a child"), or changing teacher behavior (e.g., "model or demonstrate desired play behaviors"). If this is the case, a need exists to increase educators' knowledge, or perhaps confidence in their knowledge, of instructional strategies that involve teaching specific behaviors. This need is especially important in light of research suggesting that children with disabilities may benefit from interventions that utilize explicit instruction to teach specific skills abilities (e.g., Evans Cosbey & Johnston, 2006; Nelson et al., 2007; Peterson & McConnell, 1993; van der Meer et al., 2012).

Participants' reported use of instructional strategies followed a similar pattern to their reported knowledge of instructional strategies, and it is interesting to note that the top ten instructional strategies reported as "very knowledgeable" or "knowledgeable" were also the top ten instructional strategies reported as used "very frequently" or "frequently". The design of this study does not allow for a definitive explanation regarding why "use of instructional strategies" followed a pattern that was similar to "knowledge of instructional strategies." However, one explanation could be related to a concept known as the "law of the instrument," in which Abraham Maslow (1966, p. 15) stated that "I suppose it is tempting, if the only tool you have is a

hammer, to treat everything as if it were a nail." In terms of instructional strategies used among early childhood special education professionals, this concept could suggest that educators tend to use strategies that they know the most about. As mentioned previously, this could be a problem given that the least used strategies involved teaching specific skills despite research suggesting that children with disabilities may benefit from explicit instruction designed to teach specific skills (e.g., Evans Cosbey & Johnston, 2006; Nelson et al., 2007; Peterson & McConnell, 1993; van der Meer et al., 2012). Further research is warranted to discern whether the "law of instrument" is impacting professionals' use of instructional strategies and if additional "tools" need to be included their toolbox. A second plausible explanation for the similar pattern of responses noted for the knowledge and use of instructional strategies may be that the strategies that educators have found to be most useful are the strategies that they have sought to learn the most about. This could suggest that the instructional strategies that were reported as being used most frequently have the highest level of social validity. If this is the case, then future research should more closely examine why some strategies have greater social validity than others.

Knowledge and Use of Assistive Technology Tools

The survey participants' reported knowledge of AT tools was not as high as their reported knowledge of instructional strategies. If the two categories of "very knowledgeable" and "knowledgeable" are combined, the reported knowledge across all AT tools ranges between 31%-95%. This finding suggests that overall, early childhood special education professionals are less knowledgeable about AT tools than instructional strategies.

It is interesting to note that the three AT tools that received the most responses in the category of "do not know this tool," relate to speech generating devices (SGDs). Given the significance of communication in early childhood development and research demonstrating the positive impact of SGDs in early childhood special education settings (e.g., Campbell et al., 2006; Evans-Cosbey & Johnston, 2006; Parette & Stoner, 2008; van der Meer et al., 2012), this finding is particularly important.

The survey participants' reported use of AT tools followed a similar pattern to their reported knowledge of AT tools. It is noteworthy that four of the five AT tools that received the highest percent of responses in the category of "never used this tool" (i.e., "Greater than [32] message speech generating device (SGD), [2-32] message speech generating device (SGD)", "single message speech generating device (SGD)", and "computer peripherals") are dedicated devices that are designed to be used with students in special education, rather than universally designed technology products (Judge, Floyd, & Jeffs, 2008; Rose & Myer, 2000). The more limited use of dedicated AT tools is somewhat disconcerting given research supporting their efficacy in promoting communication and play skills among children with disabilities (Campbell et al., 2006; Evans Cosbey & Johnston, 2006; Hamm, et al., 2006; Parette & Stoner, 2008; van der Meer et al., 2012).

Combined Use of AT Tools and Instructional Strategies

When examining the use of instructional strategies in conjunction with AT tools, four of the five most used strategies, regardless of the AT tool, relate to modifying the environment (e.g., "change or modify the environment to encourage play and social interaction", "modify or expand an activity to encourage the development of a specific skill", etc.). It is interesting to note that

when the AT tools are subdivided into categories related to their function (i.e., dedicated AT to support communication, dedicated AT to support access/engagement, non-dedicated AT related to computers/technology) the pattern of the top five instructional strategies is very similar. This suggests that early childhood special education professionals do not vary their use of instructional strategies based on the AT tool. Further research is needed to determine whether or not instructional strategies should vary based on the function of the AT tool. However, it seems plausible that while some AT tools (e.g., positioning devices, adapted play materials) can be used effectively when the primary instructional strategies relate to modifying the environment (e.g., "change or modify the environment to encourage play and social interaction"), other AT tools (e.g., communication boards, [2-32] message SGD, etc.) may require instructional strategies that involve teaching the child specific skills and or behaviors (e.g., "teach a child to join a play group") in order to be used effectively.

Limitations

There are limitations to this study that should be taken into account when interpreting the results. First, this study provided information regarding the reported knowledge and use of specific instructional strategies and AT tools. Due to the fact that this survey was a self-report measure, information related to the extent to which these teaching methods and tools are actually being implemented in early childhood special education settings is not available. Second, the survey sample was limited to DEC members; therefore, the findings of this investigation may not generalize to all professionals in early childhood special education.

Implications

The survey respondents' reported high levels of knowledge and use of evidence based instructional strategies for teaching play skills in early childhood special education settings is promising, and suggests that educators are utilizing evidence based instructional strategies. Although early childhood special education professionals reported high levels of knowledge and use of evidence based instructional strategies, it is noteworthy that none of the instructional strategies that received greater than 50% of the responses indicating "very knowledgeable" included the verb "teach". This may suggest that educators feel less knowledgeable about instructional strategies that involve teaching a child a specific behavior. If this is the case, then additional training and support in this area is warranted.

Relative to their reported knowledge and use of instructional strategies, respondents' knowledge and use of AT tools was more limited. Given the positive impact of AT in early childhood special education settings (Campbell et al., 2006; Judge, Floyd, & Jeffs, 2008; Parette & Stoner, 2008; Sadao & Robinson, 2010), further research is needed to determine the factors that are influencing this finding.

Finally, information related to respondents' use of instructional strategies in combination with AT tools suggests that practitioners tend to use the same instructional strategy regardless of the AT tool. Further research exploring the extent to which instructional strategies should vary across AT tools is warranted. Further, if research reveals that early childhood special education professsionals lack knowledge and experience in the use of a variety of instructional strategies in conjunction with AT, then opportunities for training should be increased. Conversely, if research

reveals existing instructional strategies are not effective and/or are not socially valid when used in conjunction with AT, then new strategies should be developed and empirically validated.

In summary, this survey study provides information related to early childhood special education professionals' (a) knowledge and use of evidence based instructional strategies for teaching play skills to young children with disabilities, (b) knowledge and use of AT tools, and (c) use of specified instructional strategies in conjunction with AT tools to teach play skills to young children with disabilities. This study advances the understanding of early childhood special education professionals' knowledge and use of evidence based instructional strategies and AT tools, and has the potential to help special education practitioners, administrators, and professionals in higher education understand areas in which to enhance service delivery to children with disabilities, as well as to enhance the education of current and future practitioners.

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