

Education and Training in Developmental Disabilities

Focusing on individuals with
cognitive disabilities/mental retardation, autism, and related disabilities

Education and Training in Developmental Disabilities

*The Journal of the Division on Developmental Disabilities,
The Council for Exceptional Children*

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Parents as teachers: Teaching parents how to teach toilet skills to their children with autism and mental retardation. Nihal Ozcan and **Atilla Cavkaytar**, Anadolu University, Faculty of Education, Department of Special Education, Eskisehir, 26470, TURKEY.

Secondary and postsecondary community activities of youth with significant intellectual disabilities. **Laura Eisenman**, Annie Tanverdi, Carol Perrington, and Allison Geiman, 213H WHL School of Education, University of Delaware, Newark, DE 19716.

Teaching students with cognitive impairment chained mathematical task of decimal subtraction using simultaneous prompting. **Shaila Rao** and Martha T. Kane, 2034 Quail Cove Drive, Kalamazoo, MI 49009.

Using videoconferencing to conduct functional analysis of challenging behavior and develop classroom support plans for students with autism. Wendy Machalicek, **Mark O'Reilly**, Jeffrey M. Chan, Russell Lang, Mandy Rispoli, Tonya Davis, Karrie Shogren, Jeff Sigafoos, Giulio Lancioni, Massimo Antonucci, Paul Langthorne, Alonzo Andrews, and Robert Didden, Department of Special Education, The University of Texas at Austin, 1 University Station D5300, Austin, TX 78712.

Assessment of leisure preferences for students with severe developmental disabilities and communication difficulties. Janice Kreiner and **Robert W. Flexer**, Center for Innovation in Transition and Employment, Kent State University, 202 White Hall, Kent, OH 44242.

Review of recent research using constant time delay to teach chained tasks to persons with developmental disabilities. Maud Dogoe and **Devender R. Banda**, Department of Educational Psychology and Leadership, College of Education, P.O. Box 41701, Texas Tech University, Lubbock, TX 79409.

Assistive technology user group perspectives of early childhood professionals. **Howard P. Parette**, Julia B. Stoner, and Emily H. Watts, Department of Special Education, Illinois State University, Box 5910, Normal, IL 61790-5910.

Comparison of transition-related IEP content for young adults with disabilities who do or do not have a legal guardian. **Dorothy Squatrito Millar**, Saginaw Valley State University, College of Education, 7400 Bay Road, University Center, MI 48710.

Why do individuals with intellectual disability turn to religion: A comparison between adolescents and adults. **Hefziba Lifshitz**, Izhak Weiss, Sara Fridel, and Rivka Glaubman, Bar-Ilan University, School of Education, Ramat-Gan, 52900, ISRAEL.

Assessment of treatment integrity in behavioral intervention studies conducted with persons with mental retardation. **John Wheeler**, Michael R. Mayton, Stacy L. Carter, Morgan Chitiyo, Anthony L. Menendez, and Ann Huang, College of Education, Tennessee Tech University, Box 5116, Cookeville, TN 38505.

Comparison of self-prompting of cooking skills via picture-based cookbooks and video recipes. **Linda C. Mechling** and Erin Stephens, Department of Early Childhood & Special Education, University of North Carolina Wilmington, 601 South College Road, Wilmington, NC 28403-5940.

Predicting the learning ability of children with autism: The assessment of basic learning abilities test versus parents' predictions. Lisa J. V. Schwartzman, Tricia Vause, **Garry L. Martin**, C. T. Yu, Lindsay Campbell, Matthew Danbrook, and Maurice Feldman, 129 St. Paul's College, University of Manitoba, Winnipeg, Manitoba R3T 2M6, CANADA.

Address is supplied for author in **boldface** type.

No Child Left Behind, the Individuals with Disabilities Education Act and Functional Curricula: A Conflict of Interest?

Emily C. Bouck
Purdue University

Abstract: Is a functional curriculum aligned with the federal education policies of No Child Left Behind (2002) and the Individuals with Disabilities Education Act (IDEA, 2004)? This article analyzes the alignment, or lack thereof, between this approach to educating secondary students with mild mental impairment and the two main federal education laws governing their education. It explores the relationship across four areas: general education curriculum and setting, accountability, highly qualified teachers, and scientifically-based research. The analysis suggests that there may be a conflict of interest between the functional curriculum model and federal legislation.

Students with disabilities, particularly developmental disabilities, and those that educate them face uncertain times. Federal education legislation has shifted the focus of education in general, and thus special education. Within the federal policies affecting the education of students with disabilities – *No Child Left Behind* (NCLB, 2002) and *Individuals with Disabilities Education Act* (IDEA, 1997, 2004) – the agenda for K-12 education has moved from access to outcomes with a focus on academics. With these shifts in focus, one has to wonder if there is a place for a functional curriculum to educate secondary students with mild mental impairment.

NCLB (2002), the reauthorization of the federal Elementary and Secondary Education Act, was founded on four pillars: stronger accountability, more freedom for states and communities (i.e., greater local control), use of proven educational methods (i.e., scientifically-based research), and more choices for parents. Its purpose is to make sure that every student has access to and achieves a quality education based on high standards (Yell & Drasgow, 2005). State standardized tests are

used to validate student and school achievement and progress, with a goal of 100% proficiency rate in reading and mathematics by the 2013–2014 school year.

The federal special education law, IDEA (2004), first passed in 1975, guarantees a free and appropriate public education in the least restrictive environment for students with disabilities, with a focus on individualization and protection under due process (Turnbull, Huerta, & Stowe, 2006). The most recent reauthorization of IDEA emphasized access for students with disabilities to the general education curriculum and participation in general large scale assessments, in alignment to NCLB. Hence, NCLB and IDEA both focus on what to teach (curriculum) and where to teach it (instructional environment) and suggest what is valued and desired in the education of students with disabilities.

Given the predominance of both policies towards increased academic achievement, especially in literacy and mathematics, and a push for schools to use evidence-based educational interventions, one has to wonder where a functional curriculum fits in as an option for educating secondary students with mild mental impairment. Do these laws provide a space for a functional curriculum, which focuses on the skills necessary to live, work, and have fun in society, to educate this population of students, students who have a below-average IQ

Correspondence concerning this article should be addressed to Emily C. Bouck, Purdue University, 5146 BRNG Hall, 100 N. University St., West Lafayette, IN 47907. Email: bouck@purdue.edu

and have limitations in adaptive functioning (Polloway, Smith, Chamberlain, Denning, & Smith, 1999)? Or does a functional curriculum and NCLB (2001) and IDEA (2004) face a conflict of interests?

This paper examines NCLB (2002) and IDEA (2004) and how they connect (or fail to connect) with a functional curriculum approach to educating secondary students with mild mental impairment. The first section of the paper discusses what a functional curriculum is and gives a historical perspective on this curricular approach. The next section discusses the alignment, or lack thereof, between functional curricula and the two policies. Here four main areas are highlighted: access to the general education curriculum and setting, accountability and assessment, highly qualified teachers, and scientifically-based practices. The paper concludes with suggestions for future research and implications for practice regarding functional curricula.

Functional Curriculum

A functional curriculum reflects one option with which to educate students with disabilities and was developed after reflecting upon already existing curriculum, the common events one needs to confront and handle in a community, and the belief that what was occurring in schools failed to address the knowledge and skills necessary for post-school success for students with mild mental impairment (Bigge, 1988; Retish, Hitchings, Horvath, & Schmalle, 1991; Sabornie & deBettencourt, 1997; Schmalle & Retish, 1989). Snell (1997) suggested that functional curricula were developed to help students with disabilities acquire the adaptive skills needed in life that they did not possess and would not develop unless explicitly taught.

Components of a functional curriculum, supported in the literature, include the functional application of skills from the core subject areas (academics), vocational education, community access, daily living, finances, independent living, transportation, social/relationships, and self-determination (Patton, Cronin, & Jairrels, 1997). These represent the core areas of knowledge needed by students with disabilities to live, work, and have fun in

an inclusive community (Brown et al., 1979; Falvey, 1989; Snell & Browder, 1987).

A functional curriculum aligns with the belief that students with disabilities, who do not plan on and/or are not capable of attending post-secondary school, do not need to focus on higher academics (e.g., mathematics – trigonometry, advanced algebra), but do need to understand functional academics (e.g., mathematics – money, time) (Patton, Cronin, & Bassett, 1997). And they need specific instruction in the elements of a functional curriculum, as research suggests that these students do not acquire these skills on their own or from just observing parents and peers (Edgar, 1988; Halpern & Benz, 1987; Sitlington, Frank, & Carson, 1993; & Wagner et al., 1992). In other words, it is not sufficient to assume students with disabilities will acquire daily living skills, vocational skills, or community access skills without direct instruction in these areas, which means they need to have access to a curriculum that specifically addresses these aspects so they can gain the skills necessary to achieve positive post-school outcomes, such as independent living, economic self-sufficiency, and full participation in community (Patton, Smith, Clark, Polloway, Edgar, & Lee, 1996; Turnbull et al., 2006).

With recognition that secondary students with disabilities are not well prepared for adult life, a growing number of educators and researchers have called for a renewed and increased use of a functional curriculum (Bigge, Stump, Spagna, & Silberman, 1999; Bouck, 2004b; Cronin, 1996; Dever & Knapczyk, 1997; Knowlton, 1998; Patton, Polloway, & Smith, 2000). Billingsley and Alberston (1999) suggested that the quality of life of a student with a disability is dependent on acquiring functional skills. Clark (1994) and Patton and colleagues have argued that all students with a disability need a functional curriculum, particularly at the secondary level. Yet, there exists controversy regarding a functional curriculum as some feel that it is only suitable for students with severe disabilities (Clark). Unfortunately, making an informed decision for whom, and if, a functional curriculum is appropriate is problematic as it is an under-researched area in the field of secondary special education, both in terms of evidence as to the inclusion

of its components as well as research on its impact on school and post-school student outcomes.

Support for a functional curriculum for students with mild mental impairment has come from limited sources. Polloway, Patton, Smith, and Roderique (1991) suggested that a student's subsequent environments should determine his/her curricular approach in school. For students who are not likely to attend post-secondary education, Edgar and Polloway (1994) suggested that rigorous academic curricula models are inappropriate. Instead curriculum models focusing on work and preparation for other adult role responsibilities should be utilized, such as life skills, vocational skills, etc. Smith and Puccini (1995) raised similar concerns regarding the use of a rigorous academic curriculum model for students with disabilities stating, "... exposing students to longer periods of time to inappropriate curricula or teaching efforts does not result in improved educational performance or an improved likelihood of success as adults" (p. 279). They also argued that too many students with disabilities at the secondary level were not receiving a curriculum that prepares them for independent living or gives them the necessary skills to be successful after high school, and that "students with disabilities should not be included in general education classes and settings and provided curricula that are not germane to their needs in developing independent living skills" (Smith & Puccini, p. 281).

Historical perspective. Functional curriculum is not a recent phenomenon; its theory actually predates its peak usage time during the late 1970s-early 1980s. Its use in practice and emphasis in research diminished from the 1970s to the 1990s. Nietupski, Hamre-Nietupski, Curtin, and Shrikanth (1997) discovered a decrease of 32% in the number of articles that discussed functional skills during this time span. Billingsley (1997) also noted a decrease in attention to functional skills in articles cited by ERIC between the mid-1980s and mid-1990s (53% reduction). This reduction in emphasis on functional skills (i.e., functional curricula) in practice and research has been linked to the increased emphasis on inclusive education. Billingsley and Albertson (1999) indicated that an emphasis on inclu-

sion increased the "marginalization, or absence" of attention to functional skills and functional curricula (p. 299), and they suggested that functional skills instruction or curriculum deserves a "renewed interest and attention" in both research and in practice (p. 301).

Functional Curricula and Federal Policy

Despite the recent decrease in attention regarding functional curricula, some researchers believe that it is still a viable, and most appropriate, option for educating secondary students with mild mental impairment (Bouck, 2004a). However in this era of federal education legislation (i.e., NCLB, 2002; IDEA, 1997, 2004), one must still question the role and need for a functional curriculum for students with disabilities and investigate alignment between the curriculum model, current policies, and the purpose and goals of special education. This is particularly important with regards to some of the more controversial aspects of NCLB and IDEA: access to the general education curriculum and setting, accountability, highly qualified teachers, and use of scientifically-based research.

Access to general education curriculum and setting. IDEA, (2004) predates by earlier reauthorizations of the IDEA, states that students with disabilities should be given access to the general education curriculum and educated in the "least restrictive environment." Yet, what exactly constitutes access to the general education curriculum and least restrictive environment raises controversy. If access to the general education curriculum means access to inclusive classes that teach mathematics, science, language arts, and social studies then a functional curriculum does not align. Although a functional curriculum includes mathematics, science, language arts, and social science through its focus on *functional academics*, it is not the same content or purpose. For example, instead of helping students understand a concept of advanced algebra, a functional curriculum focuses on students understanding finances, such as receiving paychecks, paying bills and taxes, and budgeting. With regards to the least restrictive environment, there is debate among those that are conservationists and believe in the

continuum of placements and those that are inclusionists (Dorn & Fuchs, 2004). A functional curriculum has been used primarily in self-contained, or pull-out, special education classroom settings, as opposed to inclusive classes (Nolet & McLaughlin, 2000). Hence, it works to preserve the continuum of services first guaranteed by IDEA.

A functional curriculum has often been viewed as an alternate curriculum, in reference to the general education curriculum (Nolet & McLaughlin, 2000) and hence defined as deviant from the “norm” or accepted curriculum. Despite criticism and perception, Edgar and Polloway (1994) argued that alternate curricula, such as a functional curriculum, does not mean “a watered down version of the same curriculum” (p. 443). Instead, a functional curriculum reflects a different curricular option and hence teaches a different set of topics and skills. Edgar and Polloway suggested that an alternative curriculum may not be “dumbed down” but instead may be better than the general education curriculum, particularly when one considers the needs of the students it is being used to educate (p. 444), which could be argued in the case of using a functional curriculum to educate students with mild mental impairment.

Weaver, Landers, and Adams (1991) also argued that the educational community has often associated a functional curriculum with a “limited curriculum” (i.e., a limited set of skills) (p. 284). Yet, Weaver and colleagues contended that this is not accurate. A functional curriculum actually embodies the principles all individuals need to be a contributing member to society (i.e., daily living, vocational, social, financial skills, etc). Weaver and associates stipulated a functional curricular approach is grounded by teachers continually asking themselves, “How, when, and where will my students use this knowledge in their lives, now and in the future?” (p. 285), to ensure that what students receive in school is useful and assists them in securing successful post-school outcomes. Thus, rather than being limited by alignment with the general education curriculum, and therefore NCLB (2002) and IDEA (2004), a functional curriculum may be more closely aligned to the knowledge, skills, and experiences students with mild mental impairment will need after

school. In reality, a functional curriculum may actually be better aligned with helping assist students in achieving the four national policy goals established for individuals with disabilities: equal opportunity, full participation, independent living, and economic self-sufficiency (IDEA; Turnbull et al., 2006).

Consideration of alignment or lack thereof, between current education legislation and functional curricula also needs to consider the educational setting or placement. While neither IDEA (2004) nor NCLB (2002) officially mention inclusive education, IDEA does reference the “least restrictive environment” which is interpreted as educating students with disabilities with students without disabilities to the maximum extent possible (Turnbull et al., 1996). Thus, challenges to a functional curriculum arise from the issue of placement – namely that a functional curriculum often occurs in a “segregated” setting, as opposed to the general education setting (Field, LeRoy, & Rivera, 1994). Field and colleagues noted that often, to make a curriculum functional for students with disabilities, it needs to be taught in a setting other than general education; one that allows students to gain daily living skills, community exposure as well as vocational training. Yet, with the current interpretation of IDEA’s “least restrictive environment” being the general education setting, a misalignment exists between the interpretation of the policy (IDEA) and the implementation of a functional curriculum.

Accountability and assessment. With an emphasis on the general education curriculum and setting comes a focus on accountability for students with disabilities (Branstad et al., 2002; IDEA, 2004; NCLB, 2002). All students, including those with disabilities, are now required to participate in yearly testing in grades three through eight and once again between grades 10 and 12 in literacy, mathematics, and science (NCLB). In general, students with disabilities are to take the general large scale assessment, although some students take an alternate assessment. While an unlimited number of students may take an alternate assessment, federal policy only allows for up to 1% of total school population to take the alternate assessment and have it count towards a school’s Annual Yearly Progress (AYP) (Branstad et al., NCLB). Thus, the majority of alter-

nate assessments have been typically designed for students with severe disabilities (Kleinert & Thurlow, 2001; Thompson, Quenemoen, Thurlow, & Ysseldyke, 2001; Ysseldyke, Olsen, & Thurlow, 1997), leaving students with mild mental impairment with few options.

The focus on “who” should take alternate assessments, such as students with severe disabilities, creates challenges for the “what” of instruction. With the focus of alternate assessments on students with severe disabilities, students with mild mental impairment are often excluded (Bouck, 2007). If this population is largely excluded from alternate assessments, the type of curriculum used to educate students with mild mental impairment needs to be questioned. For example, it would be unfair to students and a disadvantage to a school for teachers to use a functional curriculum for secondary students with mild mental impairment if they are to be tested on the general education large scale assessment aligned to state standards. Yet, a functional curriculum might present these students with the skills, knowledge, and experiences they need to be successful after school.

Recently, the United States Department of Education has recognized the limited nature of federal policy on alternate assessments. In 2007, the United States Department of Education indicated that “a small group of students with disabilities” would be allowed to use modified achievement standards and take alternate assessments based on the modified achievement standards (p. 17748). Students who fit within this category are believed to be those for whom the general large scale assessment is too challenging and the current alternate assessment aligned to alternate standards too easy, and thus, neither accurately measuring a student’s abilities. While this move may at first seem promising for students with mild mental impairment, it does not hold much assurance for alignment with a functional curriculum. These modified standards and assessments must still be aligned with grade-level content, making it questionable if they would align with the content found within a functional curriculum. This continues to raise questions regarding the appropriateness of a functional curriculum as the curriculum of choice for students with mild mental impairment.

Highly qualified teachers. Both NCLB (2002) and IDEA (2004) stipulate that all teachers, including special education teachers, should be highly qualified. Each law discusses what it means to be highly qualified according to the level at which the teacher teaches: elementary or secondary, and, for special education teachers, if their students are to be following general or adapted state standards.

At the secondary level, the focus on highly qualified teachers is on those that provide instruction in the “core academic areas”: reading/language arts/English, mathematics, science, government, history, geography, civics, economics, and foreign languages (Yell & Drasgow, 2005). NCLB (2002) and IDEA (2004) do not really discuss the components of a functional curriculum with regards to highly qualified special education teachers, as many of the topics are not encompassed within the core content areas. This suggests three interrelated curriculum content and teacher quality issues: (1) A functional curriculum is not valued as it is not important that teachers be “highly qualified” in the components and overall understanding of this type of curriculum (i.e., have coursework or in-service experiences); (2) no special knowledge, understanding or skills are needed to implement a functional curriculum approach or functional curriculum components for students with disabilities; and (3) students with disabilities who receive a functional curriculum are not a high priority, as the educational background of who teaches this curriculum for this population is not important, particularly since it is not a valued curriculum.

Scientifically-based research practices. A final issue to explore regarding NCLB (2002), IDEA (2004), and a functional curriculum is scientifically-based research. Scientifically-based research (SBR) is mentioned over 100 times in NCLB (Latisch, 2003; NCLB, 2002; Trybus, 2004). The implication is that only those instructional strategies and methods, curricula, and professional development programs that have evidence of their effectiveness with regard to student achievement should be used in schools (NCLB). The SBR requirement moves schools away from using personal experiences or anecdotal evidence as the means for educational decision-making, to an expectation they will seek out and interpret

research that involves empirical methods analyzed in a rigorous fashion (i.e., typically assumed to be experimental or quasi-experimental) to make curriculum, instruction, assessment, and professional development decisions (Gersten et al., 2005; NCLB).

A functional curriculum approach to teaching secondary students with mild mental impairment currently does not conform to NCLB's (2002) scientifically-based research requirements. There is limited current research regarding a functional curriculum approach for this population, as indicated by a decrease in research on this approach (Billingsley & Albertson, 1999; Nietupski et al., 1997). Hence, it is difficult to have the empirical evidence to support this curricular approach in practice if one follows federal policy guidelines.

However, there is some research to support a functional curriculum for students with disabilities. Benz, Lindstrom, and Yovanoff (2000) studied the Youth Transition Program (YTP), which provided services for special education students in their last two years of high school and involved transition planning based on post-school goals and self-determination; instruction in functional academics, vocational, independent living, and personal-social content areas; paid work experience; and a two-year follow-up service component on an as needed basis (Benz, Lindstrom, & Latta, 1999). Students in the YTP had graduation rates of 72%, and within that figure, the rates doubled for those who had two years in the program as opposed to one or less years (Benz et al., 2000). After graduation, 68% were engaged in productive work or some sort of post-secondary education.

The Youth Transition Program was recognized as an exemplary school-to-work transition model by the U.S. Department of Education (Benz et al., 1999). Follow-up studies found that students with disabilities who participated in YTP had better post-school outcomes than students who did not participate in YTP. The participating students were found to have higher average hourly wages; higher average weekly wages; higher maintenance of employment; less likely to have lost their job because they quit, were laid off, or fired; and more likely to be determined eligible for rehabilitation services (Benz et al.).

On a smaller scale, Miller (1994) also found positive results after implementing a functional approach for adolescents with high incidence disabilities. Miller examined the *On Your Own* curriculum, a functional curriculum for adolescents with "mild disabilities" geared towards developing skills in selecting a career, finding living arrangements, and budgeting. He found that after implementation of the curriculum, the percentage of students skipping class was reduced by 80% and referrals to the principal for reasons of non-compliance behavior was reduced by 72%.

Discussion

A functional curriculum represents a different, yet a viable and potentially successful, approach to educating secondary students with a disability, such as students with mild mental impairment. Research and literature suggest that a functional curriculum may assist these students in achieving better post-school outcomes, something which research has repeatedly illustrated is needed (Cameto & Levine, 2005; Wagner, 2003). Although there are advocates for a functional curriculum approach to educating this population (Bouck, 2004b; Cronin, 1996; Dever & Knapczak, 1997; Patton et al., 2000), it seems to be a curriculum and educational philosophy not supported by current federal education policies, such as IDEA (2004) or NCLB (2002). There appears to be a mismatch between federal legislation and a functional curriculum regarding curricular components and setting, accountability and assessment, highly qualified teachers, and scientifically-based practices.

General Education Curriculum and Setting

The *Individuals with Disabilities Education Act* (1997; 2004) has long emphasized that students with disabilities should be provided access to the general education curriculum and educated, whenever possible, in the least restrictive environment, which many have taken to mean the general education setting (Turnbull et al., 2006). A functional curriculum approach to educating students with disabilities appears to be at odds with the policy's intent with regards to the general education curric-

ulum and setting. Functional curricula were largely developed because of what educators felt was missing in the education of students with disabilities – daily living, functional academics, independent living, community, etc., or in other words, what the general education curriculum was lacking in the preparation of these students (Retish et al., 1991; Schmalle & Retish, 1989). Yet, these skills, and others included in functional curricula, continue to be as important today in the preparation for post-school life for students with disabilities as they were prior to NCLB (2002) and the reauthorization of IDEA. What is taught to students with disabilities should not be based solely on a state’s general set of curriculum standards, or the setting in which they are educated, but rather on how it can benefit students and help them to achieve their post-school goals.

Accountability and Assessment

A large focus of both IDEA (2004) and NCLB (2002) is accountability. A functional curriculum approach to educating secondary students with mild mental impairment does not align well with the emphasis of these policies, specifically in terms of students with disabilities taking the general large scale assessment, even with accommodations. For example, the focus on accountability, as measured by a state’s general large scale assessment and then a school’s Annual Yearly Progress (AYP), predicates a general education curriculum aligned to state standards. Yet, it would be unfair to test students with mild mental impairment using this general assessment if they were not educated using a curriculum aligned to their state’s standards and hence assessment. A functional curriculum would then disadvantage a school district, and the students, as it would be difficult for a student to pass a test if they have not received instruction based on its content. It would also be unfair to give students a curriculum, such as the general education aligned to the state standards, when it is clear that the students are not at their developmental level and it does not position them for successful post-school outcomes. Hence, the question becomes does the field (a) teach a functional curriculum and develop a new accountability system that recognizes differences in needs, or (b) teach a general educa-

tion curriculum to all and keep the same accountability system? Although the government has recently acknowledged that neither the general large scale assessment or the current alternate assessment is appropriate for all students with disabilities, it is unclear if a functional curriculum for students with mild mental impairment would be considered appropriate under the revised model as it calls for a modified alternate assessment aligned to modified state standards and includes only another 1% of the total school population, likely only 20% of the students with disabilities.

Furthermore, with the focus on accountability and the general education curriculum, one has to question why these policies have lost sight of the original underpinnings of public education: to develop productive and responsible citizens for a democratic society (Brick, 2005; Cornbleth, 1985; Cuban, 2003; Curtis, 1991; Heyneman, 2003; Patton, Pollo-way, & Cronin, 1987). Do these policies and their principles move the field from a premise of equal and equitable education for all to the “same” education for all when same does not mean equitable (NCTM, 2000). In the last 100 years, schools and society have come a long way towards achieving the goal of educating all children, including children with disabilities. The field now must try not to oversimplify the complexity of what it means to educate all by reducing it to “the same” and allowing this presumption to determine both curriculum and assessment that every student receives. This is not to say that any student should be denied the opportunity or support needed to study important and challenging content, but it does question the idea of what is important and challenging to whom. There is a reason special education programs and curricula, such as a functional curriculum, came into existence, and NCLB (2002) and IDEA (2004) should not undermine or oversimplify the needs of the students in these programs.

Highly Qualified Teachers

While no one would deny that every student deserves a highly qualified teacher, NCLB (2002) and IDEA (2004) focus on highly qualified teachers for particular areas, defined as the core content areas. Federal policy suggests that requirements for a highly qualified

teacher depend on who or what one teaches. For example, IDEA differentiates between teachers who teach to the state standards and those who teach to alternate achievement standards. Secondary special educators who teach to alternate achievement standards are stipulated as meeting NCLB's requirements if they are licensed and qualified to be an elementary teacher, whereas those that teach the traditional state standards are required to meet the requirements for a secondary teacher for each core area for which they are the primary instructor (IDEA; Turnbull et al., 2006).

In this distinction, it is somewhat unclear where teachers of students with mild mental impairment who use a functional curriculum fall. The teachers are generally not teaching to alternate standards, as many states have reserved alternate assessments, and subsequently the alternate standards they are aligned to, for students with severe disabilities (Kleinert & Thurlow, 2001; Thompson et al., 2001; Ysseldyke et al., 1997). Yet, a functional curriculum's functional academic content component may be closer to the elementary level of skills than the secondary. Hence, there is confusion if special education teachers implementing a functional curriculum need to be highly qualified in the core areas they teach to this population (i.e., functional literacy, mathematics, etc.). And one has to ask why these teachers do not need to be highly qualified in the other components. Isn't it important that a highly qualified teacher prepare students in vocational education, social skills, daily living skills, etc.? If the premise of highly qualified teachers is that teacher quality affects student outcomes (Hanushek, 1992; Sanders & Rivers, 1996; Whitehurst, 2003), shouldn't all students have highly qualified teachers regardless of the content or curriculum?

Scientifically-Based Research

While a functional curriculum has support from teachers and researchers in the field of special education, it may not have the literature base needed to be an evidence-based practice, as stipulated by NCLB (2002). This lack of scientifically-based research on a functional curriculum may be perpetuated by a

catch-22 situation. A functional curriculum for students with mild mental impairment does not appear to be widely supported by federal policies that stipulate general education curriculum and accountability. The lack of governmental support for functional curricula may decrease the financial support for research in this area. And the lack of support for research on the effects of using a functional curriculum may result in less use in the curriculum due to lack of research providing evidence of effective practice. In contrast, the lack of attention to this issue in the field, such as through research, may actually be decreasing its governmental support as its benefits are not being disseminated. Perhaps if research increases and greater attention is given to functional curricula for students with mild mental impairment, government support and recognition would be provided in terms of its implementation in practice and place in research.

Conclusion

Although a functional curriculum approach to educating secondary students with disabilities appears in conflict with current education legislation, *No Child Left Behind* (NCLB, 2002) and the *Individuals with Disabilities Education Act* (IDEA, 2004), it is important to note that a functional curriculum may still be the approach needed to successfully meet the needs of this population of students. In particular, a functional curriculum might be well-suited for helping students with mild mental impairment achieve the goals defined in America's policy related to individuals with disabilities, namely equal opportunity, full participation, independent living, and economic self-sufficiency (IDEA; Turnbull et al., 2006) as well the original conception of public education – productive citizens in a democratic society. Thus, the question becomes, does current policy meet the needs of all students, especially those with disabilities, or are we now leaving those students behind, again?

Students with mild mental impairment deserve an equal opportunity to learn the skills and knowledge they need to be successful in the world they face after high school. A functional curriculum has been shown to provide these students the opportunities to learn in-

dependent living skills, daily living skills, social skills, and vocational skills to find success post-school. Previous research has suggested that students with disabilities usually do not acquire these skills independently and thus a functional curriculum is needed to enable students to achieve positive post-school outcomes, such as equal opportunity, full participation, independent living and economic self-sufficiency (Edgar, 1988; Halpern & Benz, 1987; Sitlington et al., 1993; Wagner et al., 1992).

Individuals with disabilities deserve full participation and an equal opportunity, but full participation and equal opportunity do not necessarily equate to inclusive school settings and general education curriculum. Providing the “same” is not providing equal opportunity, and full participation should be focused on providing classes and environments that work on developing the knowledge and skills necessary for post-school opportunities rather than just traditional high school courses. The focus of secondary education should be to prepare students for the life after school, and for students with mild mental impairment this includes full participation in the community and an equal opportunity to succeed in work, independent living, and social activities. By utilizing a functional curriculum in school, students with mild mental impairment would have increased access to community settings, vocational opportunities, development of social skills and self-determination. By gaining these experiences, skills, and knowledge prior to leaving school and entering the work force, and/or independent living situations, students with mild mental impairment can increase the potential for successful outcomes.

Finally, national policy suggests that goals for individuals with disabilities be independent living and economic self-sufficiency. It seems intuitive that learning and practicing these skills in high school, such as through a functional curriculum that emphasizes components of independent living, vocational education, and financial skills, would increase students’ chances to be successful in these areas after school. All students deserve an appropriate curriculum, even if it does not completely align with current federal education policy.

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State Guidelines for Mental Retardation and Intellectual Disabilities: A Re-visitation of Previous Analyses in Light of Changes in the Field

Edward A. Polloway
Lynchburg College

James R. Patton
University of Texas at Austin

J. David Smith
University of North Carolina, Greensboro

Jacqueline Lubin and Karian Antoine
Lynchburg College

Abstract: In 2002, the American Association on Mental Retardation (AAMR) (Luckasson et al., 2002) revised their manual on mental retardation. It also extended the changes that had been made in the previous (1992) manual to further promote an alternative approach to definition and classification in the field. The study reported here sought to determine the impact of the 2002 manual on educational practices across the United States. To do so we researched state guidelines for terminology, definition, and classification. Responses were obtained from a survey of practices of and/or a website review from all 50 states plus the District of Columbia. Practices regarding terminology, definition, and classification were determined and the findings are highlighted in this study. Implications are noted with special attention to trends among the states and to emerging considerations with regard to terminology, definition, and classification practices within the field.

Over the last 20 years, the field of mental retardation has undergone continued professional scrutiny with regard to appropriate terminology, category definition, classification systems, and assessment procedures. Periodically, trends in the field have been expressed in revisions to the American Association on Mental Retardation's (AAMR) manuals. These revisions have become a basis for continued re-consideration of key issues in the field and typically reflect changes in public policy, professional practice, and/or science and understanding of retardation.

In 2000, Denning, Chamberlain, and Polloway researched state education regulations and guidelines to determine the apparent impact of the Luckasson et al. (1992) AAMR manual and definition on state educational

practices. These researchers sought to analyze findings across all states and place these results within the context of emerging considerations in the field. The study was the first significant state review since that of Frankenger (1984).

The Denning et al. (2000) study provided a basis for assessing the impact of the Luckasson et al. (1992) manual, which had signaled key changes in the AAMR's recommended system for definition and classification (e.g., conditions for the definition's appropriate use, changing the concept of adaptive behavior to the more specific 'adaptive skills', and replacing the classification system of levels of deficit with a system of levels of needed supports). The Luckasson et al. (1992) manual was presented by some (e.g., Luckasson, Schalock, Snell, & Spitalnik, 1996; Polloway, 1997; Reiss, 1994; Schalock et al., 1994) as indicative of a positive paradigm shift in the field. However, it received far less positive reviews from others (e.g., Greenspan, 1997; Jacobson & Mulic, 1996; MacMillan, Gresham, & Siperstein, 1993; Smith, 1994). Switzky and Greenspan (2006) summarized reasons why the Luckasson et al. (1992) manual received less than

The authors acknowledge the assistance of Betty Shelton in the preparation of this manuscript. Correspondence concerning this article should be addressed to Edward A. Polloway, Office of Graduate Studies and Community Advancement, Lynchburg College, Lynchburg, VA 24501. Email: polloway@lynchburg.edu

universal support from professionals within the field, highlighting concerns about the lack of input about the ways in which the earlier Grossman (1983) manual should have been changed as well as the decision by APA's Division of Mental Retardation and Developmental Disabilities to develop their own alternative manual on classification (Jacobson & Mulic, 1996).

In the Denning et al. (2000) study, 26 states (51.0%) continued to use the term mental retardation; other terms used by at least three states included mentally disabled/ mental disability, mentally impaired/mental impairment, mentally handicapped/mental handicap, and intellectual disabilities/intellectually disabled. The study also found that 35 (68.6%) of all states confirmed the use of the Grossman (1983) definition in either in an adapted or verbatim version, while the Luckasson et al. (2002) definition was used only by four states at that time. This finding reflects the reality that many states retained the use of the definition of mental retardation used in the federal regulations of the Individuals with Disabilities Education Act.

The Denning et al. (2000) study also examined eligibility criteria. The study inquired as to whether states specified an IQ cut-off score, with 13 (25.5%) indicating that no cut-off was required, 18 (35.2%) requiring the score of two standard deviations below the mean, 13 (25.5%) using a score of 70, and other states using various scores ranging from 70–80 for eligibility. With regard to adaptive behavior, 49 states (98% of the respondents) indicated that such consideration was required while 14 (27.5%) listed specific required practices. Only 12 (23.5%) of the states indicated a formal age criterion for the developmental period. Of these, 8 (15.7%) used age 18.

With reference to classification systems, 19 (37.0%) indicated they did not use a classification system, 14 (27.5%) used a deficit model consistent with the traditional AAMR system (mild, moderate, severe, profound), and eight states (15.7%) used a variation of the educable and trainable mentally retarded classifications. The remainder of the states reported the use of an approach consisting of some combination of these systems.

Subsequent to the publication of the Denning et al. (2000) study, the AAMR completed

work on the tenth manual on terminology, definition, and classification. Greenspan and Swizky (2006) (p. 20) noted that the “challenge facing the authors of the AAMR 2002 manual stemmed from the fairly widespread unhappiness that had been expressed over the . . . [1992 manual]. They further noted that the 2002 manual returned to the concept of adaptive behavior while retaining the 1992 concept of adaptive skills by indicating that “adaptive behavior is expressed in conceptual, social, and practical adaptive skills.”

Since the Luckasson et al. definition (2002), a significant amount of attention has been given to the impact of the tenth edition of the manual, with the Association indicating evidence of usage in various arenas. At the same time, the field of mental retardation has been undergoing significant scrutiny that, among other things, has increasingly focused on the use of the term itself (see Schalock et al., 2007). As an outgrowth of this shift, and also as a reflection of the advocacy work of individuals with disabilities and their families, has come a call for a change in terminology. Reflective of this movement, the AAMR recently changed its name as of January 1, 2007 to the American Association on Intellectual and Developmental Disabilities (AAIDD). Furthermore, the organization has issued an updated definition that uses the term “intellectual disability” (Schalock et al.).

Concurrent to the changes in nomenclature and conceptual understanding occurring in the area of intellectual disabilities have been changes in the federal legislation on educating students with disabilities. In 2004, the Individuals with Disabilities Education Act (IDEA) was reauthorized, with the final regulations being issued in 2006. While IDEA retained the term “mental retardation” as one of the categories of disability, states are in the process of updating their education statutes to be in compliance with the federal law.

As a result of the current professional environment, re-visiting educational practices across the nation as they relate to mental retardation (or intellectual disabilities) and as they are currently expressed in state guidelines is warranted. Thus, the purpose of this study was to survey all states to determine their terminology, definition, eligibility criteria, and classification practices in the area of men-

tal retardation (or an alternate referent) to the disability.

Related to this primary purpose was the determination of the role of IQ and adaptive behavior, the definition of the developmental period within state guidelines, and an attempt to determine emerging directions in states as related to terminology, assessment guidelines, and classification systems. Given that the AAIDD/AAMR's definition and classification manuals are not necessarily the basis for the way that individual states view their commitments to meeting the educational needs of students, data from the states can provide a profile of the current realities of educational practices for persons with intellectual disabilities in the United States.

Method

Instrument

A brief survey was designed to collect data for the above-stated purposes of this study. The instrument was derived from the questions posed in the survey originally used by Denning et al. (2000) so that direct comparisons could be made to the data previously collected by those researchers. However, certain questions were updated to reflect additional choices considered likely to be selected by respondents as well as by the addition of a question asking for the persons who completed the survey to address emerging directions in their respective states. The instrument was drafted by the two senior authors and discussed by four of the researchers. Included within the survey were a total of nine questions with six of the questions including at least one additional sub-question. (The survey may be obtained by contacting the first author).

The initial two questions requested the name of the state and the position of the person responding. The third question asked if *mental retardation* was the term being used in special education guidelines and, if not, which term was being used. A total of seven alternative choices were provided along with the option of indicating another term under the category of "other".

The AAMR/AAIDD (or other) definition that served as the basis for guidelines in each

state was the purpose of question four. The survey instrument allowed for selection among seven responses including Grossman (1983) verbatim; Grossman (1983) in adapted form; Luckasson (1992) verbatim; Luckasson (1992) adapted; Luckasson (2002) verbatim; Luckasson (2002) adapted; or other (with an opportunity to write in a specific source or definition). In order to assist the respondents, the survey included a separate sheet that provided the exact language used in the Grossman (1983), Luckasson (1992), and Luckasson (2002) manuals.

The next two questions focused on the core dimensions of mental retardation. The fifth question asked if the guidelines specified a cut-off score for intellectual functioning and, if an IQ score was specified, the score or score ranges. The sixth question then asked if the guidelines required consideration of adaptive skills or adaptive behavior and, if so, if specific assessment practices were recommended.

The seventh question focused on whether the guidelines established a developmental period that was necessary to define the time when mental retardation originated. If the guidelines called for an age, a subsequent sub-question asked for the ceiling for the developmental period.

The eighth question requested information on whether a specific classification system was used for individuals with mental retardation and, if so, whether it was: mild/moderate/severe/profound; educable/trainable; based on levels of supports (i.e., intermittent, limited, extensive, pervasive); or other, for which respondents were asked to provide the specific system used. Finally, the survey concluded with a series of questions concerning any anticipated changes in the state's terminology, assessment, and classification.

Procedure

Participants were intended to be the directors of special education (or their designees) in the fifty respective state governmental agencies and the District of Columbia (hence 51 potential respondents). An initial survey was mailed to these individuals in November 2006. The mailing included a cover letter, the survey instrument itself (2 pages), and the one page appendix that provided a verbatim statement

of the Grossman (1983), Luckasson et al. (1992), and Luckasson et al. (2002) definitions for reference purposes. The letter explained the purpose of the study, invited participation, and identified incentives (i.e., lottery drawing for respondents and a copy of the results).

The initial mailing resulted in a total of 16 responses (31.4% of all states). For non-respondents to the first mailing, a reminder letter accompanied by the original survey was mailed in January 2007. A total of 12 additional responses were received, resulting in an overall total of 28 (54.9%). A third reminder resulted in eight more responses for an overall return rate of 36 (70.6%).

In order to achieve a 100% response rate, direct contacts by email or phone were then made to professional colleagues beginning in February 2007 to seek the specific name of a person in the state department who would best be able to complete the survey. Five states were contacted as a result of this strategy. Finally, website reviews were used for the ten states that did not respond to the above strategies. These multiple efforts resulted in obtaining information on a total of fifty states and the District of Columbia.

For respondents that returned the survey, the data were entered for analysis. Data were also entered for those states for which a website source was used. At least, one additional co-author reviewed all data to confirm the accuracy of the original responses and the web-generated data. There were 51 agencies \times 11 questions = 561 data points in the study. Interobserver agreement exceeded 98% and the few disagreements were resolved by the review of a third author.

Results

State data were entered into a spreadsheet to list responses to each question. Then the nine questions were analyzed for patterns in the state guidelines. A summary of the key data on the seven of the questions is presented in Table 1.

Other than the initial items on the name of the state and optional name of the respondent, the first question asked the respondent to identify their position. The most common responses included state director of special

education, special education consultant, and educational or program specialist.

The initial content item dealt with terminology. Respondents were asked whether their guidelines used the term mental retardation when referring to individuals with cognitive impairments. Of the 51 states responding, 27 (52.9%) used the term mental retardation (MR). For those indicating that they did not use the term mental retardation, responses included: mental disability or impairment (7), cognitive disability or impairment (7), intellectual disability or impairment (4), mental handicap (2), and several terms reported once (i.e., significant limited intellectual capacity, mild/functional mental disability, developmental cognitive disability, learning impairment).

The next content question focused on the definition used as the basis of state eligibility guidelines. Respondents were asked to indicate whether the Grossman (1983), Luckasson et al. (1992), or Luckasson et al. (2002) definition was used in either a verbatim or an adapted version. The Grossman definition was used by 28 (54.9%) states in an adapted version (GA) and by 6 (11.8%) as verbatim (GV). The Luckasson (1992) definition was used in an adapted form in 4 (7.8%) states (LA92) and verbatim (LV92) in no states. The Luckasson (2002) definition was reported to be used in an adapted form by 8 (15.7%) states (LA02) but in a verbatim form by no states (LV02). Additionally, five states used their own definition, a combination of definitions, or some other definition.

The third key item asked respondents to indicate if they specified an IQ cut-off score (or range) for the criterion of intellectual functioning. Twelve (23.5%) states responded that no cut-off score was specified at the state level, while 13 (25.5%) states used a score of 70, 19 (37.3%) indicated two standard deviations (SD) below the mean, two states required a range of 70-75 to be considered, five states did not specify if they had an IQ cut-off and one state used 1.5 SD.

For the question concerning the use of adaptive behavior within the definition, 49 states indicated that AB consideration was required, while only one did not specify consideration. Based on the information available, only 23 (45.1%) indicated that there were

TABLE 1

Summary of State Response Data

| <i>State</i> | <i>Term¹</i> | <i>Definition²</i> | <i>IQ Cut Off</i> | <i>Required AB</i> | <i>AB Specifics</i> | <i>Dev'l Period</i> | <i>Classification System³</i> |
|----------------------|-------------------------|-------------------------------|-----------------------|------------------------|-------------------------|-------------------------|--|
| Alabama | MR | GV | 70 | yes | yes | no | no |
| Alaska | MR | LA02 | 2SD | yes | no | no | no |
| Arizona | MR | GA | 2SD | yes | yes | - | M/M/S |
| Arkansas | MR | GV/LV92 | no | yes | yes | no | no |
| | | | (70-75 rec) | | | | |
| California | MR | LA02 | no | yes | yes | no | no |
| Colorado | SLIC | GA | 70 | yes | no | no | no |
| Connecticut | ID | LA02 | 2SD | yes | yes | 18 | no |
| Delaware | MD | GA | 70 | yes | yes | no | EMR/TMR |
| District of Columbia | MR | LA92, IDEA 2004 | 70 | yes | yes | 18 | no |
| Florida | MH | GA | 2SD | yes | yes | no | EMR/TMR |
| Georgia | ID | GA | 70 | yes | yes | 18 | M/M/S/P |
| Hawaii | MR | GA | 70 | yes | no | no | no |
| Idaho | CI | LA92 | 70 | yes | no | no | no |
| Illinois | MR | GA | no | yes | - | - | - |
| Indiana | MD | LA02 | 2SD | yes | no | no | M/M/S |
| Iowa | MD | GV | no | yes | no | no | M/M/S/P |
| Kansas | MR | GA | - | yes | no | no | - |
| Kentucky | MMD/FMD | other | 2SD | yes | yes | 9 | M/F |
| Louisiana | MD | LA92 | 70 | yes | yes | 18 | M/M/S/P |
| Maine | MR | GA | no | yes | no | no | no |
| Maryland | MR | GA | 2SD | yes | yes | - | M/M/S/P |
| Mass | II | other | no | included not req. | no | no | no |
| Michigan | CI | other | 2SD | yes | - | no | no |
| Minnesota | DCD | LA02 | 2SD | yes | yes | 22 | M/M/S/P |
| Mississippi | MR | GA | 2SD | yes | - | 18 | EMR/TMR |
| Missouri | MR | GA | 2SD | yes | yes | no | no |
| Montana | CD | GA | - | - | - | 18 | - |
| Nebraska | MH | GA | 2SD | yes | no | no | M/M/S/P |
| Nevada | MR | LA92 | - | yes | yes | 18 | - |
| New Hamp | MR | GA | no | yes | no | no | no |
| New Jersey | CI | GA | 2SD | yes | - | - | M/M/S |
| New Mexico | MR | LA02 | 2SD | yes | - | 18 | - |
| New York | MR | GA | - | yes | - | - | - |
| North Carolina | MD | GA | 70 | yes | no | 18 | M/M/S/P |
| North Dakota | MR | GV | (approx) 70 | yes | yes | 18 | M/M/S/P |
| Ohio | CD | GA | 70-75 | yes | no | no | no |
| Oklahoma | MR | GV | no | yes | no | 18 | M/M/S/P |
| Oregon | MR | GA | 2SD | yes | no | no | - |
| Penn | MR | GV | 70 | yes | - | no | no |
| Rhode Island | MR | GA | no | yes | no | - | - |
| South Carolina | MD | GA | 70 | yes | yes | no | no |
| South Dakota | MR | GA | 2SD | yes | - | 18 | - |
| Tenn | MR | LA02 | 2SD | yes | yes | 18 | no |
| Texas | MR | GA | 70 | yes | no | no | M/M/S/P |
| Utah | ID | GV | no | yes | yes | 18 | M/M/S/P |
| Vermont | LI | LA02 | 1.5SD | yes | yes | no | no |
| Virginia | MR | GA | no | yes | no | yes | no |
| Washington | MR | GA | no | yes | no | - | no |

sults of this study indicate that the Luckasson et al. (1992, 2002) definitions have had some impact on state guidelines relative to definition in mental retardation, as indicated by the fact that 12 states use an adapted version of either the 1992 or the 2002 definition. These definitions have had far less impact on other areas such as classification.

The changes that have occurred likely can be traced more to other developments in the field rather than specifically to the 2002 manual revision. The reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004 along with the regulations that followed this legislation has forced all states to revise certain components of their state statutes in terms of the education of students with disabilities to be in compliance with the new federal law. Many states are taking this opportunity to review other sections of their statutes in this area as well. While some states indicated that a change of terminology to describe the disability category of “mental retardation” are likely, little indication was gleaned that a change in the definitions was to occur during this process.

One other fact is worth noting. Many states simply mirror the statutory language provided in the federal law as the language used in state education statutes/code. This fact is best reflected in the number of states (34) that continue to use either a verbatim or adapted version of the Grossman (1983) definition that was used and still is used in IDEA. For an example of a state that developed a comprehensive and current system based on Luckasson et al. (2002), the reader is encouraged to consult Connecticut’s excellent document (Connecticut Bureau of Special Education, 2007).

Key Findings

Terminology. Relative to terminology, Smith (2006) noted “the 2002 AAMR manual authors acknowledged the problems with the term mental retardation but concluded nevertheless that there was no acceptable alternative term, despite its acknowledged shortcomings” (p. 58). Therefore, it is informative to consider state guidelines as compared with those in past research. Sandieson (1998) reported in a broad-based international survey

that 66 terms were used in the field with 16 of those terms having been cited more than 150 times during the 1990–95 time period. Most frequently used were mental retardation/mentally retarded, with learning disabilities/learning disabled used regionally and internationally (e.g., the United Kingdom), followed by cognitive impairment, developmental disabilities, and mentally handicapped. The preference for mental retardation continued to be reflected in the current study because clearly it was the most commonly used term (27 states). This compares to the 26 states that Denning et al. (2000) reported using MR. As noted, several of the states still using the term are considering changes. Nevertheless, it is very interesting that the number of states using the term “mental retardation” actually went up in number since the Denning et al. study. Given that the movement away from using the term “mental retardation” had already begun years ago, this increase, albeit only one more state, is still unexpected.

These data are important to consider within the context of national discussions of terminology. For example, MacMillan, Siperstein, and Leffert (2006, p. 215) noted that “the precipitous decline in the application of the term mental retardation in school settings is, to a significant extent, attributable to its pejorative connotation If mental retardation is to serve as a unifying concept that includes [mild mental retardation] MMR, a new term needs to be adopted that is less stigmatizing and more palatable to educators, parents, and the individuals with MMR themselves. In our view, a term such as intellectual disability, which is increasingly becoming a standard terms outside the United States, cognitive impairment, or general learning disability would be more acceptable”. A similar case for intellectual disability has been made by Schalock et al. (2007).

Snell and Voorhees (2006, p. 74) concluded that “a new label is needed that has a more positive connotation. We can not ignore the consumer’s aversion to the label of mental retardation. The right of minority groups to select the name by which they wish to be called is respected in our society . . . the same regard has not been provided to those currently labeled with mental retardation”. Presumably, the finding that ID is now used by

four states would be consistent with those concerns; nevertheless this is quite similar to what Denning et al. reported in 2000. Rather terms relying on the key word of *cognitive* appear to reflect more of the increased focus (seven states using, four states considering) as MR/MD/MH decreases in use.

Glidden (2006) stated that “a less scientific but nonetheless compelling argument for changing a term comes from advocates . . . who view it as stigmatizing. There is little disagreement that persons with mental retardation are devalued . . . Nonetheless, empathy for individuals who are devalued is not a good reason for alteration of scientific terminology . . . History in good sense tells us that it is the condition that transfers the stigmatic label and not the reverse” (p. 47).

Definition. In terms of definition, clearly the most common source still is the Grossman adaptation, which appears in IDEA 2004. Thus, in the current study, 34 states rely on this source which is somewhat less than the 44 in the Denning et al. (2000) study. So, without question, states are moving away from the Grossman model; however, given the often-used practice of adopting whatever is used in the federal statute for inclusion in the state statutes, this definition will continue to be implemented by states until the federal law changes the definition.

It is interesting to note that more states are using a variation of either the 1992 or Luckasson (2002) definition. The Denning et al. (2000) study found that four states used an adapted version of the Luckasson 1992 definition. The present study found that same number doing so. However, eight states now rely on the Luckasson (2002) definition. The full impact of the 2002 Luckasson definition will be worthy of review in the future. In all probability, if the trend continues, more states will adopt this definition.

Intellectual assessment. In the domain of intellectual assessment, 35 states indicated requiring a cut-off score or range. In general, these scores were consistent with the Luckasson et al. (1992, 2002) and Grossman (1983) models, which cited 70–75 or approximately 70 as the ceiling for intellectual functioning. The data compare favorably with Denning et al.’s (2000) finding that 31 states used a score of 70 or 2 SDs as the cut-off score.

The relatively low number of states that reported a cut-off score approximating 70 should not be misinterpreted. Many states, which reported that no IQ cut-off was specified at the state level, leave the IQ cut-off decision to the local school districts. Although not specifically examined in this study, in all likelihood, local school districts are using an IQ cut-off that is consistent with the Luckasson (1992, 2002) or Grossman definitions.

Adaptive behavior assessment. For the area of adaptive behavior, essentially all states noted that they required assessment in this area, as was the case in the 2000 Denning et al. study. Some increase (from 14 to 23 states) indicated that specific AB practices were to be followed.

Greenspan and Swizky (2006) noted that the concept of adaptive behavior was originally introduced in the Heber (1961) manual as a substitution for previous references to maturation, learning, and social adjustment in the 1959 manual. As they noted, the term as introduced at that time was largely undefined. Continued emphases on the importance of AB may explain in part the trend toward increased specifications of AB practices.

The measurement of adaptive functioning is tricky. Unfortunately, this study did not obtain detailed information on how this prong of the definition is actually determined across all states. Some states did provide detailed information on how adaptive functioning should be measured; most states did not. Given that only eight states follow the 2002 Luckasson definition, which, if implemented correctly, requires deficits in adaptive behavior that are approximately two standard deviations from the mean (i.e., standard score of 70), most states are operating with a loosely applied criterion of what is significant limitations in adaptive behavior. More research is needed to investigate adaptive behavior assessment practices in detail.

Developmental period. In terms of the developmental period criterion, the clear majority of states 33 (64.7%) did not specify an age, which can be compared to 76.5% reported by Denning et al. (2000). Schools are more concerned with the provision of services up until age 22 and less focus is directed toward identification at the secondary level. For all practical purposes, very few individuals are being

identified as being mentally retarded later in their school years.

Given that respondents represented departments of education, it is likely that the issue of developmental period was perceived as less significant because much of the discussion about the age criterion in the field has focused on eligibility questions for adult services. The current death penalty debate however has underscored the importance of this criterion for later determination of mental retardation (see Patton & Keyes, 2006).

Classification. Relative to classification, the study's results can be considered in the context of the changes in the AAMR manuals. It is instructive to consider that Switzky and Greenspan (2006, p. xxi), in their summary of changes in the 1992 manual, indicated that the most radical change was the elimination of severity levels for categorization and the substitution of a continuum based on support needs.

The limited use of the Luckasson et al. (1992) levels of supports classification system, as reported by both Denning et al. (2000) and Polloway, Smith, Chamberlain, Denning, and Smith (1999), is consistent with the findings in the current study in which no states referenced its use. Given that Luckasson et al. (2002) no longer recommended use of this model, these findings were not surprising. Rather, 14 states reported using a classification system that is essentially the AAMR's deficit model from Grossman (1983) and three states reported using the EMR/TMR model popular in education for decades; these compare to 14 and eight, respectively in Denning et al. Most significantly, a total of 23 states reported no classification system, which is 4 greater than in the prior study. These data can be put in to the context of the 2002 manual, because as Greenspan and Swizky (2006, p. 27) noted, wording changes in the manual provide the "obvious advantage . . . in that one can use any classification system one likes . . . without being in opposition to the AAMR manual".

Limitations of the Study

Several limitations must be acknowledged in the study. First, ten states did not reply and thus web information had to be used. There-

fore the researchers had to interpret the data to complete the survey and several items had to be left blank because they were not available. Second, some of the items, particularly those related to future projected revision, were omitted by respondents. Third, the data are necessarily time-limited because the process from initial mailing of the survey to final phone calls and web reviews took seven months. Some states may have moved forward with the changes that they indicated were pending subsequent to the initiation of the data collection process. Fourth, there was no opportunity to confirm the data by another state-level person (through responses from a second respondent).

While these limitations are acknowledged, nevertheless the current study contributes to a further understanding of contemporary practices in the field of intellectual disabilities as applied to schools. We can conclude that the publication of the 2002 manual has had some initial but limited effect on some state practices although subsequent research may likely reveal greater impact within the next decade. This impact is likely limited because state agencies may view their charge in terms of service delivery as not necessarily consistent with the emphasis of the AAMR's definitional and classification efforts, and rather may be more closely aligned, for example, with federal IDEA regulations. Of course, the fact that AAMR changed its name to AAIDD and now actively advocates against its own former term ("mental retardation") that was in the 2002 manual is at best problematic. The study does confirm the continued reliance on the key diagnostic prongs of deficits in both intellectual functioning and adaptive behavior.

Policy Implications

Policy implications of the study include the need for continued scrutiny of the merits of the current practices and continued efforts by professional organizations and regulatory bodies toward the adoption of appropriate systems for defining, diagnosing, and classifying individuals with mental retardation. As professional organizations consider possible modifications in the guidelines for this field, it will be wise to consider reasons for the modest impact to date of the 2002 manual.

This study also raises the question of should the federal government review the definition of mental retardation, and other disability categories for that matter, when IDEA is reauthorized again. The fact that more are states moving away from the use of the federal definition of mental retardation, which is based on a 1983 definition, is an indication that perhaps it is time to reexamine terminology and definitions included in the federal statutory language.

As Denning et al. (2000, p. 231) noted, “mental retardation is a dynamic concept that cannot be explained in a static fashion such as with a concrete entity (e.g., matter in physical science) [and thus] further educational, psychological, and medical research and changes in social and political contexts will continue to influence how the field defines and classifies individuals who experience intellectual and adaptive impairments”. The results of the current study continue to confirm this reality.

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Efficacy of a Systematic Process for Designing Function-Based Interventions for Adults in a Community Setting

Martha A. Underwood, John Umbreit, and Carl Liaupsin
University of Arizona

Abstract: This study examined the efficacy of a systematic process for matching behavioral interventions to assessed function(s) of problem behavior with adults with developmental disabilities in a community-based day program. Previous applications of the technique were found to be effective with school-age students in classroom settings. Participants were three adults (ages 48–63) with developmental disabilities who displayed long-standing inappropriate social interactions. The study was conducted in two phases. In Phase 1, descriptive FBAs were conducted. Each FBA included structured interviews and direct observations that were used to identify the functions of target behaviors. In Phase 2, function-based interventions were systematically constructed for each participant, and then implemented for an extended period (8 weeks) within ongoing activities at their day program. The mean response rates of appropriate social interaction increased immediately when intervention was introduced, whereas the mean response rates of inappropriate social interaction decreased. Data on treatment integrity (level of implementation) were collected for every session and documented that the interventions were implemented with high levels of fidelity. In addition, staff gave the function-based interventions high acceptability ratings, indicating they viewed the interventions as socially valid and preferable to the procedures they used before intervention.

Direct service providers are continually challenged to provide positive and socially acceptable support to individuals who have severe disabilities and behavioral problems. Sometimes these behavioral problems are so serious that the individuals exhibiting them have difficulty acquiring important independent living skills, such as appropriate social interactions. As a result, they may be ostracized by their peers (Carr, 1977; Carr et al., 1994; Durand, 1990, 1999; Durand, & Carr, 1991; Durand & Merges, 2001).

Fortunately, over the last three decades, substantial progress has been made in the delivery of behavioral support strategies for persons with such significant challenges. These advances have focused on Functional Behavioral Assessment (FBA) and function-based intervention. In this approach, interventions are developed based on a prior identification of the antecedent conditions that set

the occasion for a problem behavior and the consequences that reinforce it. Resulting interventions aim to improve the antecedent conditions, withhold or minimize reinforcement when problem behavior occurs, and provide reinforcement for more desirable, alternative behaviors (Sugai et al., 2000).

The earliest function-based intervention research was conducted in residential and community-based settings, but soon spread to schools as well. Several reviews of this work (e.g., Conroy, Dunlap, Clarke, & Alter, 2005; Fox & Gable, 2004; Fox, Conroy, & Heckaman, 1998; Gresham, Watson, & Skinner, 2001; Hanley, Iwata & McCord, 2003; Heckaman, Conroy, Fox, & Chait, 2000; Lane, Umbreit, & Beebe-Frankenberger, 1999; Sasso, Conroy, Stichter, & Fox, 2001) have been published. The general consensus is that assessment-based interventions consistently produce positive results. However, regardless of setting, there has also been a consistent lack of clarity about how FBA data are used to construct interventions. This omission threatens progress in both research and practice. For example, several researchers have suggested

Correspondence concerning this article should be addressed to John Umbreit, University of Arizona, Department of Special Education, PO Box 210069, Tucson, AZ 85721-0069.

that the failure of school teams to effectively use FBA data may be due, in part, to a lack of definitive procedures for developing Behavior Intervention Plans (BIPs) (Jolivet, Scott, & Nelson, 2000; Scott et al., 2005; Van Acker, Boreson, Gable, Potterton, 2005).

To address this problem, Umbreit, Ferro, Liaupsin, and Lane (2007) describe a systematic process and set of methods for developing intervention components that are directly linked to the FBA data. Some recent research (Lane et al., 2007; Lane, Weisenbach, Little, Phillips, & Wehby, 2006; Liaupsin, Umbreit, Ferro, Urso, & Upreti, 2006; Stahr, Cushing, Lane, & Fox, 2006; Umbreit, Lane, & Dejud, 2004; Wood, Umbreit, Liaupsin, & Gresham, 2007) using this process and set of methods has already reported positive results. However, all of these studies were conducted with school-age students in academic settings.

The purpose of this study was to examine whether this methodology would also be effective with adults in a non-school (day program) environment. The study was conducted in two phases. In Phase 1, descriptive FBAs were conducted. Each FBA included structured interviews and direct observations that were used to identify the functions of target behaviors. In Phase 2, function-based interventions were systematically constructed for each participant, and then implemented for an extended period within ongoing activities at their day program.

General Method

Participants and Setting

The study was conducted in an adult day program housed in a commercial storefront in an urban strip mall. Other businesses located nearby included a small restaurant, a loan corporation, and a chiropractor's office. The program site, financially supported by a state-wide private for-profit agency, provided services for approximately 15 adults with developmental disabilities. The hours of service were Monday through Friday from 8:00 am to 4:00 pm. The day program incorporated a structured schedule of on-site activities, community events, and individualized instruction plans for each adult participant.

Participants in this study included three

adult men with developmental disabilities who attended the day program and five direct support staff members, one man and four women. All participants with developmental disabilities had the diagnosis of moderate mental retardation; their IQs ranged from 35–55 (Ysseldyke & Algozzine, 1995). Each also displayed at least one chronic problem behavior that was identified as some form of inappropriate social interaction. In each case, inappropriate interaction might include some form of aggression, self-injury, or destruction of property.

Louis, age 48, frequently displayed socially inappropriate interactions with others by thrusting his hand or fist into others' faces or upon others' upper bodies. He also occasionally displayed self-injurious behavior, hitting himself in the head, when verbally corrected for socially inappropriate interactions.

John, 48, typically interacted with others by repeatedly mentioning and/or questioning about past or future events. This reportedly occurred at a steady rate of 20 isolated conversational attempts per hour. Sometimes, John, like Louis, would hit himself when his attempts at social interaction were disregarded or ignored, occasionally directing self-deprecating expletives.

Max, age 63, was often verbally or physically aggressive. He would shout "no" loudly, push others out of his way, or throw an object in response to almost anyone who approached him with a greeting, question, or offer of participation.

Five support staff served as on-site direct caregivers. They ranged in age from early 20s to late 40s and had varying levels of experience, education, and training. All staff had completed agency-required trainings such as CPR, First-Aid, and pre- and in-service guidance regarding the individual needs of each participant. However, only three staff members had received any behavioral intervention training.

Louis, John, and Max were not taking any psychotropic medication during the study. Because their problem behaviors were longstanding and occurred frequently (at an overall average rate of 12 events per hour or once every 5 minutes), the support staff had developed informal methods of intervention. Per the support staff members' own admissions,

TABLE 1

Behavioral Definitions

| | <i>Target Behavior Inappropriate Social Interaction</i> | <i>Replacement Behavior Appropriate Social Interaction</i> |
|-------|---|---|
| Louis | Placing his hands in others' faces, making a fist and placing it near to or on other's shoulders, or kissing others' heads, arms, or hands without their permission. ^a | Verbally interacting with "hello", "how are you?" or an appropriate gestured request for a handshake, with his hand open, extended below the waist of the other person, but making no contact until the other responds. |
| John | Making impertinent statements (e.g., about past or future holidays, events) and/or asking repetitive questions about future events (e.g., upcoming holidays, team meetings, parties). ^a | Verbalizing statements and/or questions regarding current events, what is happening that day, or a brief review of the prior day's activities. |
| Max | Shouting loudly enough to be heard throughout entire day program space, yelling "no," "get away," or other negative responses to questions, hitting and/or pushing another person, and grabbing an object out of another's hands. | Verbal greetings such as "hello," "how are you?" delivered in a calm, even-toned manner or responding politely and calmly with "no," "no thanks," "not right now," or "maybe later." |

^aThough both Louis and John's behaviors were sometimes coupled with displays of self-injury, for clarity of data collection, only the listed behaviors in Table 1 were counted.

these procedures were implemented inconsistently.

Behavioral Definitions

Dependent variables were the target and replacement behaviors exhibited by Louis, John, and Max. Target behaviors were forms of inappropriate social interaction that differed by operational definition and sometimes were paired with forms of aggression, self-injury, or property destruction. Examples of the replacement behaviors included appropriate social interactions such as greeting others calmly with a verbal, physical, or low-tech communication aid, or rejecting participation in a new activity by using verbal communication skills. Table 1 lists the operational definitions of these behaviors for each participant.

Phase 1: Functional Behavioral Assessment

Procedure

A descriptive FBA was conducted for the target behavior identified for each participant.

Each FBA included structured interviews and direct observations that were used to identify the function(s) of the target behaviors

Structured informant interviews were conducted with each of the five key workshop staff using the *Preliminary Functional Assessment Survey* (Dunlap et al., 1993). The survey includes 22 items designed to produce information about the antecedents and consequences that occasion or maintain challenging behaviors. Specific items provide information about (a) the antecedent conditions under which the behavior is and is not likely to occur, (b) the frequency with which the behavior occurs, (c) the possible influence of skill deficits or medical conditions, and (d) the consequences that may affect the occurrence of the behavior. Completion of the interviews with each staff member took approximately 2 h.

Each assessment also included a minimum of four 30-45 min observational sessions (ABC data; Bijou, Peterson, & Ault, 1968) during ongoing activities in the day program. During these sessions, an observer recorded the antecedent conditions that preceded and the con-

sequences that followed each occurrence of a target behavior. The structured observations occurred at various times during the day, based upon each participant's daily routine. This allowed for adequate observation of relevant antecedent and consequent conditions.

For Louis, the interviews and observational data indicated that he usually received attention or a new activity when he engaged in socially inappropriate behavior. When staff saw Louis perform these behaviors, they either gave immediate verbal reminders to refrain and shake hands instead, or offered him something tangible such as a game, puzzle, or art craft. Additionally, other day program participants, mostly females, were the objects of his social attempts. These women usually reacted with a physical response, such as a smile, a shudder, or even a verbalized retort, such as "go away," or "no kissing" when Louis approached them. In contrast, Louis's socially appropriate actions were mostly overlooked.

John's FBA data indicated similar trends in consequences. At times, the staff listened and responded to his frequent comments about a past or future event. For example, John might have said, "My team meeting's coming up soon. You gonna' be there? My mom and case manager will be there, won't they? Can I call my case manager?" Or, though it was only September, he may have made repeated and frequent statements about future holidays, such as "Thanksgiving and Christmas are gonna' be here soon." At other times, staff either ignored his comments, or used a mild reprimand (e.g., "John, we've already talked about this. Please have a seat"), or offered him new activities.

Staff reported "Max wants everything on his own terms," that he rarely participated in group activities, and that he shouted "no" loudly when they tried to include him or encourage him. Therefore, they usually left him alone, with one staff stating, "We'd like to see him involved in more activities but never know what kind of response we'll get." Max sat at a table facing the wall and often had many of his preferred activities on hand, like favorite magazines, markers, and puzzles. Others approached him from behind, tapping his back or shoulder while offering a new activity or simply saying hello. Max's explosive responses were most often treated gingerly, with

acknowledging statements like, "Okay Max, I get the picture. I'll leave you alone. You can join the activity later, if you'd like." During the assessment process, after two of these displays, no one, neither staff nor participants, interacted with him for the rest of the observational session (approximately 45 minutes).

To identify the function(s) of each participant's target behaviors, the staff and first author jointly examined the interview results and A-B-C data and used the Function Matrix (Umbreit et al., 2007). The Matrix is a six-celled visual tool that organizes information into (a) two columns identifying positive or negative reinforcement and (b) three rows identifying specific types of consequences. The tool prompts users first to decide if the student is gaining access to something (positive reinforcement) or escaping/avoiding something (negative reinforcement). The user then identifies more specifically whether the student is gaining or escaping attention, tangibles/activities, or sensory consequences. Multiple functions are possible.

Using the *Matrix*, the first author and staff determined that Louis's inappropriate social interactions enabled him to gain both attention and access to preferred activities. The same functions were identified for John's inappropriate social interactions. However, for Max, inappropriate social interaction enabled him to avoid attention and non-preferred activities, and simultaneously gain access to preferred activities.

Phase 2: Function-Based Intervention

In Phase 2, the FBA data were used to design a function-based intervention for each participant (Louis, John, and Max). The resulting interventions were then implemented for an extended period (8 weeks) during ongoing activities in the day program.

Procedure

Function-based interventions for each participant were developed using the *Function-Based Intervention Decision Model* (Umbreit et al., 2007). This Model begins the intervention development process by posing two questions: (a) "Can the individual perform the replacement behavior?" and (b) "Do the antecedent conditions

TABLE 2

Function-based Intervention for Louis

| <i>Method Elements</i> | <i>Intervention Components</i> |
|--|---|
| Adjust the antecedent conditions so new behaviors are learned and aversive conditions are avoided. (Method 1) | 1. Interact with Louis with 1:1 conversation, or simply verbally acknowledge him once every five minutes. |
| Adjust the antecedent conditions so the conditions that set the occasion for the target behavior are eliminated and the replacement behavior is more likely to occur. (Method 2) | 2. Provide Louis at least one opportunity to greet another person per 30-minute session, modeling correct method of greeting others as described in replacement behaviors. |
| Provide positive reinforcement for the replacement behavior. | 3. Change staff seating so that Louis is in view at all times. |
| Withhold the consequence that previously reinforced the behavior when it occurs. | 4. Provide Louis with his own designated work area. |
| | 5. Provide accessible closet space for Louis's preferred activities (art supplies, puzzles, books). |
| | 6. Verbally acknowledge each appropriate social interaction. |
| | 7. If inappropriate behavior occurs, ignore initially (at least 30 seconds), then ask him to return to his work area. After Louis is seated for a minute, offer a choice of preferred activities. |

represent effective practice?” The answers to these questions lead to four possible outcomes. Each outcome identifies which of three intervention methods, individually or in combination, is appropriate for a given situation.

If the individual *cannot* perform the replacement behavior but the antecedent conditions represent effective practice, then Method 1: *Teach the Replacement Behavior* is used. If the individual can perform the replacement behavior, but the antecedent conditions do not represent effective practice, then Method 2: *Improve the Environment* is used. If the answer to both questions is No, then *both* Methods must be applied. Finally, if the answer to both questions is Yes, Method 3: *Adjust the Contingencies* is used.

Each intervention method has common components: Antecedents are adjusted to increase the likelihood the replacement behavior will occur, and reinforcement is provided when the replacement behavior occurs and withheld (extinction) when the target behavior occurs. The intervention methods differ in the ways specific antecedent and consequent variables are manipulated.

Because Louis could not easily produce socially appropriate interactions and antecedent conditions did not represent best practice, the

support team (first author and staff) chose Methods 1 and 2 that emphasized teaching the replacement behavior *and* improving the environment. John also could not fluently display his replacement behavior, and antecedent conditions also needed improvement. Therefore, Methods 1 and 2 were also selected. Max, on the other hand, was able to interact appropriately with others, but some environmental variables were problematic. Therefore, the best choice was Method 2, which emphasized improving the environment. Using these Methods, the staff and first author designed individualized intervention components for each participant. These components are presented in Tables 2–4.

Behavioral Definitions and Measurement

The same behavioral definitions used in Phase 1 (see Table 1) were used in Phase 2. Data on the dependent measures, the inappropriate and appropriate social interactions, were collected by the event recording method. During the baseline and intervention conditions, one 20–30 min session was conducted each day for each participant. The pertinent observational sessions, determined by the staff during the

TABLE 3

Function-based Intervention for John

| <i>Method Elements</i> | <i>Intervention Components</i> |
|--|---|
| Adjust the antecedent conditions so new behaviors are learned and aversive conditions are avoided. (Method 1) | 1. Interact with John with 1:1 conversation for at least 3 minutes and use picture cards to help John discuss and create his daily schedule. |
| Adjust the antecedent conditions so the conditions that set the occasion for the target behavior are eliminated and the replacement behavior is more likely to occur. (Method 2) | 2. Provide John the opportunity to assist with morning scheduling group for all day program participants using his photo cards, allowing John to present and discuss daily activities and events. |
| Provide positive reinforcement for the replacement behavior. | 3. Keep John's augmentative communication aid, his photo/schedule box, accessible. |
| Withhold the consequence that previously reinforced the behavior when it occurs. | 4. Remind John to create and discuss activities from his daily schedule. |
| | 5. Provide current events, topics, and activities and update picture activity cards as needed. |
| | 6. Verbally interact with John after each appropriate social interaction. |
| | 7. Ignore John when he engages in inappropriate social interactions. Then, after a minute, direct him to his picture photo box or daily schedule to discuss the day's events. |

initial FBA, were those periods with the greatest occurrence of the target behaviors.

Design

A multiple baseline across subjects design was used. All participants were in the same setting, and the collection of baseline data for each

participant began at the same time. However, the individualized interventions were introduced at different points in time for each participant. Specifically, the respective interventions began in Session 5 for Louis, in Session 13 for John, and in Session 18 for Max. After five weeks (25 sessions), follow-up data were collected once per week for an addi-

TABLE 4

Function-based Intervention for Max

| <i>Method Elements</i> | <i>Intervention Components</i> |
|---|--|
| Adjust the antecedent conditions so the conditions that set the occasion for the target behavior are eliminated and the replacement behavior is more likely to occur. | 1. Reposition Max's desk/seating so it faces the day program group. |
| Provide appropriate reinforcement for the replacement behavior. | 2. Approach Max from the front to ask him a question or offer a new activity. |
| Withhold the consequence that previously reinforced the behavior when it occurs. | 3. Provide new activities in a group setting. |
| | 4. Offer a choice of doing something new at least twice per session. |
| | 5. Acknowledge and respect Max's negative responses when delivered calmly and politely and let him continue with what he is doing. |
| | 6. If Max inappropriately interacts with someone, remind him by modeling a calm way of responding, and then leave him alone. |

tional three weeks. During the baseline and intervention phases, each participant was absent on occasion (Louis in sessions 7 and 18; John in sessions 1, 4, 7, and 9; and Max in sessions 1, 6, and 12).

Interobserver Agreement (IOA)

To assess IOA, a second observer independently collected data for 50% of Louis's baseline conditions, 50% of his intervention conditions, and 100% of his maintenance conditions; for 63% of John's baseline conditions, 25% of his intervention conditions, and 100% of his maintenance conditions; and for 50% of Max's baseline conditions, 50% of his intervention conditions, and 100% of his maintenance conditions.

Percentage of IOA was calculated by dividing the lower frequency of occurrences by the higher frequency and multiplying the result by 100%. During baseline conditions, IOA for the target behavior ranged from 92–100%; for the replacement behavior, it was 100% across participants. During intervention sessions, IOA was 100% for the target behavior, and ranged from 95–100% for the replacement behavior. During the maintenance conditions, all IOAs were at 100%.

Treatment Integrity

The degree to which the interventions were implemented as intended was assessed in every baseline and intervention session. The first author directly observed every session and, after each, used a checklist to identify whether each of the six or seven required components (see components presented in Tables 2–4) was properly implemented during the session. The percentage of treatment integrity was obtained by dividing the number of implemented components by the total number required. Baseline treatment integrity was expectedly low because most of the intervention components were not yet introduced or implemented by the support staff during these sessions.

During baseline sessions, treatment integrity was 7% for Louis, 8%, for John, and for 5% for Max. During intervention sessions, treatment integrity was 91% for Louis, 98% for John, and 100% for Max. During the main-

tenance sessions, treatment integrity remained high (88% for Louis, 98% for John, and 100% for Max). IOA for treatment integrity was assessed by having a second observer independently score 25% of the sessions from each phase for each participant. To calculate IOA for treatment integrity, the number of items scored identically was divided by the total number of items scored, and the result was multiplied by 100%. During all baseline conditions, IOA for treatment integrity was 100%. During the intervention conditions, it was 96% for Louis and 100% for both John and Max. During maintenance conditions, it was again 100% for all the participants.

Social Validity

The *Treatment Acceptability Rating Form-Revised* (TARF-R; Reimers, Wacker, Cooper, & DeRaad, 1992) was used to assess social validity. This instrument includes a total of 17 items, with multiple items addressing each of the following areas: reasonableness, effectiveness, side effects, disruptiveness/time required, cost, and willingness. Each item was rated on a 7-point Likert-type scale. Scores can range from 17 to 119, with higher scores representing greater acceptability. Social validity assessment was directed at both the baseline and the intervention conditions. Specifically, prior to baseline data collection and again upon completion of intervention data collection (after Session 25), four of the five staff members independently completed the TARF-R. The first set of scores was directed at the procedures used prior to and during baseline. The post-intervention scores assessed the function-based interventions that were developed using the *Decision Model*.

Results

Figure 1 shows the rate of appropriate and inappropriate social interactions per hour for Louis, John, and Max (session lengths varied from 20–30 min, necessitating the conversion to rate data). A clear functional relationship is apparent. Louis's rate of appropriate behavior changed from a baseline average of 5 occurrences per hour ($SD = 1.15$, range = 4–6 per hour) to a mean of 10.53 per hour ($SD = 3.19$, range = 4–14 per hour) during intervention

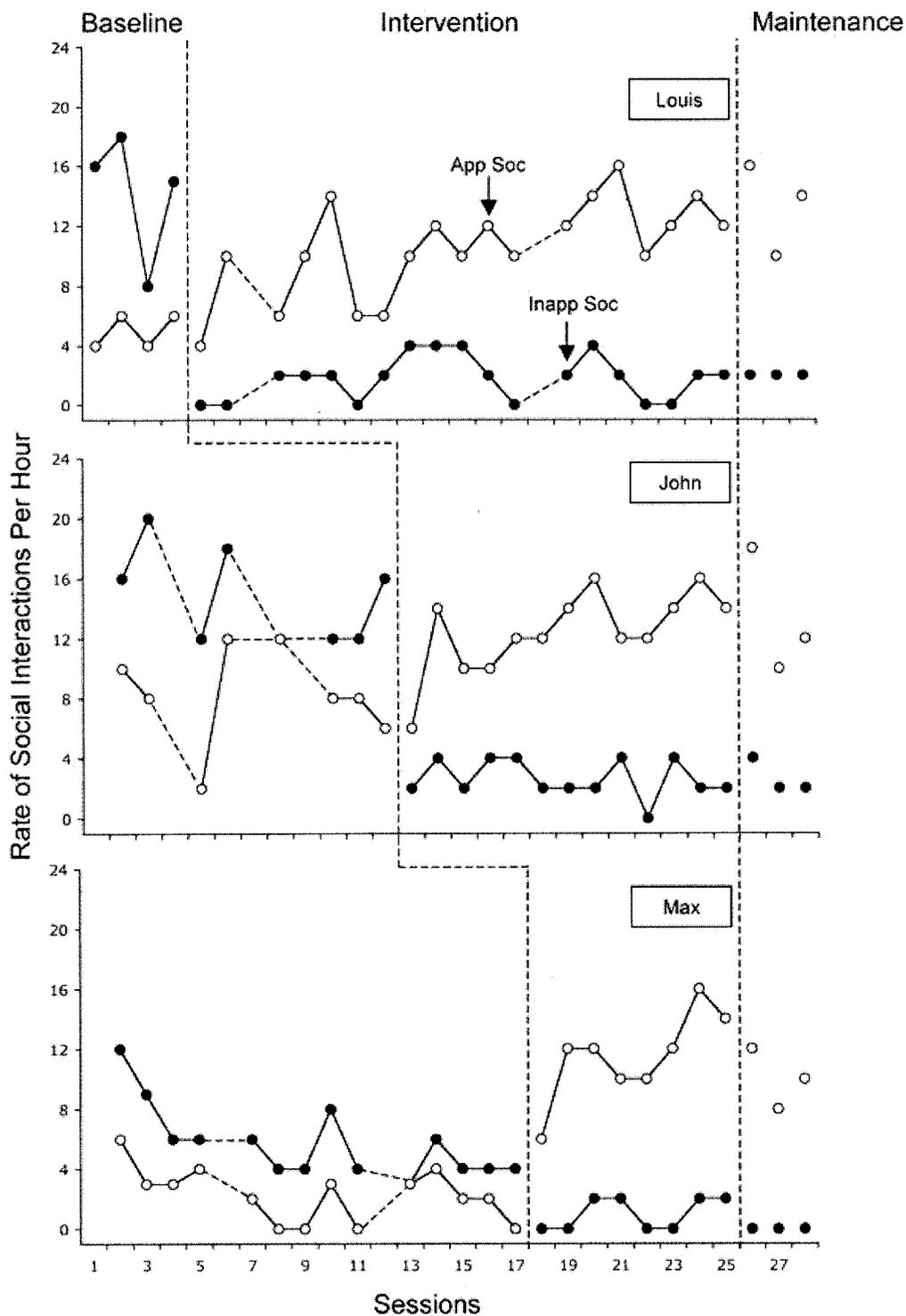


Figure 1. Rate of appropriate and inappropriate social interactions per hour.

and 13.33 per hour ($SD = 3.05$, range = 14–16 per hour) during the maintenance phase. At the same time, Louis's inappropriate behavior decreased from an average hourly rate of 14.25 ($SD = 4.35$, range = 8–16 per hour) during baseline to 1.79 ($SD = 1.47$, range = 0–16 per hour) during intervention and 2 ($SD = 0$; range = 2 per hour) during the maintenance phase.

Similarly, Figure 2 depicts John's increase in appropriate social responses across phases of intervention (Baseline: $M = 8.25$; $SD = 3.28$; range = 2–12; Intervention: $M = 12.46$; $SD = 2.73$; range = 6–16 per hour; Maintenance: $M = 13.33$; $SD = 4.16$; range = 10–16 per hour), while also indicating a decrease in inappropriate social interactions (Baseline: $M = 14.75$; $SD = 3.2$; range = 12–20; Intervention: $M = 2.61$; $SD = 1.26$; range = 0–4 per hour; Maintenance: $M = 13.33$; $SD = 4.16$; range = 10–16 per hour.)

Finally, the data for Max's appropriate and inappropriate interactions indicate a similar trend across study conditions. Appropriate interactions increased (Baseline: $M = 2.29$; $SD = 1.82$; range = 0–6; Intervention: $M = 11.5$; $SD = 2.98$; range = 6–16 per hour; Maintenance: $M = 10$; $SD = 2$; range = 8–12 per hour), while inappropriate interactions decreased (Baseline: $M = 5.71$; $SD = 2.49$; range = 3–12; Intervention: $M = 1$; $SD = 1.07$; range = 0–2 per hour; Maintenance: $M = 0$; $SD = 0$; range = 0 per hour).

Figure 2 shows these same data presented as a percentage of opportunity. Data presented for each session is the percentage of social interactions that were appropriate. For Louis, appropriate interactions increased from an average of 26% during baseline to 87% during the intervention phase and 89% during follow-up. For John, these levels changed from 35% during baseline to averages of 85% (intervention) and 82% (maintenance). Max's percentages of appropriate behavior increased from an average of 24% during baseline to 93% during intervention and 100% during maintenance.

Social validity ratings using the *TARF-R* (Reimers et al., 1992) also showed a consistent pattern (see Figure 3). In each participant's case, higher scores were given to the function-based intervention than to the practices in

effect during baseline. Scores regarding Louis's intervention increased from a mean preliminary score of 4.5 (out of 7) to a mean post-survey score of 5.5, a 22% increase. For John, the average scores increased from 4.4 to 6.2, a 41% increase. For Max, the mean scores increased from 5 to 6.6, a 32% increase.

Discussion

This study demonstrated the efficacy of a systematic process for matching behavioral interventions to the assessed functions of target behaviors of adults with developmental disabilities in a community-based day program. Specifically addressed were whether the interventions would produce positive results, including decreases in target behaviors and increases in replacement behaviors, and whether consumer ratings would indicate acceptable social validity.

Mean response rates of all the subjects' replacement behaviors increased immediately when intervention was introduced, whereas the mean response rates of their target behaviors decreased. In addition, staff gave the interventions high acceptability ratings, signifying they viewed the interventions as being socially valid and preferable to the procedures they used before intervention. These findings clearly indicated positive behavioral changes for all subjects as measured in their day program setting. Data on treatment integrity (level of implementation) collected for every session documented that the interventions were implemented with high levels of fidelity. Therefore, a clear functional relationship was established between the independent variables (each subject's individually designed intervention) and the dependent variables (appropriate and inappropriate social interactions).

These data provide strong support for the *Decision Model* (Umbreit et al., 2007), indicating it can be effective when used to develop individualized interventions for adults with developmental disabilities in community-based settings. The findings contribute to an increasing body of literature examining the positive effects of applying this systematic process to design function-based interventions (e.g., Lane et al., 2007; Lane et al., 2006; Liaupsin et al., 2006; Umbreit et al., 2004,

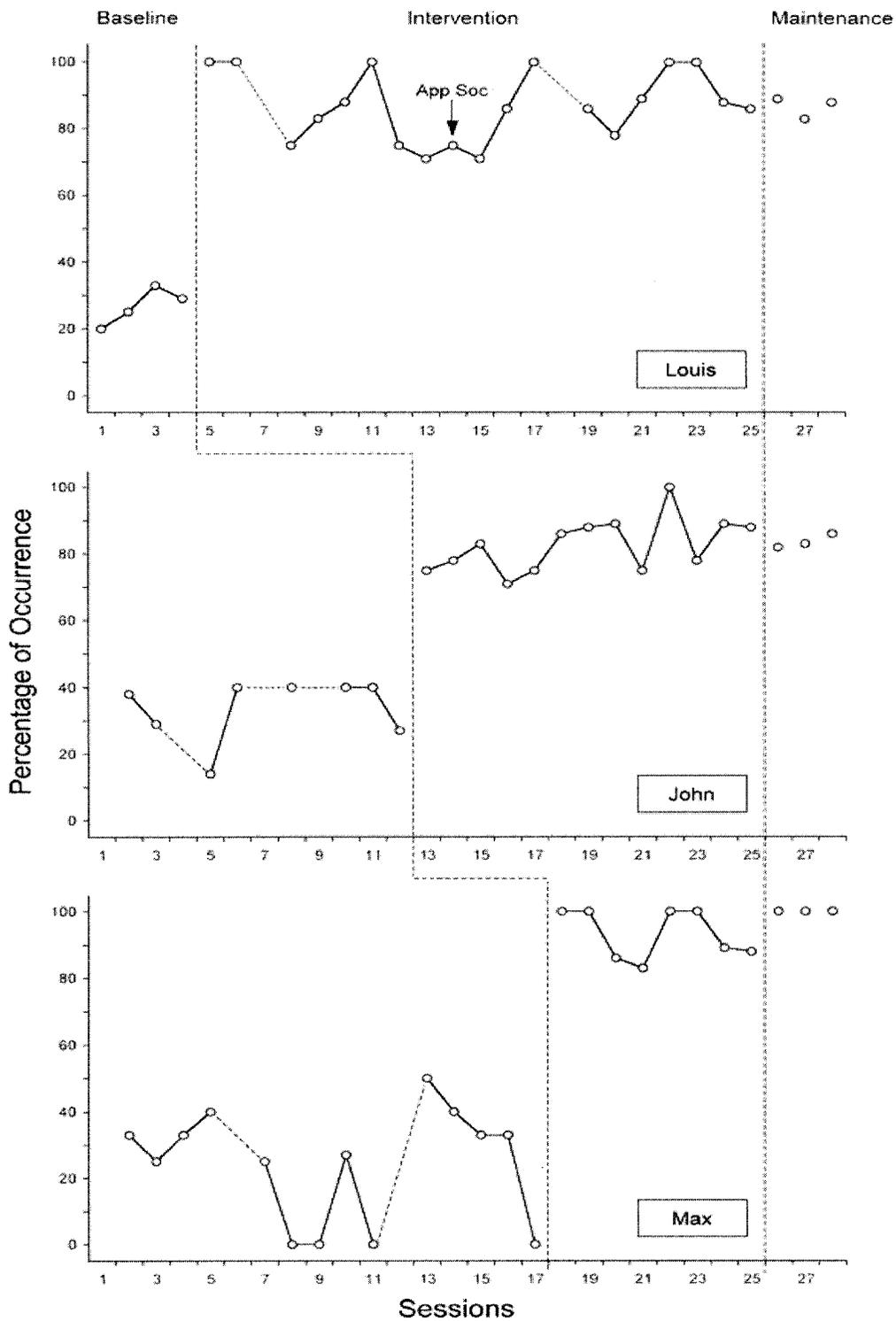


Figure 2. Percentage of appropriate responses.

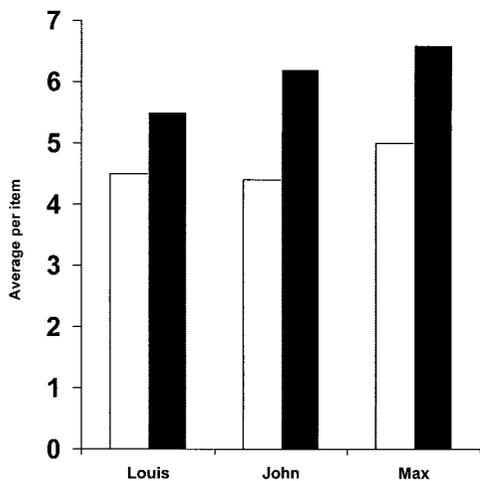


Figure 3. Baseline and post-intervention TARF-R ratings for Louis, John, and Max.

Wood et al., 2007). The study further strengthens existing research by exploring the applicability of the *Decision Model* not only with a different population, but by its investigation in an alternative environment, i.e., a community-based day program. Previous studies were conducted with children, either typically developing students with behavioral problems or those with emotional and behavioral disorders, and all were conducted in school settings.

This study also emphasized the importance of treatment acceptability. Whether an intervention is considered appropriate, effective, fair, and socially valid has become a critical part of effective behavioral intervention (Finn & Sladeczek, 2001; Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; Newcomer & Lewis, 2004; Reimers et al., 1992). In fact, Horner et al. listed assessment of social validity as one of the indicators of quality in single-subject research. The present results included data on the application of the TARF-R (Reimers et al.) with direct care personnel. Although this particular survey has been featured extensively in treatment acceptability research, it has most often been used with parents of children with behavioral disorders (Finn & Sladeczek, 2001).

The frequent measurement of treatment integrity and the high level that was documented were significant. Horner et al. (2005)

suggested that fidelity of implementation is of great concern in single-subject research when interventions are delivered over time. Effective analysis of behavior depends on accurate measurement of both the dependent and the independent variables. Data from the present study indicate that frequent measurement of the fidelity of implementation was highly desirable.

In function-based intervention research, it is common to conduct an experimental analysis after the FBA but prior to full-scale implementation of an intervention. That did not happen in this study because the staff had reported that aggressive and self-injurious behaviors and property destruction sometimes accompanied these participants' target behaviors.

Participants' age is noteworthy. Louis and John were both 48 years old. Max was 63. Each had engaged in inappropriate social interaction for many years. It is particularly encouraging that behavioral improvements occurred immediately, in each case, when an appropriate function-based intervention was introduced.

This study included only three participants. Additionally, the interventions focused only on one particular type of behavior, social interactions. Adults who have developmental disabilities and behavioral problems are considered to be a low-incidence population. Therefore, large subject pools are not available. Effectiveness of the intervention methods studied here with other adults who display other behavioral repertoires remains a question for further research.

When using a multiple baseline design, it is important to identify subjects who are functionally similar yet independent of one another. Although this appears to have occurred in the present study, the fact that the subjects were from a low-incidence population makes it difficult to be certain this criterion was met. Another potential disadvantage when using the multiple baseline design across subjects is that covariance among subjects may emerge if individuals learn vicariously through the experiences of others. Though this was not apparent in this study, it is a potential limitation that must be acknowledged.

The present study focused on improving the quality of life for adults with cognitive

disabilities. The decrease in exhibition of their problem behaviors and increase in the presentation of positive replacement behaviors demonstrated a significant improvement in each participant's social interactions. Additional studies of this approach with other adults with developmental disabilities would seem warranted.

Though this study highlighted the application of the *Decision Model* (Umbreit et al., 2007) to match interventions to functions of target behaviors, the lack of social skill curricula for adults with developmental disabilities emerged as an underlying issue. Although some researchers have studied social skill instruction for adults with developmental disabilities (e.g., Bidwell & Rehfeldt, 2004; Griffiths, Feldman, & Tough, 1997; LeBlanc, Hagopian, & Maglieri, 2000), none has incorporated FBA data into their research. More work is needed on how best to embed age-appropriate social skill instruction within the typical routine in an adult day program. This study demonstrated that if social skill instruction can be matched to a function-based intervention, the results could be extremely beneficial, not only to the individuals served but also to the direct care workers. More research is needed to explore the generalization of these skills to different settings and circumstances, e.g., in individual homes or with other friends and family members.

Results of this study unmistakably indicated that the process used produced positive intervention strategies that were easily maintained by direct support staff. As such, the *Decision Model* (Umbreit et al., 2007) became a useful guide for using FBA data to develop BIPs for individuals served by the agency. This study incorporated a maintenance period of three weeks. Future research could better examine the long-term generalization of new behaviors, as well as support staff's continued implementation of intervention strategies, when longer maintenance sessions are included. Clearly, additional studies will be needed to firmly establish this approach as a successful practice in the field of developmental disability support services.

Finally, continued assessment of social validity is of great importance not only to individuals with developmental disabilities, but also

to their caregivers and direct care workers. Future research about the social relevance of treatment goals could greatly impact an individual's quality of life. If local, state, and national agencies were exposed to more studies of effective intervention, overall systems of support services could be positively influenced to better serve the complex needs of this under-researched population.

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Effects of Direct Instruction on the Reading Comprehension of Students with Autism and Developmental Disabilities

Margaret M. Flores
Auburn University

Jennifer B. Ganz
Texas A&M University

Abstract: This study investigated effects of a Direct Instruction reading comprehension program implemented with students with autism spectrum disorders (ASD) and developmental disabilities (DD). There is little research in the area of reading comprehension for students with ASD and no research as to the effectiveness of reading comprehension Direct Instruction (DI). This study extended previous research by investigating the extent to which more complex instruction could be implemented with students with ASD and DD and its effect on their reading comprehension. A multiple probe across behaviors design was used. A functional relation between Direct Instruction and reading comprehension skills and behaviors was demonstrated across all behavioral conditions and across students. Data were also collected using curriculum-based assessments and all student demonstrated improvement. Results and their implications are discussed further.

Though not indicated in diagnostic criteria for pervasive developmental disorders (American Psychiatric Association, 2000), reading comprehension deficits are common in individuals with autism spectrum disorders (ASD). Kanner (1943) initially observed such difficulties in depth of understanding of reading materials in his participants. Individuals with ASD often have delays in both reading decoding and reading comprehension (Nation, Clarke, Wright, & Williams, 2006). However, other individuals with ASD have significant discrepancies between their reading decoding skills, which are relatively high, and their reading comprehension skills, which are relatively low (Newman et al., 2007). That is, reading decoding skills and reading fluency may be at or above levels anticipated by mental age or intelligence, while reading comprehension skills are significantly delayed (O’Conner & Hermelin, 1994; Frith & Snowling, 1983). Ultimately, it is clear that individuals with autism

spectrum disorders are a diverse group in terms of reading skills (Nation et al.).

Researchers have investigated a few components of reading comprehension and related skill areas. Nation et al. (2006) found that children with ASD who have deficits in reading comprehension also have deficits in comprehending oral language. Frith (2003) and O’Conner and Klein (2004) noted that integration of contextual information is difficult for individuals with autism. Specifically, Frith and Snowling (1983) found that people with autism have difficulty determining the appropriate homograph given the context of a sentence. Wahlberg and Magliano (2004) investigated reading comprehension in high functioning individuals with autism and observed that they had deficits in connecting previous information with ambiguous texts to assist with comprehension and difficulties making global and abstract connections to what they had read, compared to matched peers. O’Conner and Klein also stated that people with ASD have difficulty monitoring their comprehension as they read. Sandaña and Frith (2007) challenged previous findings, discovering that individuals with ASD read questions as quickly as their matched peers when those questions were related to

Correspondence concerning this article should be addressed to Margaret M. Flores, Dept. Special Education Rehabilitation Counseling/School Psychology, College of Education, 2084 Haley Center, Auburn, Alabama 36849.

previously read texts and more slowly when they were not, as did their peers. They suggest that this indicates reading comprehension difficulties might be caused, not by difficulty making inferences or lack of background knowledge, but instead by difficulties with higher processing skills.

Nation and Norbury (2005) and Snowling and Frith (1986) have asserted that oral language skill deficits have a negative impact on reading comprehension skills in individuals with ASD. Although some individuals with ASD do not speak, even those who do speak and who have normal cognitive functioning often have deficits in language skills (Lord & Paul, 1997). In particular, most individuals with ASD find that abstract and figurative language is difficult to comprehend (American Psychiatric Association, 2000), which directly impacts reading comprehension tasks beyond literal and recall questions. Further, Happé (1994) and Jolliffe and Baron-Cohen (1999) found that high functioning individuals with autism had difficulty understanding stories, particularly when they were required to understand characters' thought processes. Norbury and Bishop (2002) also discovered story comprehension deficits in high functioning individuals with autism, specifically observing that these individuals had difficulties considering information from multiple sources, made incorrect inferences, had poor short-term memories, and had inefficient working memories. These areas of deficit necessitate research investigating effective and explicit strategies to address oral language skills that are prerequisites for figurative and abstract skills required for reading comprehension.

Interventions in Reading Comprehension for Individuals with ASD

Little research had been conducted regarding methods best suited to teach reading comprehension or prerequisite oral language skills to individuals with ASD. Three studies have demonstrated such methods. O'Conner and Klein (2004) improved reading comprehension in 20 children with ASD via cueing students regarding pronouns referents. Kamps, Barbetta, Leonard, and Delquadri (1994) implemented classwide peer tutoring in an elementary general education classroom that included three

children with high-functioning autism, resulting in improvements in reading fluency and comprehension. Flores and Ganz (in press) implemented Direct Instruction (DI) *Corrective Reading* (Engelmann, Haddox, Hanner, & Osborn, 2002) for reading comprehension with four children with ASD and reading delays, finding that the participants mastered comprehension of statement inference, using facts, and word-based analogies and maintained those skills one month following instruction.

While only one study has reported the effects of DI reading comprehension for children with ASD (Flores & Ganz, 2007), several studies have demonstrated the effectiveness of DI for other children with reading comprehension deficits. Specifically, DI has been used to improve reading comprehension in children in general education classrooms (MacIver & Kemper, 2002; Ryder, Burton, & Silberg, 2006), students with learning disabilities and mental retardation (Carlson & Francis, 2002), English language learners (Carlson & Francis), individuals with epilepsy (Humphries, Neufeld, Johnson, Engels, & McKay, 2005), and students at risk for school failure (Carlson & Francis; Fredrick, Keel, & Neel, 2002; Grossen, 2004). DI reading comprehension approaches have resulted in improvements when implemented with students with reading difficulties across a range of ages, from elementary (Carlson & Francis; Fredrick et al.; Humphries et al.) to middle school (Grossen; Humphries et al.).

Purpose and Research Questions

The purpose of this study was to extend the research regarding the use of DI to improve reading comprehension of students with ASD and developmental disabilities (DD). Flores and Ganz (2007) implemented portions of a DI program and measured student progress with probes that were similar to the program skills and tasks. This study implemented different and more complex portions of the program and in addition to instructional probes, student progress was measured using curriculum-based assessments and standardized assessments. The research study investigated the following: (a) the extent to which more difficult and complex tasks included in the Direct

Instruction program could be implemented with students with ASD and DD and (b) the effectiveness of a Direct Instruction program with regard to reading comprehension skills in students with ASD and DD, specifically investigating their progress in picture analogies, inductions, deductions, and (c) the effect of the DI program on the students' overall reading comprehension as measured through curriculum-based assessments.

Method

Setting

The setting for the study was a private school for individuals with autism spectrum disorders (ASD) and intellectual disabilities. The school was located on the campus of a small, accredited, private school for elementary and secondary students with high incidence disabilities. The teachers were both state certified educators. One of the teachers was also the Director and was a Board Certified Associate Behavior Analyst (BCABA). The class consisted of ten students, five had ASD, four had mental retardation, and one student had attention deficit hyperactivity disorder.

Participants

Four students participated in the study. All previously attended public schools, were eligible for, and received special education services based on federal guidelines set forth by the *Individuals with Disabilities Education Act* (IDEA) (1997), the current law at the time of their public school attendance. Two of the students had ASD and two students had developmental disabilities, specifically mental retardation and attention deficit hyperactivity disorder. Hildi was a 12 year old girl in the 5th grade. She had a diagnosis of autistic disorder. As a young child, Hildi was evaluated and diagnosed by a developmental pediatrician; the *Pre-linguistic Autism Diagnostic Observation Schedule* (DiLavore, Lord, & Rutter, 1995) was included in this evaluation. She qualified for special education services in the public schools under the category of autism. According to the *Woodcock-Johnson III: Tests of Achievement* (Woodcock, McGrew, & Mather, 2001) (*WJ-III*), Hildi's performance in the area of

word and letter identification was low average (standard score = 86), and her performance in the area of passage comprehension was significantly below average (standard score = 67). Sally was an 11 year old girl in the 5th grade. When Sally attended public schools, she qualified for special education services under the other health impairment category because she had a diagnosis of attention deficit hyperactivity disorder. When participating in the study Sally was under the care of a physical and took medication for her condition. Sally was included in the study because attention deficit hyperactivity disorder is considered a developmental disability. According to the *WJ-III*, Sally's performance in the area of word and letter identification was low average (standard score = 89) and her performance in the area of passage comprehension was below the average range (standard score = 84). Chad was a 14 year old boy in the 6th grade with a diagnosis of autistic disorder. As a toddler, Chad was diagnosed with autism based on an assessment by his pediatrician; the *Autism Diagnostic Observation Schedule* (Lord, Rutter, DiLavore, & Rissi, 1999) was included in this evaluation. He qualified for services in the public schools under the category of autism. According to the *WJ-III*, Chad's performance in the area of letter and word identification was within the average range (standard score = 98), and his performance in the area of passage comprehension was significantly below average (standard score = 53). Jane was a 13 year old girl in the 5th grade. When Jane attended public schools, she qualified for special education services under the category of mental retardation and other health impairment because she had a medical diagnosis of attention deficit hyperactivity disorder. According to the *WJ-III*, Jane's performance in the area of word and letter identification was significantly below average (standard score = 61) and her performance in the area of passage comprehension was significantly below average (standard score = 28). The students' background information is summarized in Table 1.

Materials

Reading comprehension instruction was provided using a Direct Instruction program, *Cor-*

TABLE 1

Description of Students

| <i>Student</i> | <i>Age</i> | <i>Grade</i> | <i>Ethnicity</i> | <i>Exceptionality</i> | <i>Cognitive Ability</i> | <i>Reading Achievement (WJ-III)</i> |
|----------------|------------|--------------|------------------|---|---|-------------------------------------|
| Hildi | 12 | 5 | Native American | Autism Spectrum Disorder | Test of Nonverbal Intelligence Q=87 | LW: SS=86 PC: SS=67 |
| Sally | 10 | 5 | Hispanic | Attention Deficit Hyperactivity Disorder | Wechsler Abbreviated Test of Intelligence FS=75 | LW: SS=89 PC: SS=84 |
| Chad | 14 | 6 | White | Autism Spectrum Disorder | Test of Nonverbal Intelligence Q=95 | LW: SS=98 PC: SS=53 |
| Jane | 13 | 5 | White | Mental Retardation & Attention Deficit Hyperactivity Disorder | Wechsler Abbreviated Test of Intelligence FS=57 | LW: SS=61 PC: SS=28 |

WJ-III = Woodcock-Johnson III: Tests of Achievement, LW = Letter and Word Identification; PC = Passage Comprehension.

rective Reading Thinking Basics: Comprehension level A (Engelmann, Haddox, Hanner, & Osborn, 2002). The materials consisted of a scripted teacher presentation book. In order to promote efficient learning, the program is divided into strands of developing skills and each lesson consists of instruction in several strands. The researchers chose three strands for this study: picture analogies, induction, and deductions. These strands appear in successive order within the program. Since the students had previously received instruction, the picture analogy strand was chosen because it followed as the next skill in the sequence of program instruction. The researchers implemented instructional procedures and instructor behaviors as directed in the instructor’s manual. These procedures and behaviors consisted of: (a) following the given script; (b) choral student responses; (c) the use of a clear signal to elicit student responses; (d) correction procedures for incorrect responses or responses that were not in unison; and (e) modeling skills, guiding students by responding

with them, and asking students to respond independently.

The researchers created the reading comprehension probes modeled after the tasks and behaviors included in the Direct Instruction program. The probes consisted of eight by eleven inch sheets of paper with instructor scripts for the given skill. For the picture analogy probes, the instructor presented the student with sets of pictures. The first set of pictures represented the first part of an analogy and included one picture, the words, “is to”, and a second picture. The second portion of the picture analogy was a picture, the words, “is to,” and an array of three pictures. For example, one set was a picture of a car, the words, “is to,” and a picture of a tire. The second part of the analogy was a picture of a sail boat and an array that included pictures of water, a person rowing a boat, and a sail. In order to complete this analogy, the participant pointed to the sail which completed the analogy of “car is to tire as sailboat is to sail.” When presenting the picture analogy probes,

the researchers used a script and said, "Point to the picture that completes the analogy." For the deduction probes, the researcher presented the student with an array of four pictures of objects and a sentence related to the objects. The student was asked to evaluate three statements regarding pictures and the sentence. For example, the sentence read, "Here is the only thing that Joe did; Joe sat in small boats." Four pictures of boats followed (large tanker ship, small life raft, small kayak, and large cruise ship). Three statements about Joe and the objects (boats) followed and the student was asked respond to each statement with "true," "false," or "maybe." The three statements related to Joe and the boats were: Joe sat in object 4, Joe did not sit in object 1, and Joe sat in object 2. The response to, "Joe sat in object 4" was "false" because object 4 was a large cruise ship and the sentence stated that Joe only sat in small boats. Other deduction items involved sentences in which a person performed an action sometimes and the response "maybe" was used in these cases when the statement might be true some of the time. For the induction probes, the instructor read four facts about a particular phenomenon and asked the student to use those facts to generate rules about the phenomenon. For example the four facts were: 1) On Sunday, the clouds came out and the horse ate an apple; 2) On Wednesday, the clouds did not come out and the horse ate a carrot; 3) On Tuesday, the clouds came out and the horse ate an apple; and 4) On Thursday, the clouds did not come out and the horse ate a carrot. After reading those rules, the researcher said, "Tell me the rule about when the clouds came out," and "Tell me the rule about when the clouds did not come out." The correct responses were, "When the clouds came out, the horse ate an apple," and "When the clouds did not come out, the horse ate a carrot." Correct responses included a complete sentence with both the condition (when the clouds came out) and the behavior (the horse ate an apple). Jane had mastered induction skills prior to instruction based on baseline performances of 100%, so data were collected with another strand, opposites. The researchers read a statement orally and asked Jane to say the statement with the opposite of one of the words within the statement. For

example, "Muscles pull to move bones; Now say the statement with the opposite of pull." A correct response was, "Muscles push to move bones." Simply stating that the opposite of pull was push was not a correct response.

Procedure

Prior to any instruction, the researchers administered two curriculum-based assessments: (a) the placement test that accompanied the Direct Instruction Program, and (b) a running record that included comprehension questions following a passage that each student read orally. Instruction occurred during regularly scheduled instructional time, for approximately 20 minutes per day. One of the two researchers carried out instruction in a group format. One day per week, both researchers were present in order to verify treatment integrity, and the instructor role switched from week to week. The first author provided instruction three or four days per week and the second author provided instruction one or two days per week.

Through task analysis, the Direct Instruction program divides comprehension skills into smaller chunks of skills and behaviors (Engelmann et al., 2002). The program is divided into strands of developing skills, and each lesson consists of instruction in several strands. Some strands develop over the course of the program, and others begin and end at different points in the program. For the purposes of this study, three strands were initially chosen for instruction and a fourth strand was added because one of the students had already mastered one of the strands. The researchers chose strands based on the students' current progress within the program and the strands' successive appearance in the program. The chosen strands were as follows: (a) picture analogies in which students completed an analogy through the use of pictures; (b) deductions in which students evaluated whether an event was true, false, or maybe happened based on a descriptive statement and a series of pictures; (c) inductions in which students generated rules about a particular phenomenon based on a series of facts about the phenomenon; and (d) opposites in which the student listened to a statement and restated the statement using the opposite of

one word within the original statement. Baseline data were collected until each student demonstrated a consistent performance (varying no more than 10%) across three consecutive data points. Daily instruction began with picture analogies and continued until the students reached criterion of three consecutive probes at 100%. After all students reached criterion, picture analogy instruction lessened to 1–2 times per week and deduction instruction began. When all students reached the criterion of three consecutive probes at 100% accuracy, instruction in deductions decreased to 1–2 times per week and daily instruction in inductions began. Jane's baseline data for inductions were 100% across probes, so data were not collected for Jane although she participated with the group. The group received instruction in inductions and opposites; induction probe data were collected for Hildi, Sally, and Chad and opposites data were collected for Jane. Two sets of maintenance data were collected. The first set (M1) was collected after students met criterion and when instruction decreased to 1–2 times per week. The second set (M2) was collected six weeks after all instruction for all strands ceased.

The instructor followed the program's prescribed scripts for the particular behavior or skill (Engelmann et al., 2002). This included modeling the particular skill for the students, leading as the students demonstrated the skill or behavior, and asking the students to perform the behavior independently without the instructor. The students responded to questions as a group. The instructor followed program procedures for ensuring that the students responded together. Errors in responses were corrected immediately through the following: (a) modeling the correct response; (b) leading the students in the correct response; (c) and asking the students to respond independently. The program included instances when the students were asked questions individually and these procedures were followed as well.

The researchers administered probes individually prior to daily instruction. There were multiple sets of probes that were given in random order. In the interest of time, probes were not administered to all students on the same day. Two students completed a probe

each day prior to instruction resulting to 2–3 probes per week per student.

Treatment Integrity and Inter-observer Agreement

The researchers carried out instruction according to a checklist of teacher behaviors. These behaviors corresponded to the procedures and behaviors prescribed in the Direct Instruction program (Engelmann et al., 2002). Once per week, one of the researchers observed the other providing instruction. Each of the treatment integrity observations was carried out with 100% accuracy. Approximately 75% of the instructional probes were checked for inter-observer agreement. Inter-observer agreement was calculated as the total number of agreements divided by the total number of disagreements and agreements, multiplied by 100. Inter-observer agreement was 97% for these probes. By student, the agreements and disagreements were as follows: (a) 22 agreements and 0 disagreement for Hildi; (b) 19 agreements and 0 disagreements for Sally; (c) 19 agreements and 2 disagreements for Chad; and (d) 19 agreements and 0 disagreements for Jane.

Research Design

A multiple probe across behaviors design was employed. The behavioral conditions were picture analogies, deductions, and inductions (data collected for Hildi, Sally, and Chad), and opposites (data collected for Jane). Baseline data were collected for all four students across all three conditions (for Hildi, Sally, and Chad), and four conditions (for Jane). Direct Instruction for picture analogies began when the data were stable across three consecutive data points. Stability was defined as three consecutive points which did not vary more than 10%. When all students reached the criterion for this condition (three consecutive probes at 100%), Direct Instruction for deductions began. When all of the students reached criterion for this condition (three consecutive probes at 100%), Direct Instruction for inductions (Hildi, Sally, and Chad) and opposites (Jane) began. Instruction continued until the students reached criterion of three consecutive probes at 100% accuracy. Pre-test and post-test data were also collected using curric-

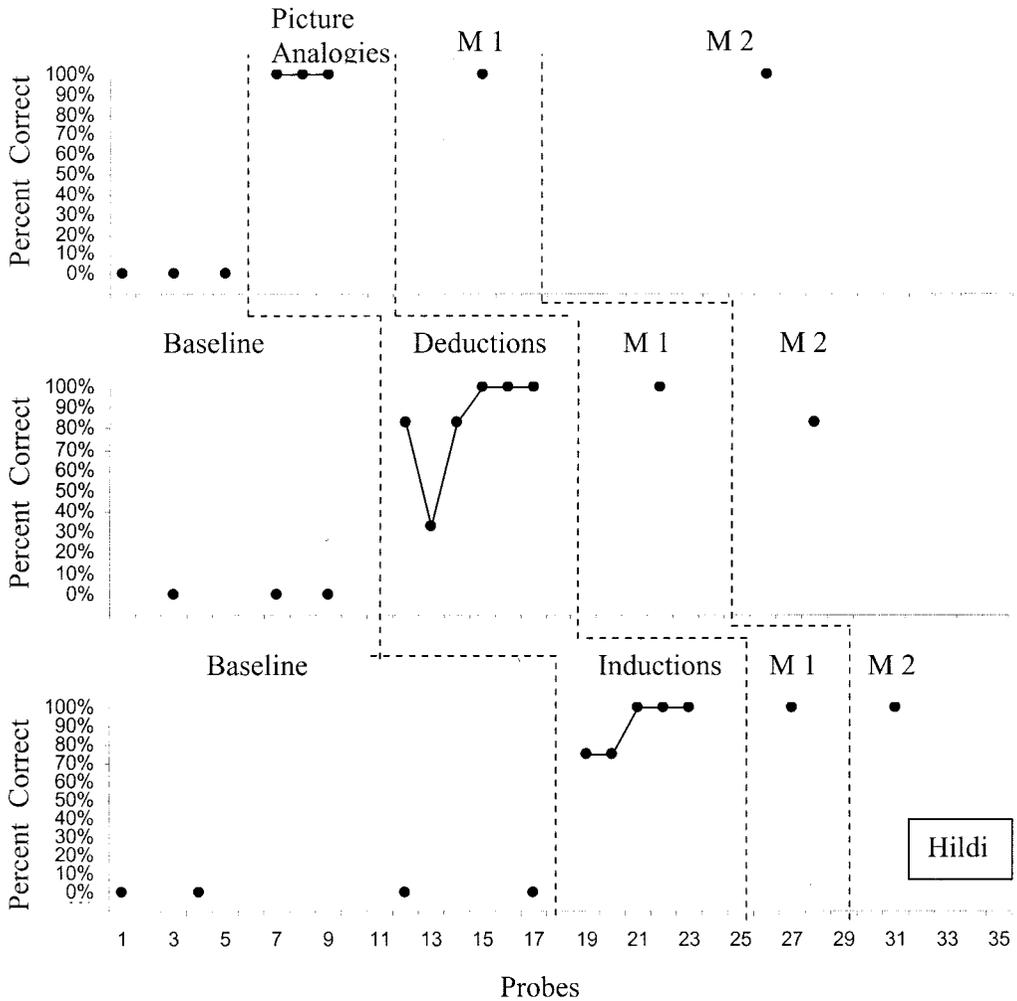


Figure 1. Percent of Correct Responses on Probes across Picture Analogies, Deductions, and Inductions for Hildi.

ulum-based assessments in the form of the placement test which accompanied the program and a reading running record which included comprehension questions.

Results

Figures 1–4 present the percentage of correct answers for reading comprehension probes for Hildi, Sally, Chad and Jane. The x-axis represents reading comprehension probes and the y-axis represents the percent correct for each reading comprehension probe.

Hildi

Baseline. During the picture analogies baseline, Hildi’s average performance was 0% with three consecutive probes at 0%. During the deductions baseline, Hildi’s average performance was 0% with three consecutive probes at 0%. During the inductions baseline, her average performance was 0% with three consecutive probes at 0%.

Picture analogies. During the picture analogies condition, Hildi’s mean performance was 100%. She reached criterion in three probes, all at 100%. There was an immediate and

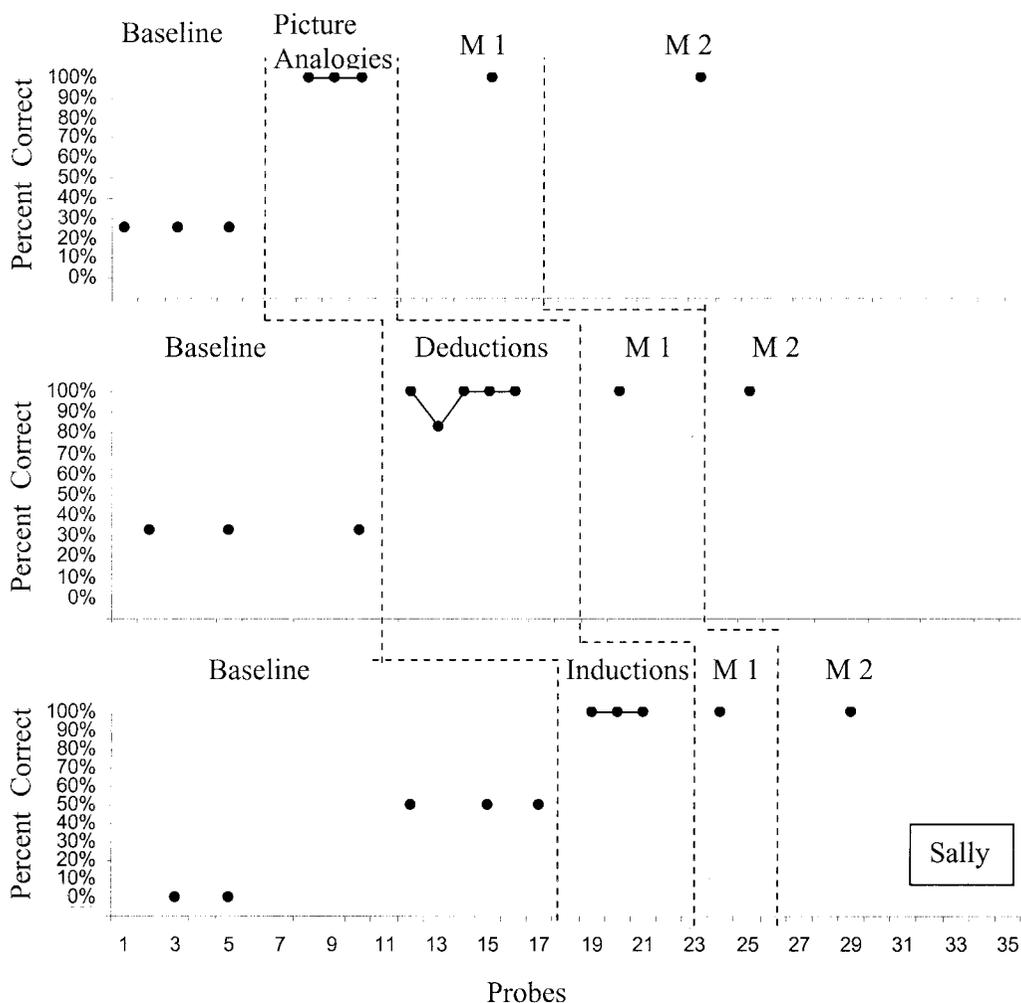


Figure 2. Percent of Correct Responses on Probes across Picture Analogies, Deductions, and Inductions for Sally.

marked improvement in her performance after instruction began in this condition. There is no overlap between baseline and instruction. When instruction decreased to 1–2 times per week during the first maintenance condition (M1), Hildi maintained her performance of 100%. Another maintenance probe was administered six weeks after instruction ended and Hildi maintained her performance of 100%.

Deductions. During the deductions condition, Hildi’s mean performance was 83% with probes ranging from 33%–100%. Hildi met criterion in 6 probes; with the exception of one data point, the points show an upward

path. There was no overlap between baseline and instruction. When deductions instruction decreased to 1–2 times per week (M1), Hildi maintained her performance at 100%. After six weeks of no instruction (M2), her maintenance performance decreased to 83%.

Inductions. During the inductions condition, Hildi’s mean performance was 90% with probes ranging from 75%–100%. She met criterion in 5 probes and the data points show an upward path. There was no overlap between baseline and instruction. When inductions instruction decreased to 1–2 times per week (M1), Hildi maintained her performance at

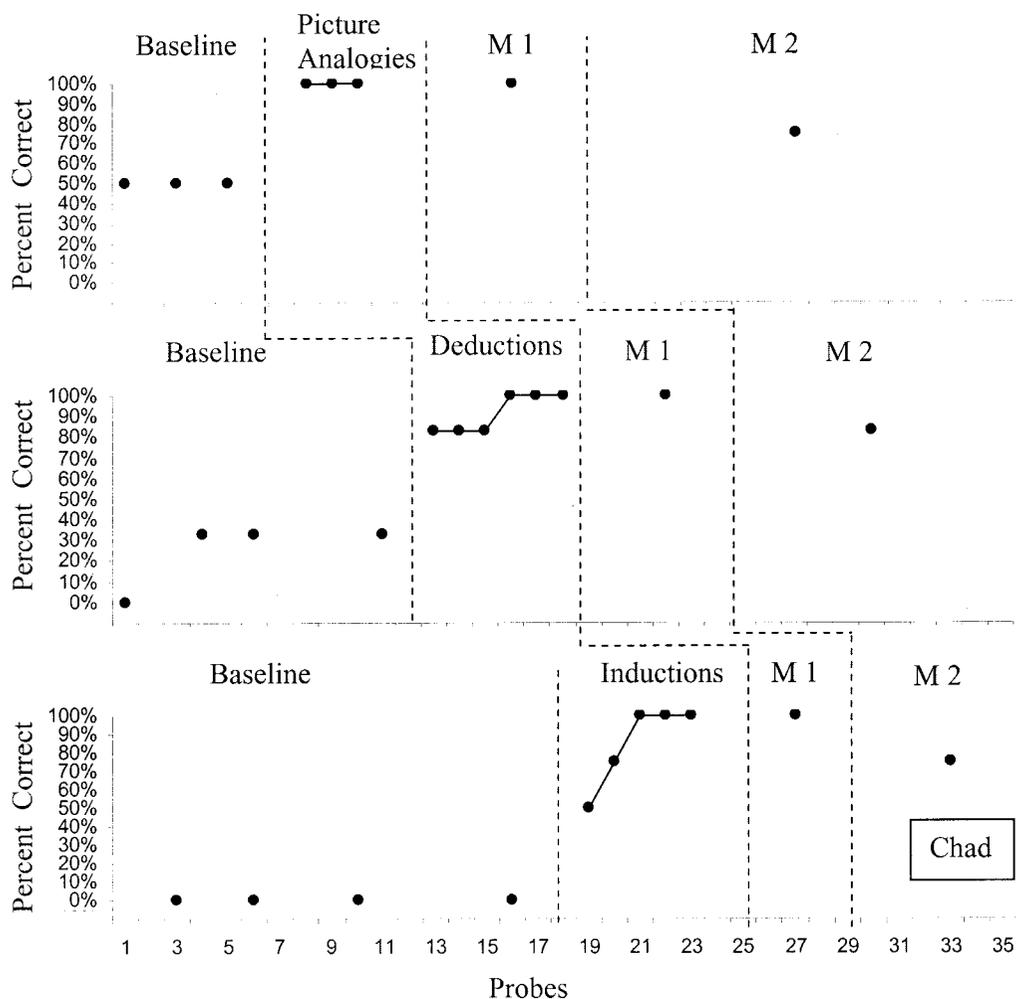


Figure 3. Percent of Correct Responses on Probes across Picture Analogies, Deductions, and Inductions for Chad.

100%. After six weeks of no instruction (M2), Hildi maintained her performance at 100%.

Curriculum-based assessments. Prior to instruction, Hildi completed the placement test that accompanied the Direct Instruction program. She made 25 errors, placing into level A, lesson 1. After participating in the current study, Hildi made 10 errors, placing into the next level of the program, level B1, lesson 1. Before reading comprehension instruction began, Hildi completed a running record which involved reading a passage at the 2nd grade level and answering 5 comprehension questions (two literal comprehension questions about story events, one question about

the main character's feelings, one question that asked how the reader arrived at the correct answer and one that involved a combination of the reader's experience and knowledge of story events). During the pre and post tests, Hildi read the passages fluently and answered questions without access to the passages. Prior to comprehension instruction, she answered 1/5 questions correctly. After instruction, Hildi answered 2/5 questions correctly.

Sally

Baseline. During the picture analogies baseline, Sally's average performance was 25%

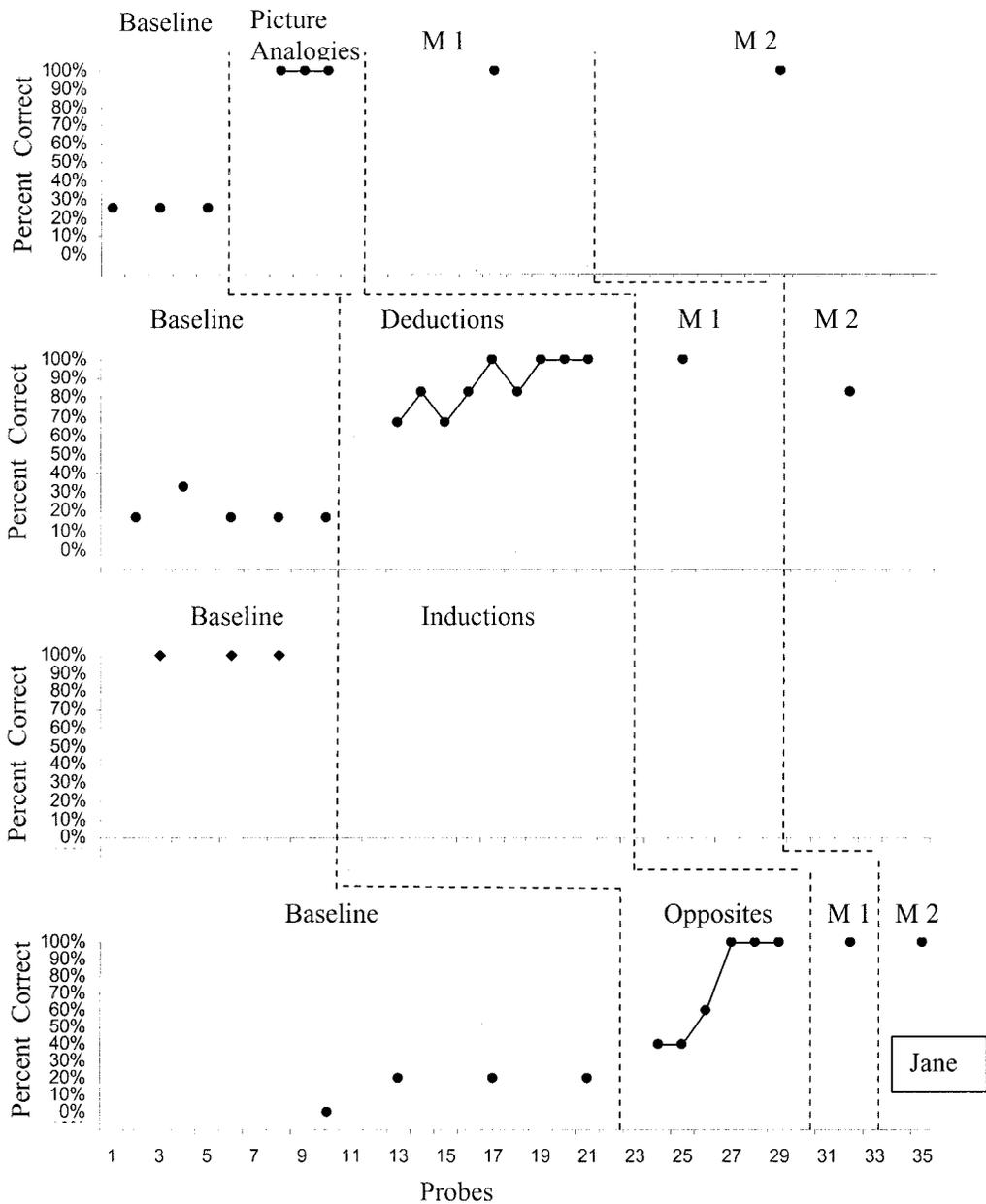


Figure 4. Percent of Correct Responses on Probes across Picture Analogies, Deductions, and Inductions for Jane.

with three consecutive probes at 25%. During the deductions baseline, Sally's average performance was 33% with three consecutive probes at 33%. During the inductions baseline, her average performance was 30% with

two probes at 0% followed by three consecutive probes at 50%.

Picture analogies. During the picture analogies condition, Sally's mean performance was 100%. She reached criterion in three probes,

all at 100%. There was an immediate and marked improvement in her performance after instruction began in this condition. There was no overlap between baseline and instruction. When instruction decreased to 1–2 times per week during the first maintenance condition (M1), Sally maintained her performance of 100%. Another maintenance probe was administered six weeks after instruction ended and Sally maintained her performance of 100%.

Deductions. During the deductions condition, Sally's mean performance was 97% with probes ranging from 83%–100%. Sally met criterion in 5 probes, showing an upward path. There was no overlap between baseline and instruction. When deductions instruction decreased to 1–2 times per week (M1), Sally maintained her performance at 100%. After six weeks of no instruction (M2), she maintained her performance at 100%.

Inductions. During the inductions condition, Sally's mean performance was 100%. She met criterion in 3 probes, all at 100%. There was a marked and immediate change in performance between baseline and instruction with no overlap of data points. When inductions instruction decreased to 1–2 times per week (M1), Sally maintained her performance at 100%. After six weeks of no instruction (M2), Sally maintained her performance at 100%.

Curriculum-based assessments. Prior to instruction, Sally completed the placement test that accompanied the Direct Instruction program. She made 16 errors, placing into level A, lesson 1. After participating in the current study, Sally made 3 errors, placing into the next level of the program, level B1, lesson 1. Before reading comprehension instruction began, Sally completed a running record that involved reading a passage at the 3rd grade level and answering 5 comprehension (two literal comprehension questions about story events, one question about the main character's feelings, one question that asked how the reader arrived at the correct answer and one that involved a combination of the readers experience and knowledge of story events). During the pre and post tests, Sally read the passages fluently and answered questions without access to the passages. Prior to comprehension instruction, she answered 1/5 questions correctly. After instruction, Sally answered 5/5 questions correctly.

Chad

Baseline. During the picture analogies baseline, Chad's average performance was 50% with three consecutive probes at 50%. During the deductions baseline, Chad's average performance was 25% with one probe at 0% followed by three consecutive probes at 33%. During the inductions baseline, his average performance was 0% with three consecutive probes at 0%.

Picture analogies. During the picture analogies condition, Chad's mean performance was 100%. He reached criterion in three probes, all at 100%. There was an immediate and marked improvement in his performance after instruction began in this condition. There is no overlap between baseline and instruction. When instruction decreased to 1–2 times per week during the first maintenance condition (M1), Chad maintained his performance of 100%. Another maintenance probe was administered six weeks after instruction ended (M2) and Chad's maintenance performance decreased to 75%.

Deductions. During the deductions condition, Chad's mean performance was 92% with probes ranging from 83%–100%. Chad met criterion in 6 probes, showing an upward path in the data points. There was no overlap between baseline and instruction. When deductions instruction decreased to 1–2 times per week (M1), Chad maintained his performance at 100%. After six weeks of no instruction (M2), his maintenance performance decreased to 83%.

Inductions. During the inductions condition, Chad's mean performance was 85% with probes ranging from 50%–100%. He met criterion in 5 probes and the data points show an upward path. There was no overlap between baseline and instruction. When inductions instruction decreased to 1–2 times per week (M1), Chad maintained his performance at 100%. After one six weeks of no instruction (M2), Chad's maintenance performance decreased to 75%.

Curriculum-based assessments. Prior to instruction, Chad completed the placement test that accompanied the Direct Instruction program. He made 24 errors, placing into level A, lesson 1. After participating in the current study, Chad made 11 errors, placing into the

next level of the program, level B1, lesson 1. Before reading comprehension instruction began, Chad completed a running record which involved reading a passage at the 3rd grade level and answering 5 comprehension (two literal comprehension questions about story events, one question about the main character's feelings, one question that asked how the reader arrived at the correct answer and one that involved a combination of the readers experience and knowledge of story events). During the pre and post tests, Chad read the passages fluently and answered questions without access to the passages. Prior to comprehension instruction, he answered 0/5 questions correctly. After instruction, Chad answered 2/5 questions correctly.

Jane

Baseline. During the picture analogies baseline, Jane's average performance was 25% with three consecutive probes at 25%. During the deductions baseline, Jane's average performance was 20% with one increasing data point at 33% followed by three consecutive probes at 17%. During the inductions baseline, her average performance was 100% with three consecutive probes at 100%. During the opposites baseline, Jane's average performance was 15% with one data point at 0% followed by three consecutive data points at 20%.

Picture analogies. During the picture analogies condition, Jane's mean performance was 100%. She reached criterion in three probes, all at 100%. There was an immediate and marked improvement in her performance after instruction began in this condition. There is no overlap between baseline and instruction. When instruction decreased to 1–2 times per week during the first maintenance condition (M1), Jane maintained her performance of 100%. Another maintenance probe was administered six weeks after instruction ended and Jane maintained her performance of 100%.

Deductions. During the deductions condition, Jane's mean performance was 87% with probes ranging from 67%–100%. Jane met criterion in 9 probes with the points showing an upward path. There was no overlap between baseline and instruction. When deduc-

tions instruction decreased to 1–2 times per week (M1), Jane maintained her performance at 100%. After six weeks of no instruction (M2), her maintenance performance decreased to 83%.

Opposites. During the opposites condition, Jane's mean performance was 73% with probes ranging from 40%–100%. She met criterion in 6 probes and the data points show an upward path. There was no overlap between baseline and instruction. When opposites instruction decreased to 1–2 times per week (M1), Jane maintained her performance at 100%. After six weeks of no instruction (M2), Jane maintained her performance at 100%.

Curriculum-based assessments. Prior to instruction, Jane completed the placement test that accompanied the Direct Instruction program. She made 27 errors, placing into level A, provisional basis. After participating in the current study, Jane made 10 errors, placing into the next level of the program, level B1, lesson 1. Before reading comprehension instruction began, Jane completed a running record that involved reading a passage at the 2nd grade level and answering five comprehension (two literal comprehension questions about story events, one question about the main character's feelings, one question that asked how the reader arrived at the correct answer and one that involved a combination of the readers experience and knowledge of story events). During the pre and post tests, Jane read the passages fluently and answered questions without access to the passages. Prior to comprehension instruction, she answered 1/5 questions correctly. After instruction, Jane answered 3/5 questions correctly.

Discussion

The purpose of this study was to extend the research regarding the use of DI to improve reading comprehension of students with ASD and DD by implementing different and more complex portions of DI and measuring student progress using curriculum-based assessments in addition to instructional probes. A functional relation was demonstrated between Direct Instruction and reading comprehension skills. All students met criterion across the picture analogies, deductions, inductions, and opposites conditions. There were no over-

lapping data points across all students and conditions. Furthermore, there was an immediate and marked change in student performance between baseline and treatment conditions. All of the students maintained their performance after reaching criterion as the frequency of instruction decreased.

Students engaged in the Direct Instruction program without any modifications to the strands of the program presented as were needed in previous research (Flores & Ganz, 2007). Students participated in the form and at the rate prescribed by the program. As Flores and Ganz found, the students followed directions, remained on-task, responded appropriately to instructional demands and tasks without any deviation from the management techniques recommended within the program.

After six weeks without instruction, performance was maintained at a level of 100% across most conditions with the exception of Hildi, whose six week maintenance for deductions decreased to 83% and Chad, whose six week maintenance decreased across all conditions. Chad did not maintain his performance at 100%, but performed at or above 75%, which is well above his baseline performance and might be considered satisfactory in typical classrooms. This extends previous research (Flores & Ganz, 2007) in which the students' maintenance performance were measured after one month. Another extension of previous research was the addition of curriculum-based assessments as a measure of student progress. All students made marked progress as measured by the program placement test, each placing into the next level of the program. Each student's comprehension performance as measured through running records improved. Sally made the greatest improvement, from 40% to 100%. Hildi, Chad, and Jane improved and continued to miss the questions that asked the reader (a) how he or she arrived at the correct answer and (b) to combine previous experience with knowledge of story events that involved a combination of the reader's experience and knowledge of story events. Hildi and Chad also missed the questions that asked the reader about the main character's feelings. This is consistent with Sandaña and Frith's (2007) findings that individuals with high functioning autism have dif-

ficulty with higher order processing skills which might explain why Hildi and Chad performed better with literal questions than those which involved high order thinking.

Limitations

Direct Instruction (DI) was not compared to any other method or strategy. Therefore the results show that DI was effective for these students rather than demonstrating any advantages of using DI reading comprehension instruction over other forms of instruction. Another limitation of this study is the degree to which the results can be generalized outside of the conditions of the study (Kazdin, 1982). Although the current study extends previous research, a larger group or multiple replications involving students with varied levels of functioning are needed to translate the results to the larger population.

The instructional delivery by the researchers is another limitation (Kazdin, 1982). The first author was trained to implement DI programs as a classroom teacher and certified as a trainer by the Association for Direct Instruction. The first author's experience with DI may have increased treatment integrity, but may make the results less realistic because the classroom teacher did not implement the program. In order to close the existing gap between research and practice, it is important that classroom teachers successfully implement instructional interventions and maintain their use over time. It is unknown and perhaps unlikely that the classroom teacher will learn the methodology and maintain this type of instruction over time. Presence of the researchers may have skewed the results since students may have been more motivated to participate or behave in different ways with outsiders to the classroom.

Implications and Future Research

There is research regarding the reading characteristics and needs of students with ASD and DD, such as oral language deficits (Nation & Norbury, 2005; Snowling & Frith, 1986), ability to understand characters' thought processes (Jolliffe & Baron-Cohen, 1999; Happé, 1994), difficulties with higher order thinking skills (Sandaña & Frith, 2007), and making

connections between text and previous learning (Wahlberg & Magliano, 2004). However less research involving interventions to remediate or compensate for these deficits exists. There is little research in the area of reading comprehension for students with ASD and DD. The Direct Instruction *Corrective Reading* comprehension series includes explicit instruction in these areas (Engelmann et al., 2002). The program implemented in this study emphasizes oral language comprehension through thinking operations, such as analogies, providing evidence for beliefs or conclusions, classification, deductions, description, inductions, meaning of opposites and meaning of same, statement inferences, and understanding true and false. This program also teaches useful information that increases students' background knowledge. These are all skills that researchers have identified as deficits for students with ASD and DD. The line of research regarding DI reading comprehension for individuals with ASD and DD is in its initial stages. Flores and Ganz (2007) and the current study have shown that seven strands within one level of the program could be successfully implemented with student with ASD and DD. Further research is needed regarding the efficacy of comprehensive implementations with more students. The effects of long-term use of this program, taking students through all or most of the levels, needs further study. It is also unknown whether long-term use of DI reading comprehension with these populations would be the most efficient and successful form of remediation. Research that involves comparison of the methodologies is needed. Finally, another area of needed research is student progress assessment. This study extended previous research by including curriculum-based assessments, but further research is needed to assess meaningful gains based on students' individualized educational program (IEP) goals, student performance on statewide assessments, and other measures of progress that are most relevant in schools today.

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Effects of Antecedent Prompt and Test Procedure on Teaching Simulated Menstrual Care Skills to Females with Developmental Disabilities

Gulhan Ersoy

Barbaros Elementary School, Eskisehir, Turkey

Elif Tekin-Iftar and Gonul Kircaali-Iftar

Anadolu University

Abstract: Although menstrual care is among the most important skill areas for females with mild to moderate developmental disabilities to facilitate their independence, there is limited research examining this issue. The present study was designed to analyze the acquisition and maintenance effects of antecedent prompt and test procedure on teaching changing sanitary napkins on a doll to three young females with mild to moderate developmental disabilities. Generalization through multiple exemplar approach and social validity were also examined. A multiple probe design across participants was used in the study which consisted of baseline, intervention, probe, maintenance, and generalization sessions. All participants were able to acquire and maintain the skills taught to them, and generalize the acquired skills to various examples. Furthermore, the parents of the participants were very pleased with the study in general. The results are discussed and recommendations regarding future research and practice are raised in the article.

Many individuals with developmental disabilities have unique learning needs which differentiate them from individuals with other types of disabilities. Self-care skills which are listed under the category of practical adaptive skills as ‘activities of daily living’ in the classification of American Association on Mental Retardation (2002) and are among the primary curricular areas for individuals with developmental disabilities when their unique learning needs are considered. Therefore, extensive research has been conducted on teaching self-care skills such as toileting and related skills (Hobbs & Peck, 1985; Luiselli, 1996; Marshall, 1996), eating (Collins, Gast, Wolery, Holcombe, & Leatherby, 1991; Denny et al., 2001;

Luiselli, 1998; Matson, Taras, Sevin, Love, & Fridley, 1990), dressing (Alberto, Jobes, Sizemore, & Doran, 1980; Matson et al., Reese & Snell, 1991; Young, West, Howard, & Whithney, 1986) and other daily living skills and cognitive skills (Cohen et al., 2006; Ellis, Ala’i-Rosales, Glenn, Rosales-Ruiz, & Greenspan, 2006; Matson et al.; Wolery, Ault, Gast, Doyle, & Griffen, 1991) to individuals with developmental disabilities. Acquisition of self-care skills (i.e., feeding, dressing, and maintaining personal hygiene) contributes to health, independence, self-determination, social acceptance, and quality of life of persons (Carothers & Taylor, 2004; Collins, 2007; Culatta, Tompkins, & Werts, 2003; Hardman, Drew, & Egan, 2005; McCarthy, Cuskelly, van Kraayenoord, & Cohen, 2006; Sheppard, 2006; Smith, 2004; Snell & Brown, 2000; Turnbull, Turnbull, Shank, & Smith, 2004).

Teaching menstrual care skills to females with disabilities has received relatively little attention from researchers and practitioners although menstrual management is often raised as a concern by either parents or caregivers of the females with developmental dis-

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abilities. The majority of the existing literature on menstrual care and developmental disabilities show that menstruation is problematic for both females with developmental disabilities and their parents or caregivers. Findings of two recent survey studies indicated that females with developmental disabilities experience similar as well as different menstrual problems when compared to other females and have limited opportunities to learn to deal with their own menstrual care. As a result, caregivers usually presume a major role in assisting females with developmental disabilities in menstrual care (Rodgers & Lipscombe, 2005; Rodgers, Lipscombe, & Santer, 2006).

Although menstrual care is among the most critical personal hygiene maintenance skills for females, menstrual care instruction is one of the most difficult personal hygiene instructions to be delivered since it may interfere with individuals' right to privacy. However, in order for females with developmental disabilities to live as independently as possible, menstrual care should be taught to them as in any other self care skills. Unfortunately, as shown in a recent study (Rodgers & Lipscombe, 2005), there are serious problems related to teaching menstrual care skills to females with developmental disabilities as well as providing appropriate assistance during menstruation period.

To address the problems on menstrual care needs of females with developmental disabilities, medical procedures such as hysterectomy rather than educational procedures have often been suggested. However, various concerns such as dysfunctions of the ovaries or cardiovascular systems as well as legal and ethical concerns are often raised regarding such procedures (Carlson, 2002; Carlson & Wilson, 1994; Rodgers & Lipscombe, 2005; Rodgers et al., 2006). Elkins, Gafford, Wilks, Muram, and Golden (1986) conducted a study with females who were referred for menstruation termination through hysterectomy. The women were able to avoid the suggested operation and successfully cope with their periods through a menstrual training program consisted of hormonal medication and home-based behavior modification.

Acceptability of the type and content of instructional procedures for teaching men-

strual care is another issue of concern. Epps, Prescott, and Horner (1990) compared the acceptability of two different training methods for teaching menstrual care skills to females with developmental disabilities. Findings of this study showed that the acceptability ratings of professional (e.g., special education) and nonprofessional females differed: professional females preferred self-training whereas nonprofessionals preferred training using a doll.

Limited research exists examining the effects of menstrual care instruction provided to females with developmental disabilities. In an earlier study, Richman, Reiss, Bauman, and Bailey (1984) analyzed the effects of a training package consisting of forward chaining and prompting on teaching specific menstrual care skills (changing stained underwear and sanitary napkins) to five females with mild to severe developmental disabilities. Results of this multiple-baseline across participants study revealed that the participants were able to acquire, maintain, and generalize those skills. The simulation training using a doll was found to be effective for teaching independent menstrual care skills to four females with moderate to profound developmental disabilities (Richman, Ponticas, Page, & Epps, 1986). Epps, Stern, and Horner (1990) compared the effects of two different simulation procedures, on self and using a doll. Treatment was implemented according to general case instruction in which a range of relevant stimulus and response variations were used for teaching generalized menstrual care skills to four females with severe developmental disabilities through a split multiple-baseline study across participants. The results indicated that limited generalization occurred after training using a doll whereas high levels of generalization occurred after on-self training.

Errorless training consists of various effective and efficient response prompting and fading procedures utilized for teaching a variety of skills to individuals with moderate to severe developmental disabilities. Antecedent prompt and test procedure (APTP) has been proven to be among the successful errorless training procedures for teaching chained tasks such as self-care skills to individuals with developmental disabilities (e.g., Crist, Walls, & Haught, 1984; Welch, Nietupsky, & Hamre-Nietupsky, 1985). This procedure includes (a)

prompt trials conducted with zero second delays between the delivery of the task direction and the prompt and (b) probe (i.e., unprompted test) trials conducted before or after the prompt trials to assess whether the student responds correctly to the task direction delivered without the prompt (Tekin-Iftar & Kircaali-Iftar, 2004; Wolery, Ault, & Doyle, 1992; Wolery, Bailey, & Sugai, 1988). Matson et al. (1990) used physical and verbal prompts to teach a variety of self-care skills to three participants with autism and mental retardation; and assessed the attainment of those skills during the probe trials conducted at the end of each session. The findings revealed that all three participants were able to acquire the skills taught to them while two of the participants maintained those skills over 7 to 12 months.

APTP can be delivered with some variations. Variations regarding the prompt trials are conducting the prompt trial with or without requiring the student to make a response. Some of the variations regarding the probe trials are: (a) delivering the probe trial immediately or a few seconds after the prompt trials, (b) delivering the probe trial before the prompt trials, and (c) delivering the probe trial independent of the time and/or place of the prompt trials (Wolery et al., 1992).

Errorless training is usually utilized to examine the effects of various instructional procedures on skill acquisition. However, generalization is another parameter of paramount importance for assessing effectiveness, especially when individuals with developmental disabilities are considered. Hence, there are various approaches for facilitating the generalization of the acquired skills, one of which is known as 'multiple exemplar approach' (Browder & Snell, 1983). Training with multiple examples of a stimulus or response class is used to facilitate generalization by multiple exemplar approach. Browder and Snell reported the stages of multiple exemplar approach as follow: (a) define the stimulus and response class, (b) define the sample, (c) test all examples prior to training, (d) start training with the first example of the target behavior, (e) when the criterion is reached on the first example, probe the rest of the examples, (f) if generalization is reached in all examples, stop training, (g) if generalization is not

reached in all examples, repeat step (d) and (e) for the second example, (h) follow the above steps until the generalization criteria are reached in all examples. The multiple exemplar approach has been used successfully to obtain or at least facilitate the generalization of the taught discrete as well as chained skills (Collins et al., 1991; Gardil & Browder, 1995; Hughes & Rusch, 1989; Hughes, Schuster, & Nelson, 1993; Schuster & Griffen, 1993; Sandkop, Schuster, Wolery, & Cross, 1992; Smith & Schloss, 1986; Solnick & Baer, 1984; Taylor, Collins, Schuster, & Kleinert, 2002). However, none of these studies utilized the multiple exemplar approach systematically as explained above.

Based on the related literature, it seems to be worth examining effects of APTP on teaching menstrual care skills. Hence, the purpose of the present study was to analyze (a) acquisition and maintenance effects of APTP on teaching changing sanitary napkins on a doll to three young females with mild developmental disabilities, (b) effects of the multiple exemplar method on the generalization of the acquired task to various examples, and (c) opinions of the parents of the participants about the instruction provided to their daughters.

Method

Participants

Participants were three female youths with mild to moderate developmental disabilities. One of them (Esra) had Down syndrome. Two subjects (Esra and Aynur) attended a special class at a public elementary school, and one (Filiz) was mainstreamed at a regular class in the same school. Filiz was 12, Esra was 13, and Aynur was 14 years old. Esra menstruated for the first time during the third full probe condition. The remainder of the participants did not experience menstruation while the study was in progress.

The purpose of the study was explained to parents of the participants. Their consents were obtained for including their daughters in the study. The prerequisite skills which the girls possessed for beginning the study were: (a) sticking an adhesive material on a surface and pulling out the same material off the

TABLE 1

Training and Generalization Sets

| <i>Training Sets</i> | <i>First Generalization Set</i> | <i>Second Generalization Set</i> |
|---|--|--|
| Anatomic doll in 43 cm length with hair | Anatomic doll in 38 cm length without hair | Half anatomic doll in 55 cm length with hair |
| Daily sanitary napkins | Regular sanitary napkins | Winged sanitary napkins |
| Lace underwear | White underwear | Colored underwear |

surface, (b) having dressing-undressing skills, (c) having hand washing skill, (d) following verbal instructions, (e) folding and rolling a paper, (f) identifying the materials used in the study such as sanitary napkins, plastic bags etc., and (g) agreeing to participate in a systematic teaching process. The first author tested whether participants had these skills. It was found out that all three girls had the prerequisite skills with two exceptions. Esra and Aynur needed training on identifying the materials and their functions. None of the participants had prior experience with APTP.

Staff. The first author of the study conducted all experimental sessions. She was the school counselor at the children’s school. A special education teacher collected the reliability data since he was familiar with the instructional procedure used in the study.

Settings

All sessions were conducted in the bathroom of the subjects’ houses. In order to standardize the bathrooms, some arrangements were made by the researchers. Each bathroom had a chair placed in front of the sink for putting the doll. Also, a trashcan was available at the left side of the chair. Toilet paper was put on the sink; towels were hung either on the door handle or on the back of the door. A handy cam camera on a tripod was placed to tape-record the sessions near the door. Sessions were conducted after school during weekdays and at times considered as convenient by the parents during weekends.

Materials

Sanitary napkins, plastic bags, dolls, underwear, trashcan, toilet paper, reinforcers (e.g., stationary items, music cassettes, etc.) cam-

era, data collection forms, and a stopwatch were used in the study. Since a multiple exemplar approach was used to facilitate generalization, except the materials (training sets) used during intervention, two different sets for testing the generalization were used (Table 1). These two sets had sanitary napkins in two different brands and sizes, two panties in different colors, and two different dolls.

Sanitary napkins were adapted for the sizes of the dolls by the researchers. This adaptation was made by cutting the daily sanitary napkins (thin ones) into two and normal sanitary napkins into four equal pieces. The winged sanitary napkins were cut from two ends.

Tangible and verbal reinforcers were used throughout the study. Participants selected the possible reinforcers from a menu. The reinforcer selection menu included stationary items such as pens, pencils, and crayons; accessory items such as buckles and rings; and music cassettes. Both the girls (teacher read the menu and signed their preferences on the menu) and their parents filled out the reinforcer selection menu. The teacher selected the items preferred by both children and their parents. The teacher put the possible reinforcers in a bag and showed the inside of the bag to the participants when letting them pick their reinforcers.

Target Behavior

The target behavior of changing sanitary napkins on a doll was comprised of placing the sanitary napkin on the underwear and pulling it off the underwear. Since a multiple exemplar approach was used in the study, task analysis for the generalization sets were developed as well. The task analysis developed for the training sets was composed of 18 steps (Table 2). The task analyses developed for the first

TABLE 2

Task Analysis of Changing Sanitary Napkins on a Doll

-
-
1. Takes the sanitary napkin and plastic bag.
 2. Walks into the bathroom with the doll.
 3. Places the doll on the chair.
 4. Lowers the pants of the doll.
 5. Lowers the underwear of the doll.
 6. Pulls out the sanitary napkin from the underwear.
 7. Wraps the sanitary napkin.
 8. Puts the wrapped sanitary napkin in a plastic bag.
 9. Throws the plastic bag in the trashcan.
 10. Wipes out the doll with a toilet paper.
 11. Takes the clean sanitary napkin.
 12. Pulls out the paper from the sticky surface of the sanitary napkin.
 13. Puts the paper in the trashcan.
 14. Places the sticky face of the sanitary napkin on the underwear of the doll.
 15. Puts on the underwear of the doll.
 16. Puts on the pants of the doll.
 17. Washes the hands of the doll.
 18. Dries the hands of the doll with the cotton towel.
-

and second generalization sets were composed of 18 and 20 steps respectively.

General Procedure

Changing sanitary napkins on a doll was taught to three subjects in the study. All experimental sessions were conducted in 1:1 teaching arrangement. All sessions were tape-recorded. Daily probe sessions were conducted to test acquisition whereas full probe sessions were conducted to establish experimental control. Also, maintenance probe sessions were conducted after the training (5, 11, and 20 days later) and generalization probe sessions were conducted following every full probe condition in the study. A trial was defined as providing an opportunity to the subject for performing all steps of the task analysis. Response intervals were 5 s during all sessions and inter-trial intervals was also 5 s during intervention sessions. Performing a trial correctly resulted in a fixed ratio schedule of reinforcement with a 1/18 ratio (FR18) during full and daily probe sessions. That is,

the subject was reinforced with a tangible reinforcer upon correct completion of all 18 steps. Reinforcements were thinned during maintenance sessions and participants were reinforced with FR18 schedule with verbal reinforcement only. FR18 and FR20 schedules were used during generalization probe sessions. The first author conducted all sessions. She delivered reinforcement for the subjects' performances as well as attending and cooperation behaviors at the end of every session.

Baseline/Full Probe Sessions

Full probe sessions were conducted before introducing the intervention to the first subject and after criterion was met for each participant. The first full probe sessions were conducted to collect baseline. Full probe sessions were conducted until stable data were recorded for at least three consecutive sessions. A trial was conducted in each full probe. Single opportunity method was used during probe sessions (Brown & Snell, 2000). The teacher presented the task direction and recorded the participant's responses to the steps of task analysis. If the participant initiated an incorrect response, the teacher interrupted her response and recorded the response as incorrect. The following steps in the task analysis were recorded as incorrect as well. There were two types of responses during full probe sessions: (a) correct responses were defined as initiating a correct step of the task analysis within 5 s and completing it, (b) incorrect responses were defined as initiating an incorrect step of task analysis, completing the step incorrectly or not initiating the step. Correct responses were verbally reinforced whereas incorrect responses were ignored during full probe conditions. Full probe sessions were conducted as follows: The teacher had the training materials ready, secured the subject's attention (e.g., "Are you ready?"), and after receiving an affirmative response, delivered the task direction (e.g., "Esra, please change the sanitary napkin on your doll."), and waited 5 s for the subject to initiate her response.

Daily Probe Sessions

Since a controlling prompt was delivered on every training trial when providing instruction

with APTP, participants did not have an opportunity to respond to the task direction independently. Therefore, daily probe sessions were conducted to assess the transfer of stimulus control. Daily probe sessions were conducted immediately after the training sessions. Correct responses during intermittent probe sessions were counted toward criterion. Criterion was 90% correct responding to the steps of the task analysis during daily probe sessions for at least three consecutive sessions for all participants. Daily probe sessions were conducted just like the full probe sessions with the exception that in daily probe sessions, only the subject who was currently being taught was assessed. Correct responses resulted in a verbal praise whereas incorrect responses resulted in ignorance.

Antecedent Prompt and Testing Sessions

Changing sanitary napkins on a doll was taught by using APTP within a total task presentation format (Brown & Snell, 2000). That is to say, subjects were required to perform all steps of the task analysis in a trial. Subjects were not required to respond during the intervention trials. Two intervention trials were conducted in each intervention session. Then the teacher conducted the daily probe sessions to test the acquisition. The teacher delivered the task direction and then immediately delivered the controlling prompt. Controlling prompt consisted of modeling and verbal prompting for all subjects. The intervention sessions were conducted as follows: Prior to intervention sessions, the teacher turned her back to the subject and placed the sanitary napkin on the underwear of the doll. The teacher secured the subject's attention by saying "Esra, watch me. I am going to change the sanitary napkin on the doll. I'll be asking you to do the same soon." The teacher delivered the task direction, "Esra, please change the sanitary napkin on the doll", and then immediately delivered the controlling prompt as verbal prompt plus modeling. That is, the teacher provided verbal prompt "Esra, take your doll to the bathroom" while taking the doll to the bathroom without waiting a response from the subject. The subsequent steps were performed in the same format.

Maintenance and Generalization Probe Sessions

Maintenance probe sessions were conducted 5, 11 and 20 days after training. The response definitions in maintenance sessions were the same as in the full probe sessions. The same behavioral consequences were provided in maintenance probe sessions as well.

Multiple exemplar approach was used to facilitate the generalization of the acquired skills in the study. Therefore, generalization probe sessions were conducted after every full probe condition. In these sessions, the two generalization sets were probed. That is to say, in these sessions generalization was assessed in the first and second generalization sets which were not used during intervention. The following rule was followed. When participants met the generalization criteria for the first generalization set, the second generalization set was probed. However, if the participant did not meet the criteria on the first generalization set, training with this set was initiated. Generalization criteria were 80% correct responding the generalization sets for all participants. Training was needed on the second generalization set for all three children.

Response definitions in generalization probe sessions were the same as in the full probe sessions. The same behavioral consequences were provided in generalization probe sessions as well.

Experimental Design

A multiple probe design across participants was used to assess the effectiveness of APTP on teaching to change sanitary napkins on a doll to three females with mild developmental disabilities. The dependent variable was percent of correct responding on changing sanitary napkins on a doll and the independent variable of the study was APTP. The independent variable of the study was introduced to each subject consecutively. Experimental control was built in when the subject was performing at or near to baseline levels during full probe conditions before the intervention was introduced and the criterion was reached only after the intervention was introduced (Tekin-Iftar & Kircaali-Iftar, 2004; Wolery et al., 1988).

Interobserver and Procedural Reliability

Reliability was collected at least 20% of all experimental sessions. Dependent variable reliability data for Esra and Aynur indicated 100% agreement during all probe sessions (full and daily), intervention, and maintenance and generalization probe sessions. Dependent variable reliability data for Filiz indicated 93% agreement (range = 86%–100%) during all full probe sessions, 67% agreement (range = 33%–100%) during daily probe sessions, and 100% agreement during intervention, and maintenance and generalization probe sessions.

Procedural (independent variable) reliability data were collected to estimate whether the teacher delivered intervention and other experimental sessions (e.g., full and intermittent probe sessions, generalization sessions, etc.) as they were planned in the study. The planned teacher behaviors were determined for reliability analyses. The planned steps that the teacher was expected to demonstrate for APTP were (a) presenting the task direction, (b) performing the steps of the task analysis in a correct (suggested) order, and (c) providing the controlling prompt. The teacher delivered the intervention with 100% compliance with the planned steps of the intervention sessions across three subjects. The planned steps that the teacher was expected to demonstrate during full probe sessions were (a) securing the student's attention, (b) presenting the task direction, (c) delivering appropriate consequences, (d) testing the generalization on the generalization sets, (e) providing intervention with the sets which the criteria for generalization was not met. The last two steps were not taken into consideration during daily and maintenance probe sessions.

The teacher delivered the intervention with 100% compliance with the planned steps of the APTP sessions across three subjects. The teacher provided full and maintenance and generalization probe sessions with 100% accuracy with Esra. She provided daily probe sessions with 100% accuracy except securing the participant's attention. She did not provide this step to Esra.

The teacher provided full probe sessions with 100% accuracy except the step of securing the participant's attention with Filiz. She

delivered this step with 33% accuracy. The teacher delivered the maintenance and generalization probe sessions with 100% accuracy. The teacher delivered the daily probe sessions with 100% accuracy except the steps of delivering appropriate consequences (67% accuracy) and securing the participant's attention (0%).

The teacher delivered full probe sessions with 100% accuracy except the step of securing the subject's attention with Aynur as well. She delivered securing the participant's attention with 67% accuracy. The teacher delivered the maintenance and generalization and daily probe sessions with 100% accuracy, except for securing attention (0%).

Social Validation

At the end of the study, parents were asked to respond to a questionnaire aimed at obtaining their opinions about the goals of the study, intervention procedure used to teach their daughters, and on outcome. To collect the social validation data a "Social Validity Form" was developed. The Form consisted of six Yes/No questions three of each had one open ended sub-question. Social Validity Form was administered to the parents following treatment.

Results

Instructional Data

Figure 1 displays the full probe and daily probe sessions data for Esra, Fliz, and Aynur. As seen at Figure 1 all of the subjects met the criteria after the introduction of APTP. Data indicated that APTP was effective on teaching changing sanitary napkins on a doll to female youths with mild to moderate developmental disabilities. No procedural modifications were needed during the experimental sessions in the study.

Esra performed the behavior with 13% (range = 11%–16%) accuracy during baseline sessions. As soon as the APTP was introduced, her performance increased to 100% accuracy for the last three days in the intervention session. Esra performed the behavior with 100% accuracy during the second and third full probe sessions, and 78% accuracy (range =

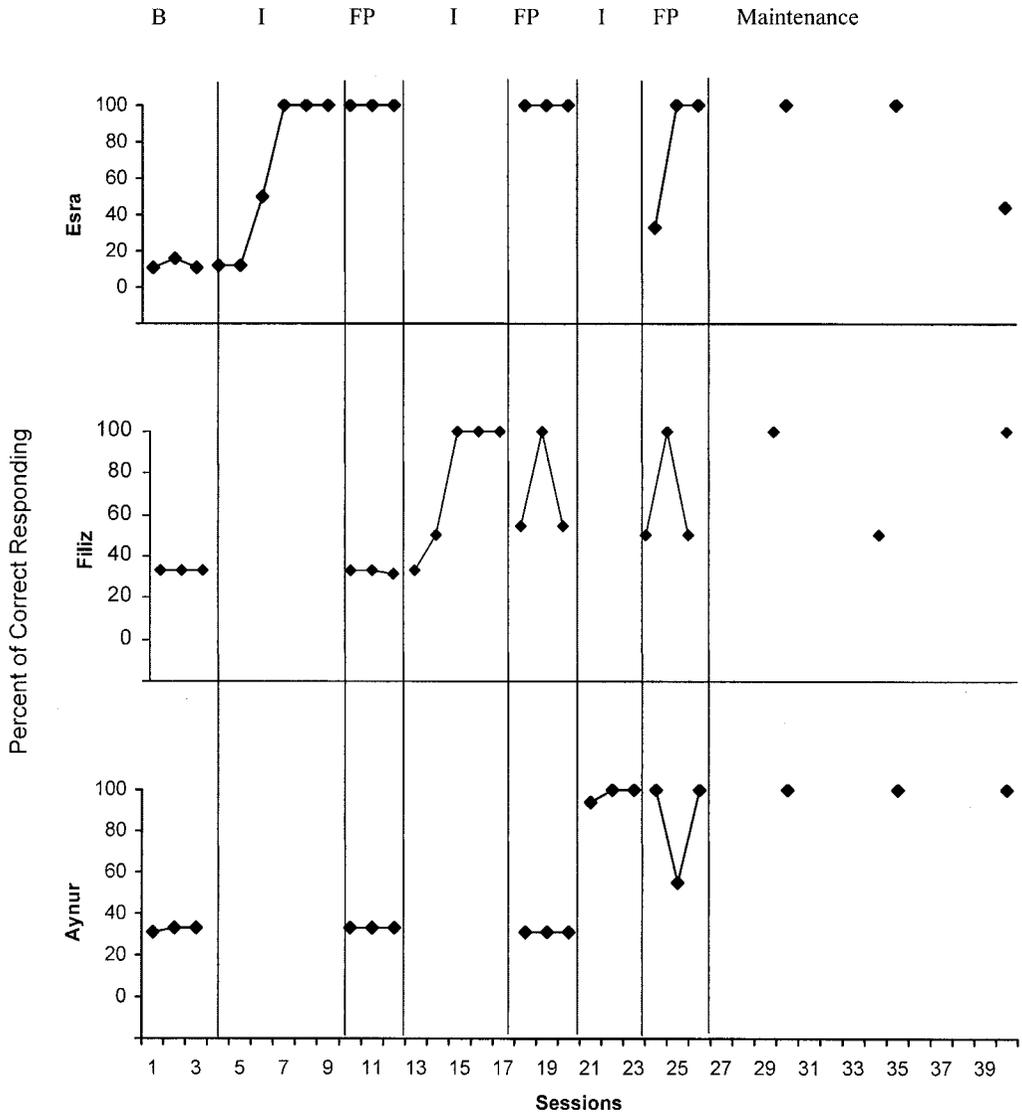


Figure 1. Percent of correct responding for Esra, Filiz, and Aynur during the baseline (B), intervention (I), and full probe (FP) sessions. Daily probes data are plotted during intervention.

33%–100%) during the fourth full probe session. Filiz performed the behavior with 33% accuracy (range = 33%) during the baseline sessions and 32% accuracy (range = 31%–33%) during the second full probe session. After introducing the APTP, her performance increased to 100% accuracy for the last three days in the intervention sessions. Filiz performed the behavior with 70% accuracy (range = 55%–100%) during the third full

probe session, and 67% accuracy (range = 50%–100%) during the final full probe session. Aynur performed the behavior with 32% accuracy (range = 31%–33%) during the baseline sessions, 33% accuracy (range = 33%) during the second full probe session, and 31% accuracy (range = 31%) during the third full probe sessions. After introducing the APTP, her performance increased to 100% accuracy for the last two days in the interven-

tion sessions. Aynur performed the behavior with 85% accuracy (range = 55%–100%) during the final full probe session.

Data also indicated that subjects maintained the acquired behavior of changing sanitary napkins on a doll (range = 44%–100%). Esra maintained the acquired behavior with a mean of 81% accuracy (range = 44%–100%) across the three maintenance probe sessions. Filiz maintained the acquired behavior with a mean of 83% accuracy (range = 50%–100%) across the three maintenance probe sessions, and Aynur maintained the acquired behavior with 100% accuracy across all three maintenance probe sessions.

Instructional data were summarized as the number of training sessions and trials, training and probe time, number and percent of probe errors. Data indicated that Esra needed three training sessions with 6 trials to criterion, Filiz needed two training sessions with 4 trials to criterion, and Aynur needed one training session with 2 trials to criterion.

A total of 14 min, 7 s training time was needed to criterion across three subjects. Esra needed 7 min training time to criterion, Filiz needed 4 min, 51 s training time to criterion, and Aynur needed 2 min, 16 s training time to criterion. Three min, 44 s daily probe time was needed to criterion across three participants. Esra needed 1 min, 39 s daily probe time to criterion, Filiz needed 1 min, 23 s daily probe time to criterion, and Aynur needed 42 s daily probe time to criterion.

A total of 55 errors occurred during probe sessions with an average of 42% across students. The probe session error rate ranged from 6% to 67%.

Generalization Data

Generalization across multiple exemplar data showed that participants generalized the acquired skills at criterion level. All subjects generalized the acquired skills on the first generalization set at criterion level. On the first generalization set Esra performed with 22% accuracy during the baseline, 100% accuracy during the second full probe session, and 100%, 80%, and 61% accuracy for the subsequent full probe sessions with the first generalization set. On the first generalization set Filiz performed with 33% accuracy during the

baseline, and 1% accuracy during the second full probe session, and 83% and 100% accuracy for the subsequent full probe sessions with the first generalization set. On the first generalization set Aynur performed with 31% to 33% accuracy during the baseline, and second and third full probe sessions, and 83% and 100% accuracy for the subsequent full probe sessions with the first generalization set. The data revealed that, Esra, Filiz, and Aynur generalized the skills as soon as they acquired them during the intervention with the training set.

As mentioned earlier, none of the subjects generalized the acquired skill at criterion level at the second generalization set. Therefore training sessions with the second generalization set were delivered to each subject.

On the second generalization set Esra performed with 20% accuracy during the baseline and second full probe session. Following the training with this generalization set she performed with 100%, 30%, and 65% accuracy for the subsequent full probe sessions with the second generalization set. Filiz performed with 33% and 1% accuracy during the baseline and second full probe session on the second generalization set. Following the training with this generalization set she performed with 100%, 73%, and 75% accuracy for the subsequent full probe sessions with the second generalization set. On the second generalization set Aynur performed with 20% accuracy during the baseline, second and third full probe sessions. Following the training with this generalization set she performed with 100% accuracy for the subsequent full probe sessions with the second generalization set.

Social Validity Data

Social validity data showed that parents' opinions were very positive in overall. The first question investigated whether the teacher was loyal to her responsibilities as indicated in the contract signed prior to the study. All parents reported that the teacher conformed to her responsibilities during the study. The second question examined the appropriateness of the materials, rules of the study (e.g., attending the study regularly, etc.) and settings. All parents reported their positive opinions regarding the appropriateness of the materials,

rules, and settings of the study. The importance of the purposes of this study was investigated in the third question. All parents reported that teaching changing sanitary napkins on a doll to their daughters was important for themselves and their lives. The fourth question investigated whether the researcher paid attention to their as well as their daughters' personal concerns such as privacy. Parents' opinions were positive on this item. The appropriateness of the intervention on teaching changing sanitary napkins on a doll to their daughters was asked in the fifth question. Parents reported their positive opinions on this item as well. The last question revealed the implications and contributions of teaching to change sanitary napkins on a doll to their daughters. They reported positive opinions on this item. When the possible contributions were asked, one parent reported that they will be free of charge from this responsibility as a parent, and two of them reported that their daughters will be functioning more independently in their lives following this intervention.

Discussion

The purpose of the present study was to examine the acquisition and maintenance effects of APTP on teaching menstrual care skills to three females with mild to moderate developmental disabilities. Furthermore, generalization effects via multiple exemplar approach were also investigated in the study. Based on the findings of the study, the following conclusions were drawn.

First, APTP was found to be effective on the acquisition and maintenance of the target skills by all three subjects. These results are consistent with the results of the previous studies inquiring the acquisition and/or maintenance of similar menstrual care skills instructed either on self or on a doll (Epps, Stern, et al., 1990; Richman et al., 1986, 1984). However, all subjects of the present study reached criterion rather fast (in one-to-three instructional sessions) compared to the subjects of the above mentioned studies. Moreover, the acquisition trend was not consistent across the subjects of those studies; i.e., some subjects showed immediate improvement on their performances whereas others did not

show the same consistent improvement (Epps, Stern et al.; Richman et al., 1986). This difference between the findings of the present and the previous studies may be due to, in part, the differences between the functioning levels of the subjects. That is, all of the subjects of the present study had mild to moderate developmental disabilities whereas the subjects of the previous studies had moderate to severe developmental disabilities.

Second, subjects were able to generalize the acquired skills via multiple exemplar approach. For instance, when the full probe sessions immediately following the intervention are considered, the subjects generalized the acquired skills with at least 73% accuracy. These results are also consistent with the findings of the previous studies which used similar generalization approaches (Collins et al., 1991; Gardill & Browder, 1995; Hughes & Rusch, 1989; Hughes et al., 1993; Sandkop et al., 1992; Schuster & Griffen, 1993; Smith & Schloss, 1986; Solnick & Baer, 1984; Taylor et al., 2002).

Third, social validity findings of the study indicated that parents of the subjects were very pleased with the aim of, procedure used in and results of the study in general. Parents especially highlighted their opinions as to the expected contributions of the study to the independence of their daughters.

Although findings of the study are very positive in general, the following points are worth discussion. The procedural reliability percentage of the step regarding 'securing the subject's attention' was consistently low throughout the study. This may be due to the fact that all of the subjects were ready for the instruction during the experimental sessions. Therefore, the teacher might have tended to omit this step and give the task direction right away most of the time.

The generalization level for the second generalization set was below the criterion across all subjects. The reason for this finding might be related with the nature and the length of the task analysis of this set. Therefore, training with this set was delivered to all subjects to reach the criterion.

The present study was planned to teach menstrual care skills on a doll without including any in vivo components. The main reason for this decision was due to the sensitivity of

the authors about the privacy of the subjects and their families. This sensitivity limited the study in terms of generalization of the acquired skills to real life. However, an informal telephone interview with the parents of the subjects showed that all subjects had already experienced their menstruation and two of them were able to deal with their menstruation successfully. Filiz's mother reported that Filiz needed extra practice after the onset of menstruation. Hence, this follow-up information suggests that the skills the participants had acquired via simulations might have contributed to their actual menstrual care performances.

Based on the above discussion, several suggestions can be raised for future research. First of all, the number of studies utilizing APTP on teaching discrete or chained tasks is limited. Therefore, studies examining the effects of APTP on various skills with different levels of developmental disabilities are needed.

Furthermore, effects of simulated training on a doll and/or on self and in vivo training can be conducted via APTP on teaching menstrual care skills to individuals with developmental disabilities. Video modeling could be added as a training component.

Social validity is a very crucial aspect in such studies interfering with the private lives of the subjects. Therefore, extended social validity data can be collected inquiring the acceptability of interventions in the future studies. For example, acceptability of various interventions (e.g., on a doll, on self, etc.) can be assessed by detailed narratives before designing instruction.

Another future research suggestion might be related to the analyses of such interventions delivered by parents, sisters or primary caregivers. Future research might be recommended to be designed to establish consciousness and awareness regarding menstrual experiences and to teach routines to initiate periodic menstrual care management to females with developmental disabilities.

The error rate during daily probe sessions was rather high, with a range of 50% to 67% in the present study. Hence, intermittent probe sessions rather than daily probe sessions and error correction can be tried in the future studies. Not only the effectiveness but also the

efficiency of an instruction is important. Therefore, efficiency variables related to APTP should be examined in the future research. For instance, the acquisition of observational learning stimuli or the appropriateness of APTP for group instruction might be investigated.

Recommendations regarding practice can be summarized as follows. Practitioners working with individuals with developmental disabilities can be recommended (a) to utilize errorless training procedures such as the one used in this study (APTP) for teaching discrete and chained skills effectively, (b) to include the instruction of critical personal care skills such as menstrual care skills in the educational programs, and (c) to use and/or adapt the instruction package consisting of APTP and multiple exemplar approach suggested in the present study in their own environments.

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Use of Video Modeling to Teach Extinguishing of Cooking Related Fires to Individuals with Moderate Intellectual Disabilities

Linda C. Mechling
University of North Carolina Wilmington

David L. Gast
University of Georgia

Melissa R. Gustafson
University of North Carolina Wilmington

Abstract: This study evaluated the effectiveness of video modeling to teach fire extinguishing behaviors to three young adults with moderate intellectual disabilities. A multiple probe design across three fire extinguishing behaviors and replicated across three students was used to evaluate the effectiveness of the video-based program. Results indicate that video modeling was effective in teaching fire extinguishing skills. Skills were further generalized to novel examples and levels of performance were maintained up to 52 days.

For decades preparing students with disabilities for living in public communities has been considered essential (Freagon et al., 1983). Instruction and intervention for persons with disabilities includes planning and programming for the greatest degree of independence attainable for entry into community, domestic, employment, and recreational settings. As independence increases, less supervision and adult support are provided, leading to possible exposure to unsafe situations (Collins, Schuster, & Nelson, 1992). Due to these increased risks, emphasis on preparation for transitioning from school to community requires safety skill instruction to be a component of the school curriculum (Taber, Alberto, Hughes, & Seltzer, 2002) to help ensure that persons with disabilities have skills to avoid and manage dangerous situations as they prepare for independence in least restrictive environments (Collins, Wolery, & Gast, 1992).

Clees and Gast (1994) define social safety

Correspondence concerning this article should be addressed to Linda C. Mechling, University of North Carolina Wilmington, Department of Early Childhood & Special Education, 601 South College Road, Wilmington, NC 28403-5940.

skills as being verbal or nonverbal behaviors that serve to avoid potential danger, escape, or terminate presently occurring harm. Safety skills may be: a) preventative (recognition and avoidance) such as walking during daylight hours; or b) reactionary (safe responses to situations when they happen) such as walking away from a barking dog (Collins & Griffen, 1996; Collins, Wolery, & Gast 1991). A number of community risks have been identified in the literature and addressed through safety skill instruction including: safe response to lures of strangers (Collins, Schuster et al., 1992; Gast, Collins, Wolery, Jones, 1993; Haseitine & Miltenberger, 1990; Watson, Bain, & Houghton, 1992); safe response when lost in the community by emergency use of pay phones (Collins, Stinson, & Land, 1993) or cell phones (Taber et al., 2002) to call for assistance; and community pedestrian movement and street crossing (Horner, Jones, Williams, 1985; Matson, 1980; Page, Iwata, & Neef, 1976; Sowers, Rusch, & Hudson, 1979).

Prevention of ingesting harmful substances by reading and understanding product warning labels (Collins & Griffen, 1996; Collins, & Stinson, 1994–1995); handling broken materials (Winterling, Gast, Wolery, & Farmer, 1992) and safe storage of potentially danger-

ous household materials (Feldman & Case, 1999) have also received research attention. Safe responses to personal injuries and first aid skills have been effectively taught to persons with disabilities including: treatment of minor cuts, burns, and insect bites (Gast, Winterling, Wolery, & Farmer, 1992); abrasions (Marchand-Martella, Martella, Christensen, Agran, & Young 1992); and first aid for choking (Spooner, Stem, & Test, 1989). Responding to fire alarms and exiting homes has also been identified and taught as crucial skills for persons with disabilities (Collins et al., 1993; Freagon et al., 1983; Haney & Jones, 1982; Jones, Sisson, & Van Hasselt, 1984; Rae & Roll, 1985; Tiong, Blampied, & Le Grice, 1992), however, to date no studies have measured generalization using actual small, contained, fires. Further, although the importance of young adults with disabilities to have access to working fire extinguishers and to know how to use them is recognized (Kelly, 2006), no studies have evaluated extinguishing common kitchen fires or use of a fire extinguisher.

A range of instructional strategies for teaching safety skills have been identified along with limitations and recommendations for future research. Reading stories and scenarios, with guided discussion and verbal responding, have been effective (Mazzucchelli, 2001), as well as adding audio visual materials (Feldman & Case, 1999) and behavioral strategies [e.g. Behavioral Skills Training (Bevill & Gast, 1998)] that include the features of modeling, rehearsal, and role playing (Watson et al., 1992). Katz and Singh (1986) used verbal instructions, modeling, rehearsal and feedback to teach adults with intellectual disabilities to report fires, exit a building, and extinguish a fire on self and others using the “stop, drop, and roll” technique.

Errorless learning procedures have also been recommended when teaching safety skills that may pose potential harmful scenarios. Of these errorless procedures, time delay has received the greatest amount of attention for teaching safety skills (Collins & Griffen, 1996; Collins, Schuster et al., 1992; Collins & Stinson, 1994–1995; Collins et al., 1993; Gast et al., 1992; 1993; Winterling et al., 1992).

Recommendations further include use of realistic teaching materials that closely resemble stimulus and response requirements that

are identical or similar to those that will be found in natural settings where safety skills will be used (Clees & Gast, 1994). Use of teaching exemplars which closely resemble those encountered in “real life” situations increase the probability that students will generalize use of skills to untaught or novel examples (materials, persons, verbal stimuli) and settings (Branham, Collins, Schuster, & Kleinert, 1999; Collins & Griffen, 1996). Further, multiple exemplars of stimuli that will be encountered in natural environments is recommended (Clees & Gast, 1994; Horner et al., 1985; Mazzucchelli, 2001) and has been shown to be effective in teaching generalized safety skills (Gast et al., 1993; Watson et al., 1992; Winterling et al., 1992). Although community-based instruction and community referenced stimuli have been shown to be effective in providing natural teaching examples, money and time constraints may limit in vivo instruction (Branham et al., 1999; Collins et al., 1993). To address these constraints, simulated materials and settings, as an adjunct to in vivo instruction, have been effective in teaching generalized safety skills. Simulations have included the use of: adult “actors” to teach safe response to lures from strangers (Gast et al.); costume makeup to simulate cuts, burns, and insect bites (Gast et al., 1992); puppets for application of first aid procedures (Marchand-Martella et al., 1992); and heating pads on door knobs to simulate household fires (Haney & Jones, 1982).

Although relatively unexplored, another means for simulating safety skills is the use of video instruction. Carroll-Rowan and Miltenberger (1994) and Poche, Yoder, and Miltenberger (1988) used video tape models of child actors and behavior rehearsal to teach abduction prevention skills to young children without disabilities, while Branham et al. (1999) evaluated videotape modeling to teach street crossing to three students with moderate intellectual disabilities, and Tiong et al. (1992) used video prompting of individual steps of a task analysis to teach four adults with moderate intellectual disabilities to exit their bedrooms in response to a fire alarm. Video instruction has been effectively used to teach a wide range of skills to persons with disabilities (Mechling, 2005) including: food preparation (Graves, Collins, Schuster, & Kleinert,

2005); ordering at fast food restaurants (Mechling, Pridgen, & Cronin, 2005); play-related statements (Taylor, Levin, & Jasper, 1999); play sequences (D'Ateno, Mangiapanello, & Taylor, 2003); purchasing with a debit card (Mechling, Gast, & Barthold, 2003); spontaneous requesting (Wert & Neisworth, 2003); grocery shopping (Mechling & Gast, 2003); self-care (Hagiwara & Myles, 1999; Norman, Collins, & Schuster, 2001); daily living skills (Cannella-Malone et al., 2006; Van Laarhoven & Van Laarhoven-Myers, 2006); augmentative and alternative communication device use (Mechling & Cronin, 2006); and transitioning between activities (Schreibman, Whalen, & Stahmer, 2000).

In addition to the issue of providing appropriate teaching examples of difficult to simulate community environments, potentially dangerous situations may pose challenges due to the need to provide safe environments while teaching these skills (Collins & Griffen, 1996; Collins, Stinson, & Land, 1993). Use of video instruction to simulate unsafe environments has been recommended when teaching persons with disabilities (Clees & Gast, 1994) yet remains relatively un-researched. The purpose of the current study was to measure the effects of video modeling to teach fire safety skills to young adults with moderate intellectual disabilities.

The primary research question was: Will video modeling be effective in teaching extinguishing of cooking related fires to young adults with moderate intellectual disabilities? A second question was: Will participants generalize their behavior to novel materials for extinguishing fires?

Method

Participants

Three students (two females and one male) with moderate intellectual disabilities participated in the study and were selected based on their IEP objectives for cooking and development of independent living skills. Students were screened for the following entry level skills: (a) visual ability to see video images on the portable DVD screen; (b) motor ability to perform each of the three tasks; (c) ability to imitate a video model. Students were enrolled

in a local high school Transition Program for Young Adults (TPYA) designed to support transition from school to community. All students had a history of video-based instruction, use of visual prompting systems such as pictorial task analyses, and demonstrated generalized motor imitation of video and live models.

Melissa was a 19-year, 3 month old female diagnosed with a moderate intellectual disability (IQ 52, Kaufman Assessment Battery for Children: Kaufman and Kaufman, 1983). She spoke in complete sentences with some grammatical errors and difficulty staying on topic. She worked two days a week at the local YMCA folding towels and filling soap dispensers and was applying to work at McDonalds. She sometimes became distracted or anxious to quickly complete a task when other activities were being implemented in her vicinity. She was reported to read 10 personal care words and recognized 32 survival signs. She could rote count to 100 with visual cues and tell time on the hour and half hour. She could write her personal information, basic 2-3 letter sight words, and had some phonemic skills. She could make simple meals from memory and required picture and text cues with verbal prompting when preparing multi-step recipes. Her needs included: (a) writing 3-4 letter words; (b) writing simple notes to friends; (c) completing familiar tasks without saying, "I don't know"; (d) preparing simple meals (including use of the stove, oven, and microwave); (e) reading and ordering from simple menus; (f) using the city bus; and (g) crossing streets and parking lots. She reported that she enjoyed working at the YMCA, shopping, eating out, and watching television.

Jeff was a 19-year, 4 month old male diagnosed with a moderate intellectual disability (IQ 46, *Wechsler Intelligence Scale for Children – Third Edition*: Wechsler, 1997). He was able to participate in simple conversations with reminders to refrain from repeating questions about the same topic. He independently completed all of his personal care needs, made simple snacks, and completed simple household tasks (i.e. sweeping and dusting). He could write his personal information, fill out job forms with minimal assistance, and write using capitalization and punctuation. He counted and made change up to \$1.00 and used a calculator to add prices. He was re-

ported to read on a first grade level with sight words, but unable to decode words. His needs included: (a) refraining from asking for assistance when not needed; (b) using a schedule for time management of daily activities; (c) making purchases and identifying the cheaper of two items; (d) budgeting, and managing a checkbook; and (e) completing first aid skills. He reported that he enjoyed listening to music, watching DVDs, playing basketball, working on the computer, and swimming.

Eileen was a 21-year, 3 month old female with a moderate intellectual disability (IQ 45, *Differential Ability Scales – Second Edition*: Elliot, 2000). She was very social and verbal with peers, but completed minimal conversations with adults, answering in short phrases. She was able to follow simple directions, but often nodded her head, “yes” when she did not understand a direction. She had difficulty staying on task when other peers were in the area. She could ride the city bus and use transfers, make a bed with verbal cues, and wash and dry clothes. She prepared simple microwave snacks. She was able to count bills to \$10 and add sums of money to \$90 using a calculator. Her needs included: (a) answering questions with an appropriate tone of voice; (b) remaining on task until a job was completed; (c) following 4-step recipes including using measuring cups and spoons; (d) washing, rinsing, and drying dishes; (e) storing food in appropriate containers; and (f) reading prices and labels on packages and clothes. She reported that she enjoyed going out to lunch, shopping, listening to music, dancing, talking on the telephone and being with friends.

Settings

Probe and individual instructional sessions were conducted either in the kitchen or barbeque area of the apartment rented by the school system for delivering home living instruction to young adults with disabilities. The 8.5ft x 9ft kitchen area contained the stove, microwave oven, and toaster oven. The microwave and toaster ovens were positioned on a counter to the left of the stove. Items for extinguishing fires (flour, lid, and fire extinguisher) were placed in different locations. The flour was placed in the refrigerator that was to the left of the counter and the lid was

located in the cabinet directly below the microwave and toaster ovens.

The barbeque area was located in the yard behind the apartment and was shared by multiple units. The storage container with the fire extinguisher was to the right of the picnic table within the barbeque area (the grill, fire pit, deep fat fryer and metal trash can were placed in the center of the area at least 6ft from the picnic table). The portable DVD player was positioned on a table in the dining area. The dining area was adjacent to and visible from the kitchen (open floor plan). Students watched the video DVD model and then walked approximately 3ft to the kitchen or 30ft to the barbeque area.

When students were watching the video, the investigator stood to the left of the student. When students were given the opportunity to extinguish the fire, the investigator stood approximately 3ft behind the student. An additional fire extinguisher was in the kitchen during all sessions and a first aid kit was also available. The reliability data collector stood beside the table with the DVD player or barbeque area during video modeling and probe sessions.

Target Behaviors, Materials, and Equipment

Three behaviors for extinguishing fires were targeted for instruction: (a) scooping and releasing flour; (b) placing a lid on a pot or pan; and (c) using a fire extinguisher. The three behaviors were selected based on observation and evaluation of current environments and daily cooking routines, interviews with teachers supervising cooking routines, interviews with parents, and consultation with the local fire department. Water was not used because kitchen fires caused by grease are not readily extinguished with water. Simulated fires were made using ethanol gel and salt (extinguished with flour); cooking sherry (extinguished with a lid), and newspaper (extinguished with fire extinguisher). Three teaching stimuli were used to teach each extinguishing behavior and one additional example was used to evaluate generalization of each response across novel materials (Table 1).

A separate video model was created for each extinguishing task. Video captions were made using a SONY digital DVD-RW 1.4 GB video

TABLE 1**Fire Extinguishing Tasks and Stimuli**

| <i>Extinguishing with Lid</i> | <i>Extinguishing with Flour</i> | <i>Extinguishing with Fire Extinguisher</i> |
|-------------------------------|---------------------------------|---|
| 1. 10 in. skillet | 1. Stove top burner | 1. Metal fire pit |
| 2. Double boiler | 2. Microwave oven | 2. Charcoal grill |
| 3. 8 in. pan | 3. Stove oven | 3. Deep fat fryer |
| 4. Novel stimuli: wok | 4. Novel stimuli: toaster oven | 4. Novel stimuli: metal trash can |

camera. Video models of each task were recorded directly onto DVD-RW, 30 minute discs. A *TOSHIBA* portable DVD player with battery pack and 7 in. screen was used to deliver video models. The DVD video models were made using an adult model or model's hand completing a step. Each DVD video model was made showing the complete task analysis from beginning to end and included verbal descriptions corresponding to each step of the task analysis. For example, the video showed a simulated fire in the skillet followed by the adult model opening the cabinet and taking out a lid. While doing this, the person operating the video camera said, "Get a lid out of the cabinet." Duration of the videos ranged from 10s to 20s.

Response Definitions and Data Collection

During probe and video modeling the investigator collected data on each student's ability to perform each step of the task analyses for extinguishing cooking related fires (Table 2). During probe conditions student responses were recorded as unprompted correct, incor-

rect, or no response. An unprompted correct response was defined as initiating a step within 3s and completing a step independently within 5s of the start of the fire or previous step. An incorrect response was defined as either (a) incorrect topography of a response (topography error) or (b) not completing the step within 5s of the start of a fire or the previous step (duration error). No response was defined as failing to initiate a response within 3s after the start of a fire or the previous step (no response error).

Experimental Design and General Procedures

A multiple probe design across behaviors (i.e. three different behaviors to extinguish cooking related fires) (Tawney & Gast, 1984) and replicated with three students was used to evaluate the effectiveness of video modeling. The fire extinguishing tasks were individually instructed to each student through video DVD modeling. Sessions took place 2-3 times per week. Prior to instruction, data were collected respectively on each of the three fire extinguishing behaviors and on the generalization

TABLE 2**Task Analysis for Extinguishing Cooking Related Fires**

| <i>Extinguishing with Flour</i> | <i>Extinguishing with Lid</i> | <i>Extinguishing with Fire Extinguisher</i> |
|-----------------------------------|------------------------------------|---|
| 1. Remove flour from refrigerator | 1. Remove lid from kitchen cabinet | 1. Remove fire extinguisher from patio closet |
| 2. Open flour | 2. Place lid over flame | 2. Place hand over release valve |
| 3. Scoop out one handful of flour | 3. Release lid | 3. Squeeze release valve |
| 4. Throw flour over flame | | 4. Spray foam over flame |
| 5. Scoop out one handful of flour | | 5. Release when flame is extinguished |
| 6. Release flour over flame | | |

exemplar for each target behavior. This condition was followed by video modeling on the first set of fire extinguishing behaviors. When criteria was met (100% corrects on three sessions) for a student, probe measures were again taken across all three sets of fire extinguishing behaviors and novel generalization behaviors followed by video modeling instruction on the second set of fire extinguishing behaviors. Subsequent probe sessions for mastered sets served as maintenance data and were conducted for one session. The order of behaviors taught varied across students.

Probe Condition Procedures

Prior to video modeling, each student's ability to perform each of the three different fire extinguishing behaviors was evaluated in a one-to-one arrangement for a minimum of three sessions or until data stabilized (Probe 1). One novel example, which was not depicted in the video, was used to assess stimulus generalization for each behavior set. Immediately following mastery of a fire extinguishing behavior, each behavior example was evaluated once during one session. This was followed by one generalization session evaluating a student's performance using novel materials. Each session consisted of three trials (one exemplar of fire locations for each behavior - Table 2) in the kitchen or barbeque area of the apartment. After criteria was reached for extinguishing one set of cooking related fires, one probe session was again conducted to evaluate the student's completion of the mastered task and remaining tasks without the video model prior to introduction of the second fire extinguishing behavior. Trials began with the investigator starting the fire out of view of the student and waiting 3s for the student to initiate the first step of the task analysis. Students could perform each step correctly, incorrectly, or not respond. An incorrect or no response resulted in termination of the task. At the end of a trial the investigator provided verbal praise for general attending and attempts to put out the fire.

Video Modeling Condition Procedures

The purpose of the Video Modeling condition was to evaluate each student's ability to extin-

guish a set of fires after watching a video model. During instructional sessions, the student first sat at the dining room table that held the portable DVD player. The student was directed to, "Watch the video to see how to put out a fire". The investigator then turned on the portable DVD player and the student watched the first video model (e.g. placing a lid over a flame in a skillet). All tasks were taught in a total task sequence.

After the video was finished, the investigator selected the "pause" button and the student was immediately taken to the kitchen or barbeque area. The investigator then lit the fire (out of view of the student) and waited 3s for the student to initiate the first step of putting out the fire. Students could perform each step correctly, incorrectly, or not respond. Incorrect or no response resulted in termination of the task. At the end of a trial the investigator provided verbal praise for general attending and attempts to put out the fire. The student then returned to the table and watched the second video example of putting out a fire within the same fire extinguishing behavior set (i.e. placing a lid over a flame in a double boiler), was taken the kitchen or barbeque area and repeated the above procedure. This video model, test procedure continued for three trials (one trial for each behavior). Video modeling continued until criteria were met (100% corrects for three sessions).

Reliability

Inter-observer agreement and procedural reliability data were collected simultaneously by the investigator and university student on 36.2% of all sessions across conditions. Inter-observer agreement was recorded for each step of the fire extinguishing task analyses during probe and video modeling sessions. The point-by-point method was used to calculate inter-observer agreement by dividing number of investigator and observer agreements by agreements plus disagreements and multiplying by 100. Inter-observer agreement ranged from 91.7% to 100% with a mean of 98.8%

The measured investigator behaviors were: (a) turning on and presenting the video model; (b) all materials present and in correct locations; (c) lighting the fire; and (d) deliv-

ery of reinforcement. Procedural reliability agreement was determined by dividing number of each observed investigator behaviors by the number of opportunities to emit that behavior, multiplied by 100 (Billingsley, White, & Munson, 1980). Procedural reliability ranged from 88.9% to 100% with a mean of 98.6%. One error occurred when the fire extinguisher was empty and another occurred when the flame went out prematurely in the skillet. Another error was recorded when the lid was left on top of the stove between trials.

Results

Figures 1-3 present performance data for three behaviors for extinguishing cooking related fires (scooping and releasing flour, putting on a lid, and using a fire extinguisher). Data indicate the effectiveness of the video modeling procedure in teaching three young adults with moderate intellectual disabilities who had generalized motor imitation skills to extinguish simulated fires and to generalize the behavior to novel examples of materials with flames. Performance levels, prior to video modeling instruction, remained at 0% for all students across all behaviors. When video modeling was introduced, an immediate increase in level of performance occurred with all three sets of behaviors for each student. Melissa was the only student who required more than three video modeling sessions, the minimum, to reach criteria on a set of behaviors. During use of the fire extinguisher she required five sessions to criteria. Two of the three students demonstrated 0% errors across the three fire extinguishing behaviors using video modeling, and reached criteria in a total of nine sessions, the minimum (3 sessions per behaviors). Melissa required 11 total instructional sessions (2 above minimum), and emitted 10.26% errors across the three sets of behaviors. She was errorless on the first two sets of behaviors, but on the third behavior (fire extinguisher) she emitted 21.3% errors. The most difficult step for her was placing her fingers correctly on the release valve. She committed errors on this step for 100% of the trials during the first video modeling session and for 33.3% of the trials during the second session.

Generalization

Results also support generalization to novel examples of cooking related fires without use of video modeling. After using video modeling to teach across three examples of a behavior, students were presented with a novel fire representing an example within the set of behaviors (Table 2). No video model was used with the generalization example of a fire. All students were able to generalize the three fire extinguishing behaviors across novel examples.

Maintenance

Each subsequent probe session, following acquisition of a set of fire extinguishing behaviors, evaluated student's ability to perform behaviors without immediately viewing the video model. During follow-up sessions all students maintained performance levels with both training and novel fire extinguishing behaviors from 22 to 52 days following video modeling.

Discussion

Results of the current study provide support for previous research using video technology to teach persons with intellectual disabilities (Ayres & Langone, 2005; Bellini & Akullian, 2007; Delano, 2007; Mechling, 2005). Results extended use of video technology to teach a difficult to simulate skill. Through use of video modeling, acquisition of fire extinguishing skills was immediate, generalized to novel examples, and levels of performance were maintained when video modeling was no longer present.

During the first probe condition, students expressed fear and misunderstandings for extinguishing fires. When presented with fires, students made comments such as: "It's getting bigger," "It's going to burn down the apartment," and "The fire will kill me." Jeff stated that he should, "blow on it" (to put out the fire), Eileen stated she should put water on the fire, and Melissa screamed during one probe trial. Following the last maintenance probe sessions, students were asked, "What would you do if there was a fire in the trash can?" All students stated that they would get a

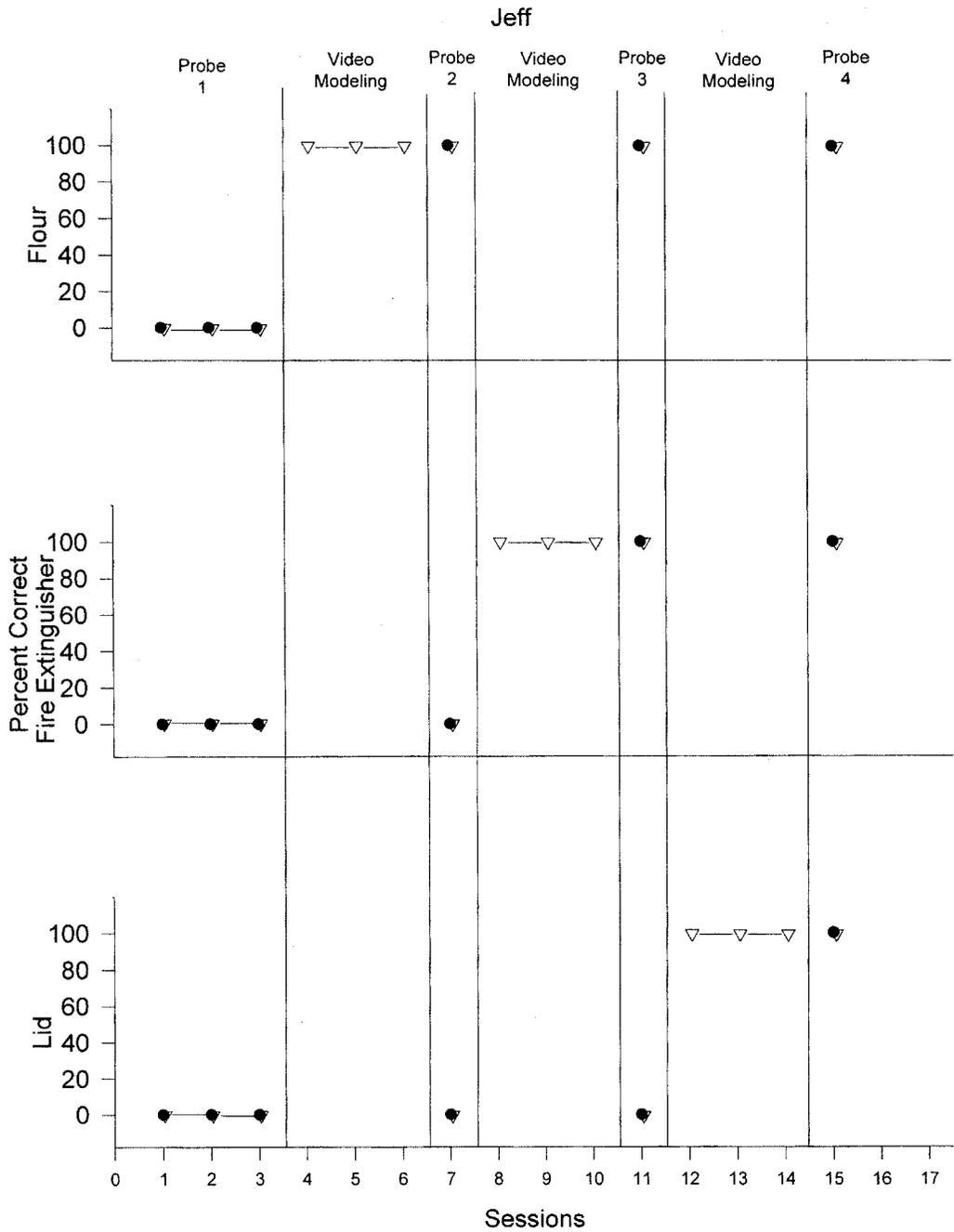


Figure 1. Graph of Jeff's performance, open triangles: fire extinguishing behaviors taught with video modeling; closed circles: novel fire extinguishing behaviors.

fire extinguisher. When asked, "What would you do if there was a fire on the stove?" all students stated they would put flour on it and

Jeff included that he would, "Put flour on it and it won't spread."

The current study also extends use of video

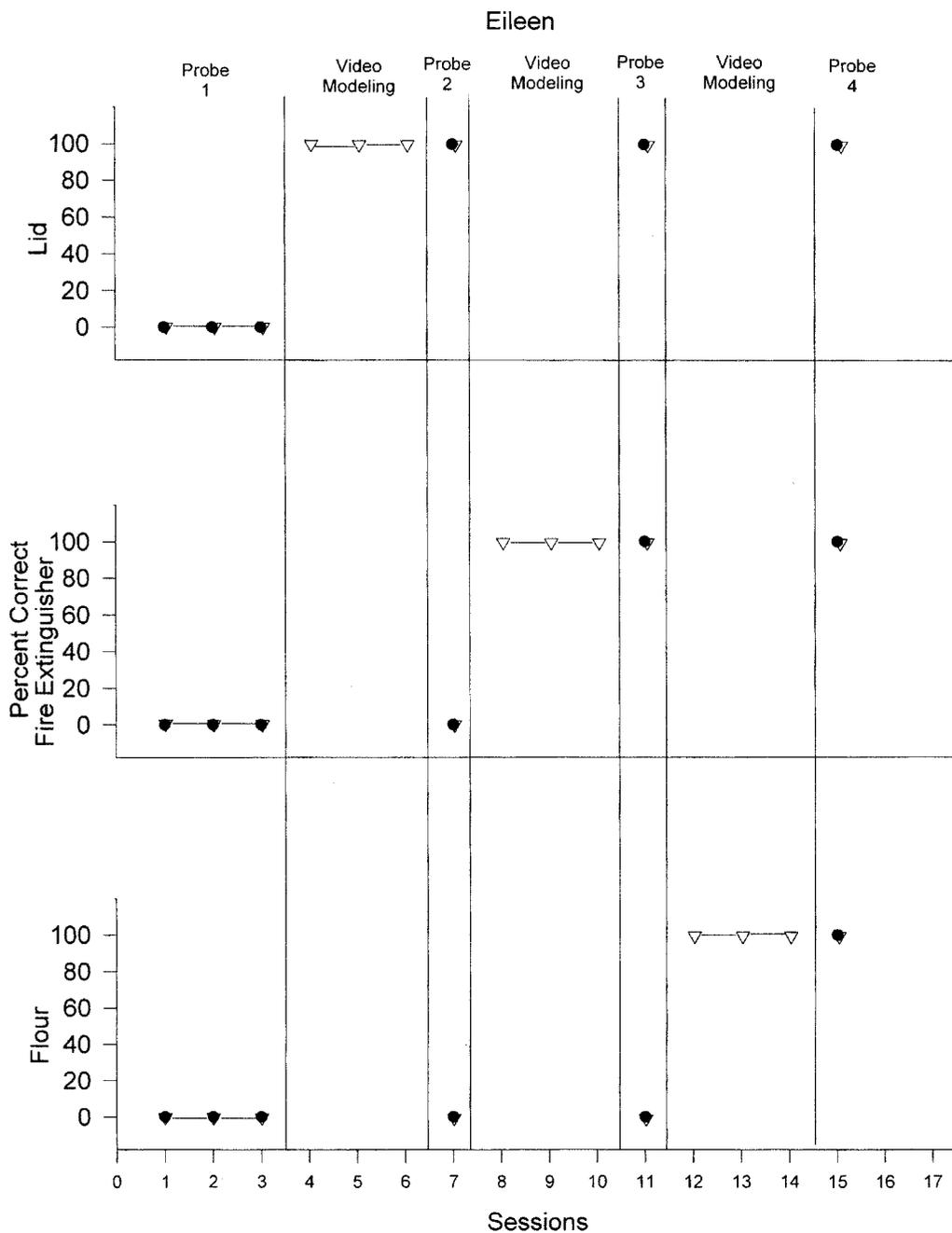


Figure 2. Graph of Eileen's performance, open triangles: fire extinguishing behaviors taught with video modeling; closed circles: novel fire extinguishing behaviors.

technology as a possible “priming” tool. Priming is a teaching method which allows a person to view or practice future events in order to increase the predictability of the events and

performance by the student (Schreibman, Whalen, & Stahmer, 2000; Zanolli, Daggett, & Adams, 1996). Priming has been presented using: a) real life peers to teach spontaneous

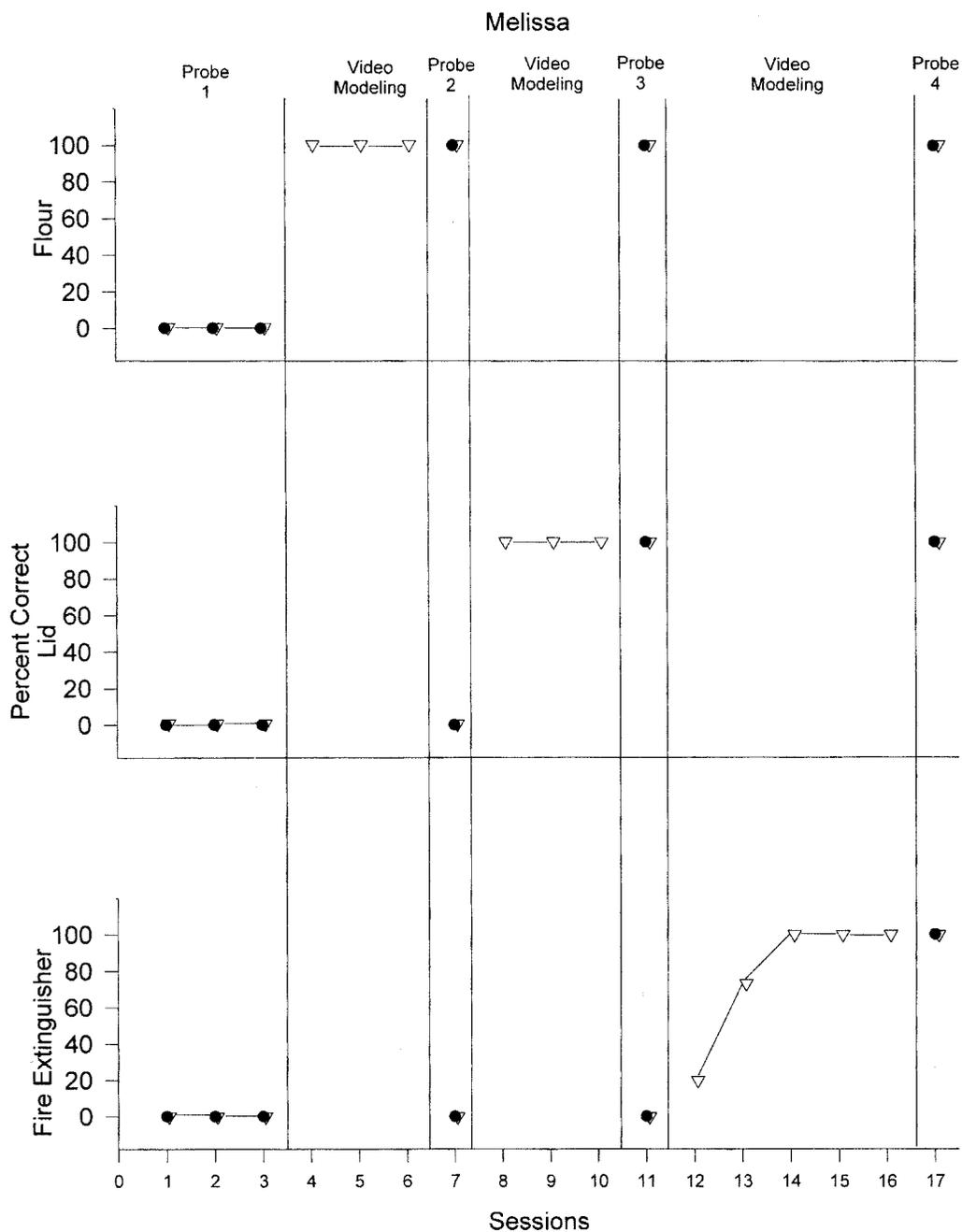


Figure 3. Graph of Melissa's performance, open triangles: fire extinguishing behaviors taught with video modeling; closed circles: novel fire extinguishing behaviors.

play initiations (Zanolli et al.); b) video models of transition scenarios (Schreibman et al.); c) video models of social story scenarios (Hagiwara & Myles, 1999); and d) toilet train-

ing videos (Bainbridge & Myles, 1999). Clees and Gast (1994) suggest that video taped models may be a means for providing safe models whereby students imitate the safe response

after viewing a video tape. Alcantara (1994) reports that videotapes provide a means to show students expected behaviors in advance of exposure to them in real life community situations. In the current study, students viewed a video model of a fire and the steps for extinguishing the fire prior to receiving simulated instruction with an actual fire. This procedure may provide a priming tool to expose students to unsafe or perhaps frightening situations prior to actual performance of the task.

Limitations of the study should be noted. First, due to ethical concerns and the potentially harmful nature of the tasks, the investigator remained in close proximity to the student at all times. The investigator presence may have therefore served as a discriminative stimulus for putting out the fire. Future research should evaluate student's ability to initiate and extinguish fires without the obvious presence of an adult while maintaining a safe learning environment. Second, although video modeling appeared to provide a realistic representation of unsafe scenarios and a means for students to recognize and extinguish cooking related fires, no generalization to actual fires (not set by the investigator) or untaught scenarios (i.e. burning pot holder) was included. Research supports the need for: effective teaching strategies to teach generalized safety skills (Collins and Griffen, 1996; Gast et al., 1992); teaching students to cope in a wide variety of situations; and use of multiple exemplars that will be found in natural environments (Mazzuchelli, 2001). Although use of multiple examples takes more teaching time, as students learn to respond to a class of stimuli rather than a single stimulus at one time (Collins, Schuster, et al., 1992), future studies should take care to provide a sufficient number of examples and to evaluate use to untaught scenarios.

Researchers and practitioners should be aware of the need for alternative assessment measures to verbal responses that may not adequately assess the ability of students to perform a skill in community settings (i.e. lure of stranger), yet ones they can use when they can not ethically subject students to some situations (scare them or put them in danger) (Haseltine and Miltenberger, 1990). Further, although results indicate that video modeling alone was effective in teaching extinguishing

of cooking related fires, the task analysis for each fire extinguishing behavior were relatively short (3-6 steps). Cannella-Malone et al. (2006) suggest that video modeling may be less effective when using longer duration video and found video prompting to be more effective for teaching multi-step tasks. Care should therefore be taken when interpreting the current results in relation to safety skill instruction of lengthier tasks.

Finally, although stringent criteria was included in the current study before termination of instruction (Collins & Griffen, 1996), it is recommended that acquisition, generalization, and maintenance levels be set high if the safety skill is to be functional (Collins, & Stinson, 1994–1995). Maintenance of skills that are not performed on a daily basis can be difficult (Spooner et al., 1989) yet, ramifications of a single error can be critical (Matson, 1980). Future investigations should extend follow-up sessions over several months to determine whether levels of performance can be maintained for skills infrequently encountered (i.e. those in emergencies) (Peterson, 1984) and video technology provides a potential means to present information as part of review and maintenance after time has elapsed (Tiong et al., 1992).

With the majority of safety skill studies being conducted in the 1980s, evaluation of technologies for teaching safety skills is a relatively unexplored area of research. Video-based instruction, interactive computer-based video programs, and virtual environments for simulation, may create new avenues to create real-life scenarios for teaching safety skills to persons with disabilities while maintaining a relatively safe learning environment. Future research should continue to evaluate the merits of these video-based programs for teaching difficult to simulate skills.

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Using Simultaneous Prompting Procedure to Promote Recall of Multiplication Facts by Middle School Students with Cognitive Impairment

Shaila Rao

Western Michigan University

Lynette Mallow

Bronson Junior/Senior High School

Abstract: This study examined effectiveness of simultaneous prompting system in teaching students with cognitive impairment to automate recall of multiplication facts. A multiple probes design with multiple sets of math facts and replicated across multiple subjects was used to assess effectiveness of simultaneous prompting on recall of basic multiplication facts. Two students with mild cognitive impairment at middle school level completed this intervention to recall 30 math multiplication facts between 0-12. Data collected over a period of approximately three and a half months indicated maintenance and generalization of the skill across materials, settings, and people.

From the six overarching principles of National Council of Teachers of Mathematics (NCTM, 2000) the first, 'equity' principle states 'excellence in mathematics education requires equity—high expectations and strong support for all student' (p. 12) and the 'teaching principle' emphasizes that 'effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well'. Learning mathematical concepts and skills may be particularly difficult for students with cognitive impairments. However, these skills are essential for achieving an acceptable level of independence in adult life. According to Vaughn, Bos, and Schumm (2007) a central topic in education is mathematics instruction. The authors highlighted importance of teaching and learning basic math facts and expressed concern that a lack of knowledge of basic math facts is a common impediment to learning higher-level math for all students including students with disabilities. Due to this lack of knowledge of math facts *students may*

learn neither math computation nor higher-order mathematics (p 399). McCallum, Skinner, Turner and Saecker (2006) cited various studies (Cates & Rhymer; Deno & Murkin; Haring & Eaton; Shapiro; Ysseldyke, Thill, Pohl, & Bolt) that emphasized importance of automaticity (arriving at answers accurately and rapidly) over and above understanding basic math facts such as multiplication facts.

Wolery, Ault, and Doyle (cited in Morse & Schuster, 2004) emphasized teachers' responsibility in producing learning and a need to be experts at presenting instruction. Three essential conditions for students' acquisition of a behavior or a skill described included students attending to relevant stimulus, teachers providing information about how to perform target behavior, and finally, providing feedback about the correctness of the response. Instructional antecedents (Snell & Brown, 2006) are planned and incidental stimuli used in learning situation in antecedent teaching methods used by teachers to teach skills and behaviors to students with cognitive impairment. Snell and Brown described prompting as a major category of antecedent strategies teachers can use to successfully teach various skills and behaviors to students with cognitive impairment. Response prompts are actions taken by a

Correspondence concerning this article should be addressed to Shaila Rao, 2034 Quail Cove Drive, Kalamazoo, MI 49009. E-mail: Shaila.Rao@wmich.edu

teacher before a student responds (or after an error) to increase the probability of a correct response (Snell & Brown, p. 136). These prompts minimize errors during instruction and can be used singularly, in combination, or as a part of a prompting system. Prompting systems recommended and cited in successful studies include constant time delay, progressive time delay, system of least prompts, most-to-least prompts hierarchy, and simultaneous prompts (Kennedy & Horn, 2004; Snell & Brown; Westling & Fox, 2004; Wolery, Ault, & Doyle, 1992).

There are several reasons that simultaneous prompting is preferable to other response prompting procedures such as constant time delay, progressive time delay, and system of least prompts. Primarily, simultaneous prompting is more efficient for the classroom teacher to set up and implement. Unlike a system of least prompts, simultaneous prompting does not require the instructor to set up a hierarchy of prompts. Simultaneous prompting also requires fewer prerequisite skills unlike the wait response that is necessary with time delay interventions. Also, simultaneous prompting uses a controlling prompt that reduces instructional time and the quantity of student error (Singleton, Schuster, Morse, & Collins, 1999). It is similar to antecedent prompt and test in that zero second time delay trials are used throughout all training sessions. Daily probe sessions are conducted to determine if the student can respond to the discriminant stimuli without prompting. Two features of simultaneous prompting are unique. First, probe sessions are always conducted immediately before training sessions and second, a controlling prompt is used throughout the training sessions (Gibson & Schuster, 1992).

Morse and Schuster (2004) conducted a review of published literature pertaining to use of *simultaneous prompting system* that reported a total of 18 studies conducted between 1992 and 2002 that used the procedure successfully to teach various skills. Participants in 17 studies included individuals with mild, moderate and/or moderate to severe cognitive impairment, developmental delays, and one with learning disabilities and mild cognitive impairment. Within the last five years other studies (Akmanoglu & Batu, 2004; Ak-

manoglu-Uludag & Batu, 2005; Bikran, 2005; Gursel, Tekin-Iftar, & Bozkurt, 2006; Tekin-Iftar, Acar, & Kurt, 2003) used simultaneous prompting procedure with students with autism and cognitive impairment.

The majority of research reported between 1992 and 2005 pertaining to use of simultaneous prompting system focused on teaching discreet or chained tasks to preschoolers and elementary aged children with four reporting studies with high school students, and two with adults. Only two studies (Fickel, Schuster, & Collins, 199; Gursel et al., 2006) had participants from middle school level. These studies successfully taught skills and behaviors that included receptively and/or expressively identifying various vocabulary, occupations, signs; object identification; identification of relatives; identification of maps, river, countries; and various discrete skills such as making juice, and construction of shipping boxes. Only three studies used simultaneous prompting to teach skills involving numbers and/or mathematics; Bikren (2005) taught telling time in hours, halves and quarters to a high school age students, Akamanoglu and Batu (2004) taught 6 and 17 year old students with autism to point to numerals, and Gursel et al. (2006) taught a group five middle school age students to name various mathematical symbols.

In light of the efficiency and effectiveness of simultaneous prompting in studies that have been conducted and potential benefit for the students, more research is warranted. Little has been written to date on effects of using simultaneous prompting to help junior high students with cognitive impairment to automate the recall of math facts. This study was conducted to determine if simultaneous prompting procedures could teach junior high students with mild cognitive impairment to automate the recall of multiplication facts. Progress of two students was compared to better measure effectiveness and efficiency of simultaneous prompting in the acquisition, maintenance, and generalization of the target behavior and to rule out the influence of other factors.

Specifically, this study addressed the following research questions: (1) Is simultaneous prompting effective in teaching two students with mild cognitive impairment automate the

recall of multiplication fact? (2) Will the two students with cognitive impairment be able to maintain the skill of recalling multiplication facts over time? (3) Will the two students with mild cognitive impairments be able to generalize the skill of recalling multiplication facts across other setting, materials, and people?

Method

Participants

This study was conducted with two students with cognitive impairment (CI) one male and one female enrolled in a public junior/senior high school serving students from 7th to 12th grades. Participants spent mornings in a special self-contained classroom for students with cognitive impairment. During mornings students received instruction in core subject areas of math, language arts, and geography from an instructor majoring in instruction of students with cognitive impairment. There were typically seven other students in the room at the same time as the participants. Students were both approximately 14 years and 10 months of age at the beginning of this study. A psychologist had diagnosed both participants as having intellectual disabilities. Student A (male, Caucasian) was not on any medication. Student B (female, black) took prescribed medication for a seizure disorder related to her cerebral palsy.

Student A, an eight grader had a full scale I.Q. of 62 and excellent adaptive behavior skills that allowed him to pass through the school system until the seventh grade before he was diagnosed as having a mild cognitive impairment. He had a pleasant personality, and made friends easily. His major weakness was making decisions under pressure. He often got in trouble for not thinking before acting. In the areas of transition and vocational skills, student A had good skills. He displayed strong work habits learned on his family farm. Student A also had a strong grasp of basic science concepts and safety procedures. He did household chores at home, but would benefit from life skills classes on money, budgeting, renting, using credit, and consumer rights and responsibilities. Physically, student A was in good health and physical condition. In math, student A showed

emergent competence in basic operations. He was strong in numbers and counting. His areas of weakness were remembering multiplication facts and calculating elapsed time.

Student B was a seventh grader with strong verbal skills in reading, listening, and speaking and had a full scale I.Q. of 49. She was especially weak in math with a grade level equivalent of 2-9 (2 year 9 months). It was necessary to modify classroom instruction in division to meet her needs. She was new to the school system as her adoptive parents moved from New Orleans. Her areas of weakness in language were in reading and listening comprehension. Her writing was very disorganized and she had a weak understanding of written language concepts. Student B had a very outgoing personality and made friends easily but she sometimes alienated her peers by being too clingy. She was competent in completing household chores and had acquired some independent living skills. She would benefit from life skill classes, and was weak in basic science and safety concepts. Student B had many ties to the community through her involvement with her church youth group. This provided her many opportunities to engage in recreational activities with her peers. She also participated in the school choir and art classes. In math, student B was strong in numbers and counting, and could do basic operations. Her areas of weakness were abstract concepts like elapsed time, money, and multiplication facts. According to the available records the student was diagnosed at an early age with mild to moderate cognitive impairment and cerebral palsy with a double hemiplegics pattern. She also had a shunt due to a hydrocephalic condition at birth, as well as other orthopedic impairments.

Screening

Though strengths and weaknesses of the students varied greatly based on their individual circumstances, they both had similar skills in math. They also had similar prior learning experiences since they both came from the same upper-elementary school before coming to the Junior./Senior High School. Both students had learned their multiplication tables through rote memorization. Both students had strengths in verbal receptive language,

and had mastered the majority of their multiplication tables using rote memorization. Therefore, the simultaneous prompting technique would work well for both students.

For this simultaneous prompting project, we worked with these students with cognitive impairment to help them automate recall of multiplication facts. The math class as a whole was working on long division involving decimals, and these two students were having particular difficulty. It took them a long time to recall multiplication facts and they often had to work out the problem using repeated subtraction instead of simply recalling the multiplication fact and reversing it. Also, learning their multiplication facts was a priority goal on both students IEP(s), as well as, being a survival skill for life.

The second author who was the classroom teacher working with the participants at the Junior/Senior High School and also a graduate student at a large Midwestern university had adequate knowledge of simultaneous prompting system and conducted all experimental sessions and collected data under the supervision of university professor, the first author. The first author who initiated this project also conducted inter-rater reliability checks, procedural reliability checks, and guided the second author throughout the duration of the study including analysis of data and interpretation of results.

Setting

All sessions in this research project were carried out in the students' normal morning placement. This was a room at the south end of the building located next to the rear entrance of the school. Most days students came to this room directly upon entering school. The room had three large windows that faced west and allowed for substantial natural lighting. There were also three strips of fluorescent lighting spaced evenly across the ceiling that were typically in use during the time that students were present for instruction. Tables were arranged in two long rows facing south toward the blackboard where most direct instruction took place. Occasionally, tables were arranged in a horseshoe formation also facing the board. Students were adaptable and accepting of either arrangement. The room had

nondescript walls, floor, and ceiling, but bright, cheerful decorations and displays of student work that made it a pleasant, welcoming atmosphere. The room was relatively quiet, but sometimes noise from the adjacent classroom filtered through.

During all baseline and training sessions the teacher sat across from the student at one of the students' tables. All probes were conducted in a 1:1 ratio. The other students in the room did quiet seatwork during the probe sessions. All students worked with flashcards sometime during the day, so this was an accepted and normal occurrence that did not stigmatize participants.

Materials

The primary instructional materials for this study were flash cards constructed on 3x5" note cards, all of which were handwritten in the same size by the same person for consistency. Other materials consisted of baseline data sheets, daily full-probe session data sheets, daily training session data sheets, and maintenance data sheets. All sheets were color coded (blue for the male student, and pink for the female student) and tabbed for easy reference and use in a three-ring binder. The only other required instrument was a sharpened pencil.

Experimental Design

A multiple probes design with multiple sets of math facts and replicated across the multiple subjects was used to assess the effectiveness of simultaneous prompting on the recall of basic multiplication facts. The dependent variable in this research was number of correct responses given to the previously unknown multiplication facts. The independent variable for this study was the simultaneous prompting procedure. The independent variable was introduced using one multiplication set at a time. Experimental control was established through sequential introduction of the teaching set and introduction of the independent variable in time lagged fashion (Tawney & Gast as cited in Birkan, 2005; Tekin- Iftar et al., 2003; Tekin & Kircaali-Iftar as cited in Akamanoglu & Batu, 2004)

General Procedure

The goal of this research project was to see if simultaneous prompting would be effective in teaching students with cognitive impairment to automate the recall of multiplication facts from 0-12. Both students who participated in this research had a firm grasp of 114 of the 144 multiplication facts from 0-12. The remaining 30 facts had not been learned, were learned incorrectly, or were not practiced enough to be maintained. These 30 multiplication facts were written on 3x5" note cards, all of which were handwritten in the same size by the same person for consistency.

Through using the intervention of simultaneous prompting, it was the aim of this project to provide an opportunity for errorless learning of these facts by providing the correct response immediately during training sessions, before the student made an incorrect response. Showing the student a flash card with the targeted multiplication fact on it, asking for an answer, and immediately providing the student with the correct response would accomplish this.

Experimental procedure consisted of full-probe (baseline), daily probe, training, maintenance, and generalization phases. During training sessions five flashcards were presented, one at a time. When the student had mastered these five facts, they moved on to the next set of five. Students demonstrated mastery of a set by responding correctly to those facts 100% of the time in at least two consecutive daily-probe sessions. The project took approximately three-and-half months to complete including baseline data collection.

Generalization was assessed in the classroom setting, as well as others. In the normal course of the math class conducted in this room, the students had multiple opportunities to demonstrate generalization. Data were collected on the students' ability to recall and use the targeted multiplication facts when working long division problems. Also, a direct comparison of students' performance on routine progress monitoring probes before and after the intervention was assessed. Finally, observations and antidotal data were collected from students' general education classrooms on their ability to recall and use the targeted multiplication facts.

Task Selection

To initiate this project it was necessary to determine exactly which multiplication facts students had committed to memory and which they had not. To accomplish this task each student was shown a series of flashcards representing all multiplication facts from zero through twelve. Each student participated in these sessions individually. The classroom instructor, who was also the student researcher, conducted each probe session. At the beginning of each baseline session the attention of students was secured by asking them if they were ready to begin. When they responded with an affirmative the task direction was presented. "When I show you each flashcard, please say the correct answer. If you do not know the answer, it is O.K. I will wait four seconds then show you the next flashcard. Do you understand?" When students responded in the affirmative, the session began. Each flashcard was presented one at a time in random order. Students had four seconds to produce the correct response to each flashcard. As students progressed through all flashcards, the researcher discreetly put the cards that the student responded to incorrectly or did not respond to in four seconds (4s schedule), into a separate pile to be recorded later. At the end of each session, students were thanked for their participation and praised for their effort as a form of reinforcement. The students consistently responded incorrectly, or not at all, to between 30 to 47 of the multiplication facts. To simplify the execution of the study, the 30 incorrect multiplication facts that the students had in common were selected. The 30 multiplication facts were then broken down into 6 sets of 5 each (see Table 1).

Full-probe Session (Baseline Data)

Once the thirty target facts and the sets were decided, three baseline/full-probe probe sessions were conducted each day for five days for student A, and three baseline probe sessions were conducted each day for eight days for student B until a stable baseline score was obtained. The full-probe sessions for baseline were conducted exactly as above following the 4s schedule. All 30 flashcards were presented one at a time in random order. Students had

TABLE 1

Multiplication Facts Sets

| <i>Set 1</i> | <i>Set 2</i> | <i>Set 3</i> | <i>Set 4</i> | <i>Set 5</i> | <i>Set 6</i> |
|--------------|--------------|----------------|----------------|---------------|----------------|
| 9×4 | 8×9 | 11×11 | 12×7 | 2×12 | 3×12 |
| 6×9 | 7×8 | 8×7 | 11×12 | 12×9 | 6×12 |
| 8×8 | 9×6 | 4×12 | 12×4 | 12×6 | 12×11 |
| 7×9 | 7×6 | 10×12 | 12×3 | 8×12 | 12×2 |
| 4×8 | 3×6 | 5×12 | 12×8 | 12×5 | 12×10 |

four seconds to produce the correct response to each flashcard. As students progressed through the flashcards, the researcher recorded 'X' for an incorrect response or no response within 4 seconds, and a checkmark for a correct response on the full-probe data sheet. Three trials were conducted during each full-probe session and the percentage of correct responses was calculated. At end of these sessions students were thanked for their attention and cooperation.

Daily-probe Session

The daily-probe gave a chance for participants to respond independently to stimulus cards with target math facts by sets and helped collect the study data. The reason for having daily probe sessions was that while using simultaneous prompting, correct answer or the controlling prompt is provided simultaneously when the stimulus cards are presented, the students do not have a chance to respond independently and as such, it is not possible to test student's achievement of the skill and collect data. A Daily-probe session was conducted each school day, prior to each training session. The daily-robe session was conducted exactly like the full-probe baseline sessions. The only difference was that these sessions were conducted for each of the five sets instead of presenting all 30 facts randomly.

Each student participated in the daily-probe sessions individually. The classroom teacher, who is also the student researcher, conducted each probe session. At the beginning of each daily-probe session the attention of the students was secured by asking them if they were ready to begin. When they responded with an affirmative, the task direction was presented as

"When I show you each flashcard, please say the correct answer. If you do not know the answer, it is O.K. I will wait four seconds then show you the next flashcard. Do you understand?" When the students responded in the affirmative, the daily-probe session began. Each of the 30 flashcards was presented one at a time, in random order. Students had four seconds to produce a response to each flashcard. As students progressed through the flashcards, the researcher recorded 'X' for an incorrect response or no response within 4 s, and a checkmark for a correct response on the daily-probe data sheet. Three trials were conducted during each daily-probe session and the percentage of correct responses was calculated. The overall percentage of correct responses of each trial was averaged for each day to see if the criterion for mastery had been met. Mastery criterion was defined as 100% accuracy of the facts currently being taught (or taught previously in prior sets). At the end of each daily-probe session, students were thanked for their participation and praised for their effort as a form of reinforcement. Student A reached mastery criterion in the 18th daily probe session. Student B reached mastery level in the 24th daily probe session.

Training Session

Immediately following each daily-probe session, a training session was conducted on one set of five multiplication facts. During training sessions the five flashcards were presented, one at a time. Each student participated in the training sessions individually. During the training session direction and the controlling prompt (correct answer) were both delivered simultaneously (0s delay). Each training ses-

TABLE 2

Participants' Instructional Data

| Student A | | | |
|----------------------------|-------------|--------------------------|------------------|
| Baseline Data (Full Probe) | Sessions 5 | % Errors (Average) 98.6% | Time 1 hr 15 min |
| Daily Probe | Sessions 18 | % Errors (Average) 15.2% | Time 1 hr 30 min |
| Training Session | Sessions 18 | % Errors (Average) 8.6% | Time 3 hr 0 min |
| Maintenance | Sessions 13 | % Errors (Average) 0.15% | Time 1 hr 15 min |
| Student B | | | |
| Baseline Data (Full Probe) | Sessions 8 | % Errors (Average) 100% | Time 1 hr 25 min |
| Daily Probe | Sessions 24 | % Errors (Average) 26.4% | Time 1 hr 35 min |
| Training Session | Sessions 24 | % Errors (Average) 17.6% | Time 3 hr 15 min |
| Maintenance | Sessions 4 | % Errors (Average) 0.0% | Time 1 hr 15 min |

sion had a total of five trials with a 4s interval between each trial. At the beginning of each training session, the attention of the students was secured by telling them we were going to learn some multiplication facts and asking them if they were ready to begin. When they responded with an affirmative the task direction was presented. "I will first show you a flashcard and also tell you the answer and you will listen. Then, when I ask you what the answer is, you will repeat". When students responded in the affirmative, the training session began. Each of the five flashcards in the given set was presented one at a time, in random order. Students had four seconds to produce the correct response to each flashcard when the student was asked to give the multiplication fact before proceeding to the next training trial. At the end of each training session, that lasted between 3-5 minutes students were thanked for their participation and praised for their effort as a form of reinforcement. Training sessions continued until students reached a 100% correct responding on three consecutive days during the daily-probe sessions.

When the student mastered the five facts in the set, they moved on to the next set of five. The number of sessions it took to master a set of facts varied by student and by difficulty of the facts in each set. Student A, for example, required five training sessions to master the first set of multiplication facts, but then proceeded to learn subsequent sets with a consistently decreasing number of training sessions (Set 1 – 5 training sessions, set 2 - 4 training sessions, sets 3 through 6 – 2 training sessions each). Student B, on the other hand, had a

more varied learning pattern. She required 5 training sessions to learn set 1, 7 training sessions for set 2, 3 training sessions for set 3, 2 training sessions each for sets 4 and 5, and 4 training sessions for set 6. Students demonstrated mastery of a set by responding correctly to those facts 100% of the time in at least two consecutive daily-probe sessions.

Student A required a total of 18 training sessions to master all 30-multiplication facts to criterion level. Student B required a total of 24 training sessions to master all 30-multiplication facts (See Table 2).

Maintenance

Maintenance probe sessions were built into the study by using a multiple probe design (Birkan, 2005). Conducting the daily-probe sessions with all 30 facts in sets of five prior to each training session not only helped collect the study data but also helped with maintenance of the learned facts. Continuing the daily probe sessions for several days after the last set of facts had been mastered and the training sessions had ceased assessed maintenance of the 30 multiplication facts. Maintenance probe sessions were conducted exactly like the daily-probe sessions, except that they were no longer followed by training sessions. Each student participated in the maintenance probe sessions individually. All 30 flashcards in sets of five was presented one at a time, in random order. Students had four seconds to produce the correct response to each flashcard. As the students progressed through the flashcards, the researcher recorded 'X' for an incorrect response or no response within 4

seconds, and a checkmark for a correct response on the maintenance probe data sheet. Three trials were conducted during each maintenance probe session and the percentage of correct responses was calculated. Overall percentage of correct responses of each trial was averaged for each day to see if the criterion for mastery was maintained. At the end of each probe session, students were thanked for their participation and praised for their effort as a form of reinforcement.

Maintenance probes for Student A were performed for 10 consecutive sessions after training sessions ended, then at one-week intervals for three weeks. Student A maintained 100% accuracy through all 13 maintenance probe sessions. Maintenance Probes for Student B were performed the day after training sessions ended and at one-week intervals for three weeks. Student B maintained 100% accuracy through all 4 maintenance sessions. Maintenance probes were continued longer for Student A (13 sessions altogether) to give Student B time to reach mastery, so both students could begin the generalization process together. Student B required 6 more training sessions than Student A. Also Student B began training 3 days later than Student A, due to the delayed start model of the experiment that required three additional days of baseline for Student B.

Generalization

Both students demonstrated generalization of the multiplication facts learned in the training sessions by completing a two-minute timed multiplication test in their normal math class. Six other students also took the timed tests at the same time as Student A and B, since this is a normal part of the regular math class. The timed tests were presented on 8.5 x 11" paper with seven single digit multiplication problem presented vertically in each row. There were six rows of problem on each paper. Three timed tests were given to each student to assess generalization. Generalization sessions took place in the morning on three consecutive school days, following the last maintenance probes for both students. The test was conducted by a paraeducator that was not part of the simultaneous prompting training. Also, the timed test included all multiplication

facts, not just those taught in the simultaneous prompting training sessions. Both students achieved 100% accuracy on this timed test, thus demonstrating generalization across format, setting, and personnel.

Furthermore, students dramatically improved the number of correct digits per two-minute timed test after this experiment. Prior to this experiment, Student A averaged 38 correct digits per two minutes on the weekly curriculum based measurement (CBM) math probes of multiplication facts. However during the generalization sessions Student A averaged 47 digits correct per two-minutes. Student B averaged 22 correct digits per two-minute CBM probe prior to the experiment, but averaged 34.3 correct digits per two minutes during the generalization sessions. Evidence of generalization of the skill was also observed in the areas of science and long division, where students' speed and accuracy in using multiplication facts to solve problems had noticeably improved.

Reliability

Through out the baseline, training, and maintenance sessions the first author (principal investigator and university professor) supervising this study conducted random inter rater reliability checks and procedural reliability checks. Procedural reliability checks were conducted to see that appropriate procedure including administering the instruction, collecting and recording the data are in place. Steps recommended and used in previous studies (Akmanoglu & Batu, 2005) included (1) controlling the materials, (2) attention securing, (3) delivering the task directions, (4) delivering the controlling prompt, (5) correct response time, (6) giving appropriate response, and (7) correct inter-trial interval. These observations resulted in procedural reliability score above 90%. The interrater reliability checks obtained by dividing number of agreements divided by number of agreements plus disagreements and multiplied by hundred (Akmanoglu & Batu, 2005) resulted in 100% inter rater reliability.

Social Validity

Understanding basic math facts, ability to accurately respond to basic math facts, and an

Data Chart - Student A

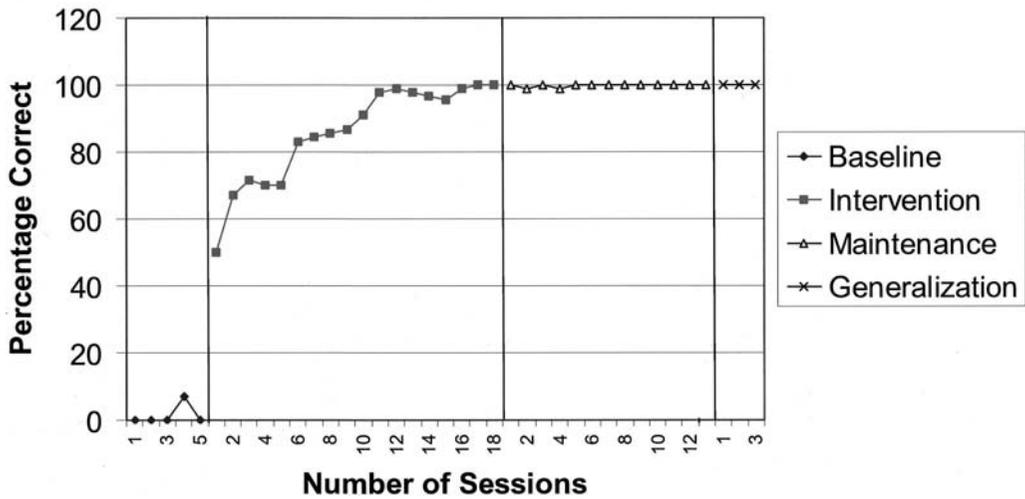


Figure 1. Data Chart for Student A.

ability to rapidly arrive at correct answers is a prerequisite to understanding and carrying out higher order mathematical computations. This was a skill that everyone else in the math class was working on and these two students had particular difficulty with. Also, learning their multiplication facts was a priority goal on both students IEP(s), as well as, being a survival skill for life.

Results

Results (see Figure 1 & Figure 2) and maintenance and generalization data revealed that this intervention involving using simultaneous prompting was successful. Both students had learned to automate recall of multiplication facts and maintained the skill learned and were able to generalize across setting, material, and people. Table 2 lists participants' data indicating number of sessions and average % errors that decreased to near errorless phase. Student A had a total of 55 sessions over a total time of seven hours for intervention to be successful and student B the intervention had involved 56 sessions over a total time of seven hours and 30 minutes. Students A and B continued to be monitored for the remaining six weeks of the school year. They maintained their skills at 100%, and contin-

ued to improve their speed and consequently their scores on the two-minute CBM probes. Further monitoring at the beginning of the next school year will test retention over the summer months. The same simultaneous prompting procedure will be employed to re-teach any skills that were lost during that time period.

Discussion

The No Child Left Behind Act (NCLB) of 2001 requires that all students should be included and make adequate yearly progress in high-stakes assessments, regardless of disability. Added to this is the provision of access to general curriculum promoted by the reauthorization of Individual with Disabilities Act (IDEA) in 1997 and again, in 2004. To create this access to general education mathematics curriculum teachers need to use effective, near errorless strategies that promote success in and motivation to learn basic math concepts that lead to success in higher order mathematics skills.

This study successfully taught two middle school age students with cognitive impairments to automate recall of multiplication facts that they were able to generalize in other settings, with other materials, and with peo-

Data Chart - Student B

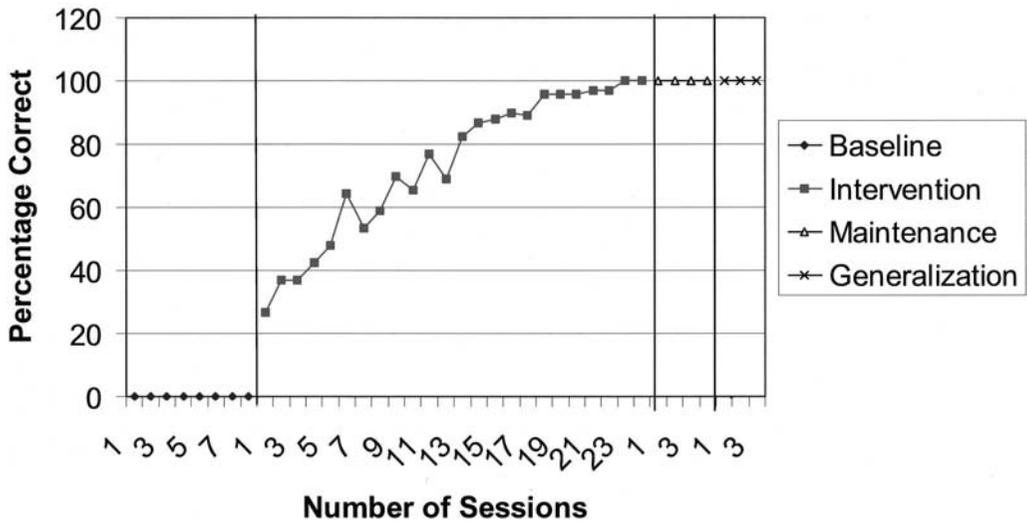


Figure 2. Data Chart for Student B.

ple. Morse and Schuster (2004) in their literature review and other recent studies (Akmanoglu & Batu, 2004; Akmanoglu-Uludag & Batu, 2005; Birkan, 2005; Gursel et al., 2006; Tekin-Iftar et al., 2003) reported successful use of simultaneous prompting in teaching various discrete chained tasks and learning receptive and expressive vocabulary in content areas. Limited research is reported however, using this procedure in teaching mathematical concepts.

More research is needed to examine effectiveness of simultaneous prompting system in teaching other essential mathematical concepts and areas highlighted in the NCTM (2000) standards that include various concepts under number operations, algebra, geometry, measurement, data analysis and probability, representation, connections, problem solving, and communications. This study had a limitation in terms of sample size of only two participants and it may need to be replicated with a small group of students in a similar setting of resource room as well as, in inclusion setting in general education classrooms given a steady move towards inclusive setting for students with cognitive impairments and other disabilities. More studies also need to be conducted with students with different disabili-

ties and also with students without disabilities. Lastly, although simultaneous prompting has many reported (see Singleton et al., 1999) advantages over other promoting systems such as constant time delay that have been used in general education classrooms (see McCallum et al., 2006) there is a need to conduct more comparative studies using constant time delay and prompting procedures (such as progressive time delay and system of least prompts).

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Decreasing Inappropriate Behaviors for Adolescents With Autism Spectrum Disorders Using Modified Social Stories

Janet E. Graetz
Oakland University

Margo A. Mastropieri and Thomas E. Scruggs
George Mason University

Abstract: A multiple baseline design study was implemented to assess the effects of a modified social story intervention on inappropriate social behaviors of three adolescents with moderate autism. Baseline data were collected on inappropriate behaviors that included refusal to stand, use of a high-pitched voice, and placing hands/objects in mouth. Individualized social stories, ranging from five to seven pages and containing text, color photographs, and callouts, were created for each student. Results suggest that social stories immediately improved behavior for two of the participants and these improvements were maintained. Information is also provided regarding teacher opinion on the use of social stories. Implications for training and future research are discussed.

During the past 20 years, there has been a substantial increase in research related to autism spectrum disorders (ASDs), including literature that pertains to effective interventions. Because of the complexity of the disorder, these interventions have addressed the communicative, behavioral, and social needs of children with autism (Odom et al., 2003). In the area of social skills, although a number of programs have been developed for children, few address the needs of adolescents.

The lack of needed social skills and the presence of inappropriate social behaviors critically affect the lives of individuals with autism. A variety of interventions has been attempted for children with autism to decrease inappropriate behaviors (e.g., McConnell, 2002). These include pivotal response training (Sherer & Schreibman, 2005; Koegel, Carter, & Koegel, 2003; Koegel, Koegel, Harrower, & Carter, 1999), video modeling (Ayles & Langone, 2005; Charlop-Christy, Le, & Freeman, 2000), peer-mediated interventions

(Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007; DiSalvo & Oswald, 2002; Gilberts, Agran, Hughes, & Wehmeyer, 2001; Laushey & Heflin, 2000), self-management (Koegel, Koegel, & McNeerney, 2001; Newman, Reinecke & Meinberg, 2000), and the use of visual supports (Charlop-Christy, Carpenter, Le, LeBlanc, & Keller, 2002; Dettmer, Simpson, Myles, & Ganz, 2000; Johnston, Nelson, Evans, & Palazolo, 2003). This array of interventions responds to the range of characteristics of individuals with autism, which have typically proved resistant to treatment.

Treatments implemented to date have extended our knowledge of methods for improving the social behaviors of students with autism (Simpson et al., 2005; Onnes & Lucangeli, 1999). One approach to training social skills for children with autism includes the use of Social Stories™. A social story is a short, personalized story designed to help individuals with autism understand a specific social situation. Gray and Garand (1993) introduced this social story concept and presented broad guidelines as to how they could be developed and implemented for individuals with autism. Initially, they suggested that the stories include three sentence types (a) descriptive (describes the scenario), (b) directive (describes the desired response), and (c)

Correspondence concerning this article should be addressed to Janet E. Graetz, Oakland University, Department of Human Development and Child Studies, 420 C Pawley Hall, Rochester, MI. 48309. Email graetz@oakland.edu

perspective (states the feeling of others). They did not recommend illustrations but added that “photographs have been effective in some stories” (Gray & Garand, p 4). In regards to implementation, they present three types of approaches: (a) a student reading a story independently, (b) putting the story on cassette tape for nonreaders, and (c) creating a videotaped social story for those who are independent or need assistance. They also suggest that comprehension be checked either by a student checklist or having a student answer questions at the end of the story.

Since 1993, researchers have taken liberty to alter aspects of the social story format suggested by Gray (1994) to meet the needs of individual students. Effective interventions, by design, should be individualized for specific children. For example, Agosta, Graetz, Mastropieri and Scruggs (2004) wrote the following illustrated, modified social story for a six year old boy with autism who exhibited screaming behaviors in school: Page 1: Everyday we sit in circle; Page 2: All the children sit quietly; Page 3: Sometimes in circle I want to scream; Page 4: I need to sit quietly and not scream in circle; Page 5: It makes my teacher happy when I sit quietly and do not scream. She says, “Good job, Robert!” (p. 283). To utilize an interest of the child, a response cost system was incorporated with the modified social story.

Ali and Frederickson (2006) report on 16 research studies completed between 1994 and 2004 that implemented social stories. The majority of these social story studies (those adhering to the original guidelines and others who have not) have been conducted with young children with autism, ages 4 to 11, to improve a variety of social behaviors, including coping skills and independent behaviors (Haggerty, Black, & Smith, 2005; Ivey, Heflin, & Alberto, 2004), inappropriate talking out (Crozier & Tincani, 2005), hand washing and staying on task (Hagiwara & Myles, 1999), social skills and communication (Agosta, et al, 2004; Barry & Burlew, 2004; Keyworth, 2004; Demiri, 2004; Smith, 2004; Adams, Gouvousis, VanLue, & Waldron, 2004), bedtime behaviors and mealtime skills (Burke, Kuhn, & Peterson, 2004; Moore, 2004; Norris & Dattilo, 1999), aggressive behaviors (Kuoch & Mirenda, 2003; Lorimer, Simpson, Myles, &

Ganz, 2002), anxiety (Cullain, 2002), vocal volume and shouting (Brownell, 2002; Scattone, Wilczynski, Edwards, & Rabian, 2002), and learning new routines (Gray & Garand, 1993). The majority of these studies report positive findings with the use of social stories as an intervention but, as will be discussed, not all adhere to the original social story format.

Unfortunately, even fewer social stories studies have been conducted with individuals between 11 to 15 years of age. Current research on social stories for children with autism between the ages of 11 to 15 has been shown to decrease inappropriate behaviors including staring at females (Scattone et al., 2002), increase communication/social skills (Keyworth, 2004; Rogers & Myles, 2001; Thiemann & Goldstein, 2001), increase greeting responses and decrease aggression (Swaggart et al., 1995), increase chewing with mouth closed/ napkin use and eating related skills (Bledsoe, Myles, & Simpson, 2003; Staley 2001), and reduce precursors to tantrum behavior (Kuttler, Myles, & Carlson, 1998). Again, with many of these studies, researchers claim positive findings. However, Staley (2001) reported that social stories did not positively impact behaviors for three adolescents with various disabilities, including autism, although reinforcers were successful in modifying behavior.

While these studies use the term social stories, many deviate from the original guidelines recommended by Gray and Garand (1993) thereby making it difficult to assess if the social story, or which of its components, were responsible for any improved behaviors. For example, Hagiwara and Myles (1999) introduced the social stories through the use of a computer and Feinburg (2001) had students read their social stories five times a day. Barry and Burlew (2004) prompted students to practice what they had read in their social story while Haggerty, Black, and Smith (2005) included an apron story telling technique. Crozier and Tincani (2005) in another recent study acknowledge that their modified social story with prompts may have been more effective than the basic social story in producing the desired changes in behavior of an eight year old with autism.

In addition, many of the social story studies contain design flaws that render conclusions

tentative at best. For example, two of the studies utilize an AB design which does not take into account other classroom variables (Norris & Dattilo, 1999; Swaggart et al., 1995) while others lack reliability procedures (Rowe, 1999; Romano, 2002) and others report implementation flaws (Adams et al., 2004). Additional studies have used the social story intervention with other behavior change techniques (Crozier & Tincani, 2005; Thiemann & Goldstein, 2001; Staley, 2002; Swaggart, et al., 1995; Agosta et al., 2004). Earlier studies also provided vague description of participants thereby making it difficult to know which students may best benefit from social stories (Swaggart et al., 1995; Rogers & Myles, 2001). It is still not known which components of the social stories lead to improved results or how the implementation of the social story may affect results with various individuals exhibiting a variety of cognitive and communicative skills.

Despite lack of consistency in design, development, and implementation, previous research has provided the foundation for additional investigations examining the effects of modified social stories, especially for adolescents. As students with autism spectrum disorder reach adolescence, the potential impact of inappropriate social behavior increases. It is therefore critical to have additional intervention efficacy research to help guide practitioners in reducing inappropriate behaviors and increasing appropriate behaviors for adolescents with autism. This study, therefore, intends to expand the research base by examining the effects of modified social stories for adolescents with autism. In the present study, the modified social story adheres to the original guidelines of a simple story written from the student's perspective. It deviates from the original guidelines in that color photographs with callouts were included in the stories. The following research questions were examined: (1) Would the use of the modified social story be an effective social skills intervention that increased appropriate behaviors for adolescents with autism? (2) Would this increase in appropriate behaviors generalize to other settings?, and (3) Would this increase of appropriate behaviors be maintained when the modified social stories were withdrawn?

In addition to the lack of research on adolescents with social stories, previous studies

have neglected to elicit opinions from staff regarding social stories as an intervention in an autism classroom. Therefore, this study also asked the following: Following implementation of the social stories, would school staff be able to (a) describe the basic guidelines for developing a social story for a student and (b) describe situations in which a social story may be used?

Method

Participants

Five adolescents with autism were originally selected for the study. One participant was dropped from the study when it became obvious that he was unresponsive to the modified social story as presented in this study and the decision was made that additional procedures would be needed to effectively impact his behavior. A second participant was dropped due to a lack of reliability during data collection. Three participants therefore were the focus of this study. None had previous experience with social stories. Criteria for selection of students were as follows: (a) males or females between the ages of 12 and 15 with an autistic spectrum disorder; (b) available intellectual, language, social, and academic records obtained within the past two years; (c) students not classified as having Asperger's Syndrome; and (d) verification of autism on the Gilliam Autism Rating Scale (GARS) (see Table 1). Students with Asperger Syndrome were not included since the study wanted to examine the effects of the modified social story with students who appeared to have a cognitive impairment in addition to autism. The following section presents a more detailed description of each participant.

Participant 1: Ronnie. Ronnie was a 12-year, 10 month old Caucasian male classified as having an average degree of autism severity, based on the Gilliam Autism Rating Scale (Gilliam, 1995). This meant that Ronnie displayed delays in communication and social interactions and exhibited stereotyped behaviors. Although no IQ score had been established for Ronnie, he had an age equivalent score of 2 years, 6 months on the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981). He was nonverbal and used ges-

TABLE 1

Demographic Data on Participants

| <i>Student</i> | <i>Age</i> | <i>Gender</i> | <i>Ethnicity</i> | <i>Autism Diagnosis*</i> | <i>Language Functioning</i> | <i>Adaptive Behavior</i> | <i>Cognitive Level</i> | <i>Reading Grade</i> | <i>TARGET BEHAVIOR</i> |
|----------------|------------|---------------|------------------|------------------------------|---------------------------------|------------------------------|----------------------------|--------------------------|----------------------------|
| Ronnie | 12-10 | Male | Caucasian | Average | 62 (V) | 65 (V) | 2-6 (PPVT) | K-1 (WJPB) | stands independently |
| Bobby | 13-1 | Male | Middle Eastern | Average | 66 (V) | 48 (V) | IQ = 42 (WJPB) | 1 (WJPB) | appropriate voice |
| Cathy | 12-2 | Female | Caucasian | Average | 63 (V) | 59 (V) | 2-0 (WJPB) | K (WJPB) | hands down |

Note. *Gilliam Autism Rating Scale; V = Vineland; WJPB = Woodcock-Johnson Psycho. Battery; PPVT = Peabody Picture Vocabulary Test

tures as a primary means of communication. Ronnie responded to commands and gave fleeting eye contact to staff and peers. The teacher reported that his skills in reading and math were at the Kindergarten level. In the classroom, Ronnie usually sat quietly at his desk and rarely interacted with peers or staff. The teacher reported that he preferred a very structured day and would become upset and yell if his routine were interrupted.

Physical Education (P.E.) was frequently problematic for Ronnie. During P.E., a 45-minute class, Ronnie frequently dropped to the ground when asked to participate in activities. This occurred both outside, when P.E. was held on the field, or in the gymnasium. If asked to stand, Ronnie would refuse and when physically moved to stand, he immediately fell to the ground. The teacher found this behavior especially problematic and had no success with a previous intervention (providing a reinforcer for standing). The teacher decided that this behavior should be targeted for the social story intervention. The operational definition of Ronnie’s target behavior was “when given a verbal direction by staff to ‘stand up’ or ‘get up,’ Ronnie stands independently within 15 seconds.” Although it was recognized that this may not mean that he would be “participating”, the teacher believed that getting Ronnie to a standing position was the first important step toward active participation in P.E.

Participant 2: Bobby. Bobby, a 13-year old Middle Eastern male diagnosed with autism at the age of two, appeared good-natured in all settings and participated eagerly in most activities. Recent administration of the Gilliam Au-

tism Rating Scale (Gilliam, 1995) suggested an average degree of autism severity. While Bobby did not display stereotyped behaviors that interfered with his school day, he displayed deficits in the social use of language and in social interactions. He had an IQ of 42 as measured by the Woodcock-Johnson Psychological Battery- revised (Woodcock & Johnson, 1989). Bobby was able to read sentences at the first grade level and enjoyed reading and talking with staff. He was alert to other students in the building and would frequently attempt to give them a “high five” as he passed in the hall. Bobby spoke in complete sentences to both staff and peers. He eagerly began conversations with staff and peers in the morning and talked appropriately about a variety of topics. Although he had a natural deep voice, he frequently changed to a high pitched, infantile voice that was incompatible with his size and gender. His teacher was concerned that if Bobby used this inappropriate voice in the general education settings that he would be the object of ridicule. For that reason, the teacher selected Bobby’s high-pitched voice for the modified social story intervention. The operational definition of Bobby’s behavior was “when talking with staff or peers, Bobby uses an appropriate vocal pitch.”

Participant 3: Cathy. Cathy, a 12-year, 2 month old Caucasian female diagnosed with autism and a cognitive impairment, had a very limited vocabulary and used gestures to communicate. Recent administration of the Gilliam Autism Rating Scale (Gilliam, 1995) suggested an average degree of autism severity. She demonstrated severe deficits in commu-

nication and social interactions. Although no IQ score had been established for Cathy, she had an age equivalent score of 2 years on the Woodcock-Johnson Psychological Battery-revised (Woodcock & Johnson, 1989). Cathy was a nonreader and when informally assessed, was only able to read her first name. She could be seen slumped over her desk in her classroom and appeared unresponsive to staff and peers. She frequently sucked her fingers and objects while in her classroom or in other school settings. At times, she screamed and rocked in her chair, especially when left unattended or asked to put her hands down. The teacher felt that it was difficult to get Cathy to work in the classroom because of this behavior. For that reason, her social story addressed keeping her hands down. The operational definition of Cathy's behavior was "when seated in the classroom, Cathy keeps her hands down and keeps materials away from her lips."

Design

A multiple baseline design across participants (Tawney & Gast, 1984) was implemented to evaluate the effectiveness of modified social stories on inappropriate behaviors. A target behavior was identified for each participant and tracked during baseline, intervention, generalization, and maintenance phases (see Table 1).

Design of Social Stories

In consultation with parents, special education teacher, special education paraprofessional, and speech clinician, individual modified social stories were developed for participants using basic guidelines recommended by Gray and Garand (1993). The first author and speech clinician had previously received a one day in-service on the development of social stories. According to Gray and Garand, social stories may be written with three types of sentences in a prescribed ratio format. Sentence types are: descriptive, directive, and perspective. Regardless of the length, the story should include one directive sentence and two to five descriptive and/or perspective sentences which consider the student's age, reading and comprehension level,

interests, attention span, and preferred learning style.

Descriptive sentences describe what people do in particular social situations. For example, "Almost every day I sit in circle." The directive sentences identify a suggested response or choice of responses to a situation. They may begin with the words, "I can" or "I will" and should tell the student in positive terms what to do or say in a target situation. Perspective sentences describe the reactions and responses of others in the target situation. They may include the feelings of others and are written from the child's perspective, e.g. "It makes my teacher happy when I sit quietly during circle time." The sentences included in these modified social stories included these three types of sentences.

The modified social stories in this study varied from Gray and Garand's (1993) initial guidelines to include actual photographs of students and teachers. Since the participants had not shown response to stories that included only text, the researcher, teacher, and speech clinician felt that the photographs would provide needed concrete visual images. In addition, the photographs contained 'callouts', words that appear to come from a person's mouth. Callouts are frequently used in typical comic strips. Because the teacher had stated that the students enjoyed typical comic strips, it was decided to use the callouts in their social stories. Stories also included only positive examples of desired behaviors. Each story was designed on 8.5 x 11 inch paper, approximately six pages in length, and was bound and laminated. Initial versions of stories were shown to special education teachers and speech clinicians considered experts in autism for feedback prior to implementation. Revised versions were developed based on their feedback. Ronnie's social story follows:

Page 1: Ronnie Learns to Stand and Play (with photo of Ronnie standing).

Page 2: My name is Ronnie and I go to Lawrence Middle School (with photo of the school).

Page 3: Almost everyday we have P.E. (with photo of Ronnie and classmates at P.E. Ronnie is standing next to his peers).

Page 4: Everyone stands up. Everyone plays (with photo of Ronnie and classmates playing in P.E.).

TABLE 2

Modified Social Stories for Additional Participants

Bobby: Inappropriate high, vocal pitch
Page 1 Title Page: Bobby Learns to use a Young Man's Voice (smiling picture of Bobby)
Page 2: My name is Bobby. I go to Lawrence Middle School. (photo of school)
Page 3: When I am at school, I like to talk with my friends. (photo of Bobby surrounded by peers)
Page 4: My friends are young men. They use young men voices. (three photos of friends with callouts of them talking)
Page 5: I am a young man. I need to use a young man's voice. (photo of Bobby with a callout, saying 'I have my book, My Smith.' Another photo of teacher says, 'Nice voice, Bobby!')

Cathy: Putting hands/objects in mouth
Page 1 Title Page: Cathy Keeps Her Hands Down (smiling photo of Cathy)
Page 2: My name is Cathy. I go to Lawrence Middle School. (photo of school)
Page 3: Every day, I sit at my desk. I have my work to do. (photo of Cathy at desk; hands down)
Page 4: I am a big girl now. I need to keep my hands down. (photo of Cathy in hallway, smiling)
Page 5: When my hands are down, my teacher and friends can hear me talk. (photo of Cathy with callout, 'Mrs. Smith, I am ready to work.'
Page 7: My teachers say, "Good work, Cathy!" (photos of Cathy, Teacher and Paraprofessional; callouts say, 'Nice talking, Cathy!')

Page 5: I will stand up. I will play (with photo of Ronnie standing and playing in P.E.).

Page 6: It makes my teachers and friends happy when I stand up and play (photo of teachers, Ronnie and classmates).

The two other students' modified social stories also followed this format and are presented in Table 2.

Staff and Observer Training

Special education personnel and graduate student observers were trained in procedures for using the modified social stories and how to elaborate on them by pointing out the pictures or asking the students questions. The researcher presented a sample social story to the staff and modeled the desired behavior of how the modified social story was to be read to participants. In addition to reading the story, the researcher also modeled how to question and/or comment to the participants about the pictures presented in the modified social story. For example, for Ronnie's story, the paraprofessional commented, "Ronnie! Look at you! You are standing! Way to go!" The observers were trained to follow steps to implement the social story and to use simultaneous data

collection involving interval recording (Bobby and Cathy) and duration recording forms (Ronnie).

Fidelity of Treatment

Teachers were observed at least once weekly throughout the study by graduate students trained in the social story implementation. Following each observation, teachers/staff were provided feedback if the social story had not been implemented correctly. The observers recorded the presence or absence of the necessary experimental procedures. Teachers were trained to (1) read the social story at appropriate time (prior to P.E. for Ronnie and during P.E. if his body fell to the ground and within 20 minutes of language arts for Bobby and Cathy), (2) ask the student questions and/or comment about the social story, and (3) leave the social story in the student's desk. The percentage of experimental procedures present during the observations was calculated by dividing the number of correct procedures by the number of correct and incorrect procedures and multiplying by 100. Across the three participants, the procedural reliability mean was 97% (range 80%-100%).

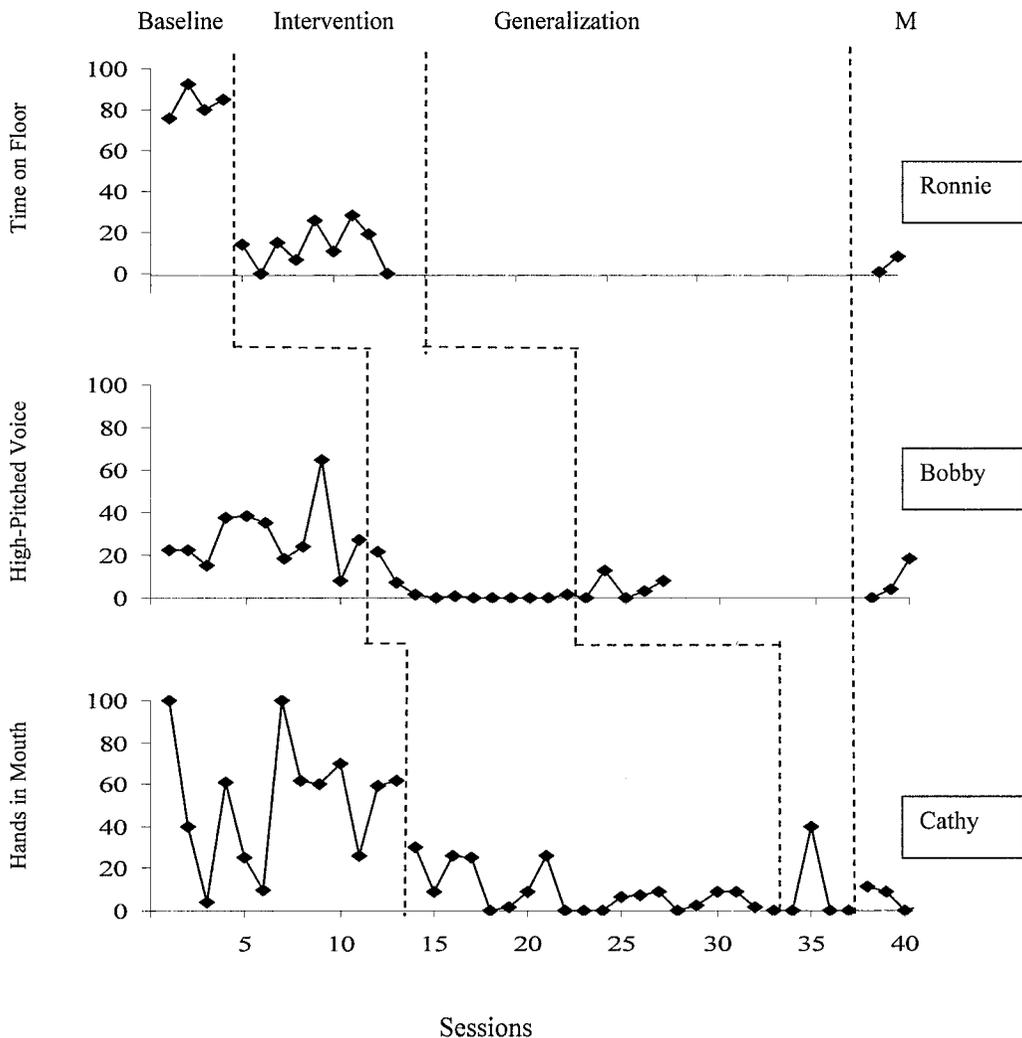


Figure 1. Multiple baseline data across three participants.

Data Collection

Baseline procedures and intervention phase. Data collection took place daily over an eight-week period. Baseline data were collected from 4 to 13 days. Baseline data for participant 1, Ronnie, were collected during 45 minute P.E. sessions (in the morning, 4 days). Baseline data for participant 2, Bobby, were recorded every 15 seconds during a 20 minute period of language arts (in the morning for 11 days). Baseline data for participant 3, Cathy, were recorded every 15 seconds for 20 consecutive minutes during language arts (in the morning for 13 days).

After target behaviors were identified, staff trained, and the modified social stories developed, performance levels were established for each participant following at least four consecutive days of observations (see Figure 1). Intervention data were collected as follows: Participant 1 (Ronnie): 9 days; Participant 2 (Bobby): 11 days; Participant 3 (Cathy): 20 days. During the intervention phase, the modified social stories were read at least twice to each participant. For Bobby and Cathy, the modified social stories were read during the first 20 minutes of the language arts period. Ronnie’s social story was also read during the

morning but prior to P.E. Ronnie's modified social story was then carried to P.E. by the paraprofessional and was read to him upon entering the P.E. area, either the gymnasium or outside playground. The teacher, paraprofessional or speech and language teacher reviewed modified social stories individually with each student. The modified social stories remained at the students' desks throughout the day. Project staff consisting of the first author and two graduate assistants, recorded observations. To have a clearer understanding of classroom activity, observers also took anecdotal notes including a description of the classroom activity, a description of staff and student behaviors during the implementation of the modified social story, and behavior of each student.

Generalization and maintenance. All participants except Ronnie were observed in another setting (e.g., lunch, music or library) to see if the inappropriate behavior was present. Since Ronnie's behavior only occurred during P.E., alternatives were not feasible. Generalization data were collected for five days. To assess maintenance, approximately 3 to 4 weeks following intervention, observers returned to record the target behaviors during morning work sessions (for participants 2 and 3) and during P.E. for participant 1. Maintenance data consisted of two days for Participant 1 (Ronnie) and three days for Participants 2 (Bobby) and Participant 3 (Cathy).

Reliability

Interobserver agreement was assessed on approximately 20% of observations across all phases. If 80% or greater reliability was not achieved (calculated as a percentage of agreement of observations), further training on observational techniques was conducted. A coefficient of agreement was calculated for each participant, and then averaged to yield a mean interobserver coefficient. Interobserver agreement ranged from 91% to 95% for the three participants.

Interviews with Staff

Following implementation of the social stories, interviews were conducted with the autism teacher, paraprofessional, and speech cli-

nician. Interviews focused on questions about the design, development, implementation, and effect of the social story intervention.

Results

This study explored three research questions: (1) Would the use of modified social stories be an effective social skills intervention that increased appropriate behaviors for adolescents with autism? (2) Would this increase in appropriate behaviors be generalized to other settings, and (3) Would this increase of appropriate behaviors be maintained when the modified social stories were withdrawn? In regards to the first research question, visual inspection of data indicates that the introduction of the modified social story resulted in immediate decline in the inappropriate behaviors for the three participants. Figure 1 presents the data for the three participants. These data also indicate positive findings for research question two (behaviors were generalized to other settings) and research question three (appropriate behaviors were maintained) (see Table 3). It was assumed that behavior change occurred if there was no overlap between the baseline and intervention phases, no overlap between the baseline and generalization phase, and an estimated change in the trend across 7 to 10 data points. This would indicate that the general slope or general direction of the behavior was decreasing (Kazdin, 1994). Table 3 presents the slope or general direction of the inappropriate behaviors for each participant. The decreasing slope was greatest for participants 1 and 2 (Ronnie and Bobby) but data on participant 3, Cathy, also indicates a decline in her inappropriate behavior. The following section presents detailed results for each participant.

Individual Participant Results

Participant 1: Ronnie. Baseline data were recorded during the 45 minute P.E. session. During the baseline phase (4 days), percentages of time Ronnie spent on the ground ranged from 74% to 90%, with a median level of performance of 82.33% (mean = 83.41%). On the fifth day, the social story was introduced to Ronnie. During the intervention phase (9 days), the level of performance

TABLE 3

Summary of Statistical Data During Four Phases: Baseline, Intervention, Generalization, Maintenance

| <i>Participants:</i> | <i>Baseline</i> | <i>Intervention</i> | <i>Generalization</i> | <i>Maintenance</i> |
|----------------------|-------------------------------------|------------------------------------|-----------------------|----------------------|
| Ronnie | X 83.41 (SD) 4.69 Slope 1.23 | X 13.37 (SD) 10.15 Slope .52 | N.A (SD) 16.45 | X 4.50 (SD) 4.69 |
| Bobby | X 30.95 (SD) 15.32 Slope 2.97 | X 5.21 (SD) 9.03 Slope -1.58 | X 3.91 (SD) 4.69 | X 10.36 (SD) 7.63 |
| Cathy | X 50.62 (SD) 29.64 Slope .57 | X 7.01 (SD) 8.81 Slope -0.70 | X 121.0 (SD) 9.60 | X 1.25 (SD) 1.76 |

ranged from 0% to 28%, with a median level of performance of 14% (mean = 13.37%). Four weeks after the social story had been withdrawn, Ronnie sat only 4.5% of the total time period.

Participant 2: Bobby. Baseline data on Bobby’s use of an appropriate-pitched voice were recorded every 15 seconds during a 20 minute period of language arts, for eleven days. Data indicated he used an inappropriate high-pitched voice 15% to 65% of the time, with a median of 22.45% (mean = 30.95%). During the intervention (11 days), the target behavior ranged from 28% on the first day to 0%, with a median performance of 0% (mean = 5.21%). Data collection in other school settings (five days) indicated that the percentage of time Bobby used a high-pitched voice ranged from 0% to 12.5% with a median of 5.62 % (mean = 3.91%). Twenty-two school days later, the percentage of high-pitched voice ranged from 3.7% to 18.7% with a mean of 10.36%.

Participant 3: Cathy. Observations of Cathy putting fingers/objects/hair in or on her mouth were recorded every 15 seconds for 20 consecutive minutes during language arts for 13 days. Data indicated variability in Cathy’s behavior from a low of 3.75% to 100%. The median performance during baseline was 60% (mean = 50.62%). Although not represented in these data, Cathy frequently experienced periods of crying when her inappropriate behavior exceeded 60% of the time during a 20-minute period.

During intervention, Cathy’s inappropriate behavior ranged from 0% to 30% with a mean

performance of 7.01%. During the four day data collection in other school settings (music and library), Cathy’s performance ranged from 0% to 40% with a median performance of 7.5% (mean = 12%). During a maintenance check 21 days later, she exhibited inappropriate behavior between 0-2%.

Social Validity

Any social skills intervention needs to directly address the needs of specific students (Heflin & Alaimo, 2007) and lead to improved social competence. Since the intervention is frequently implemented by the classroom teacher, it is also necessary that the classroom staff understand the relevance of the intervention and can describe how the intervention is developed. At the conclusion of the study, staff was asked a series of questions to note 1) their understanding of modified social stories as an intervention, 2) to describe how modified social stories are developed, and 3) to describe additional situations in which social stories or modified social stories may be used. The classroom teacher, paraprofessional, and speech clinician were interviewed separately by the first author and their comments were recorded. Upon completion of the interviews, the first author grouped responses into three areas: 1) can staff describe the guidelines of developing a social story and describe their purpose, 2) can staff describe how modified social stories are developed, and 3) can staff describe how social stories or modified social stories can be used in other situations.

In regards to the first and second questions,

all three professionals were able to describe the basic social story guidelines and describe the various types of sentences to be included (descriptive, directive, and perspective). Comments from the teacher, paraprofessional, and speech clinician indicated that they found modified social stories to be an effective intervention and would implement them with other students. In addition, they were able to identify how their present use of a modified social story differed from Gray's original design. They each identified the presence of the color photographs and the use of the callouts as a way to "tweak the social stories and make them really appropriate for the students. . ."

Comments also indicated that they could creatively identify further modifications that may render a modified social story even more effective. For example, the modified social stories in this study were produced in a laminated book format, 8 ½ inches by 11 inches. The paraprofessional had recently read about the use of Power Cards as an intervention to change behavior (Gagnon, 2001) and suggested a format change for the modified social stories based on Power Cards. Power Cards are typically the size of a trading card and utilize a student's favorite character/object or obsession to improve behavior. Her suggestion was that the modified social story be created in a minibook format that would fit in the adolescent's pocket.

Question three examined whether or not the staff could identify other situations in which a modified social story or social story may be used. Each professional listed situations in which further social stories could be used. The special education paraprofessional stated that she could "actually describe the bus situation . . . that would work . . . it could be like 'when I'm sitting watching the buses, I get very excited. When I get excited, this is what I do . . .'" Both the paraprofessional and teacher mentioned using social stories to address the issue of sexuality with their students. Although the teacher said she preferred to write her own stories, and felt comfortable doing so, she also found prepared social stories by Anne Marie Johnson also effective (Johnson & Susnik, 1995). She noted that other modified social stories, like those presented by Ann Marie Johnson are also valuable and that "students identify with characters in stories . . . the

characters stayed in their minds and the content stayed in their minds social stories generally work specific to target . . . a particular behavior." She also believed that the color photographs worked well and that "they [the students] are fascinated by looking at themselves whether it be in the modified social story or in a video . . . and other students liked to see other students' modified social stories as well [laughter]."

The speech clinician, while able to list the strengths of the modified social story, also recognized limitations. She thought that although social stories should be written as part of a collaborative team, she stated that it was frequently difficult to get teams together as is needed. She also believed that since the researcher came in from a university and could devote the time to consulting with the professionals, it made the design and development stage of the social story progress more smoothly. She wondered if it would be this easy without additional assistance.

Staff commented that it became increasingly difficult to implement social stories as the number of students requiring them increased. The teacher stated:

I have seven [students] . . . that's an important piece . . . how are we going to implement it? I mean if the teacher is talking, are we going to stop to read the story? Staffing that's important . . . this population is very challenging . . . more than emotionally impaired or learning disabled.

The paraprofessional added:

On many days we just couldn't . . . we couldn't really drop what we were doing and read the book [when students needed it] . . . they couldn't read the book . . . the negative part is actually the time involved in reading the book when they can't read . . . and the [collecting data and] observations.

Additional comments reflected how the professionals enjoyed reading the modified social stories to the students. The special education paraprofessional, who implemented most of the stories, spoke enthusiastically about the modified social stories: "They are great! And I loved using the pictures they really noticed it was their picture . . . I

didn't think they would. That really helped." She also thought that the use of the modified social stories provided an additional benefit in that it "let the child and me bond in some way . . . I was the one that was reading them the stories when it came time . . . when they saw me come with the story they were welcoming . . . because they were personal . . . it had their pictures."

Discussion

Overall findings from this study indicate that modified social stories with the use of color photographs were effective for the three participants and results were immediate and pronounced. The inappropriate behaviors decreased in other school settings and were maintained over extended periods without the use of their stories. The present study extends previously conducted research using modified social stories with individuals with autism in several ways. First, adolescents with autism were the participants. As noted earlier, most research exploring social stories has focused on children under the age of 10 (example, Haggerty et al., 2005; Ivey et al., 2004; Crozier & Tincani, 2005; Hagiwara & Myles, 1999). Second, the construction was modified in that actual photographs of the students were included in their modified social stories. It may be that the photographs enhanced the concreteness, meaningfulness and visual aspect for these adolescents with autism. It may also be that the perspective statements combined with the photographs facilitated understanding of the social situation for these students. Third, only positive instances of desired behaviors in the modified social stories were represented.

In this study, participants displayed cognitive impairments. The cognitive functioning of individuals with autism remains a mystery. It is unknown if the social-communicative deficit stems from an impairment in shared attention or information processing. Since rapid shifting of attention and shared attention seems problematic (Mundy, Sigman, & Kasari, 1994), then sustained focus on pictographic stimuli may be supported for use in interventions.

Studies that have focused on cognitive and social competencies of children with autism

have noticed strengths in visual-perceptual skills (Rodgers, 2000; Siegel, J., Minshew, N., & Goldstein, 1996) and pictographic stimuli (O'Reilly, Sigafoos, Lancioni, Edrisinha, & Andrews, 2005; Schmit, Alper, Raschke, & Ryndak, 2000; Bryan & Gast, 2000). Visual displays of skill sequences, in particular, have helped with skill acquisition of daily living skills (Charlop-Christy et al., 2000; Pierce & Schriebman, 1994).

A social story targets the behavior from a personalized view in very concrete terms then presents this story in a relaxed style. This procedure may help students understand the social context of their behavior, and the perspectives of others. Perhaps the social story serves to motivate the individual to perform the appropriate behavior, by demonstrating how it pleases other people. It may be that by personalizing a social situation with pictures, the social story enhances the concreteness and meaningfulness sufficiently to enhance understanding of appropriate social behavior. Quill (1997) suggests that visually cued instruction reflects the learning style strengths of individuals with autism. Their ability to maintain sustained attention to the pictographic stimuli "enhances the child's attention to and encoding of the social-linguistic message." (p. 708).

Teacher acceptance and understanding of the modified social stories is also important to note since limited research has elicited comments from staff in the use of the social story (Crozier & Tincani, 2005; Smith, 2004). While the participants demonstrated improved behaviors with the modified social stories, the teacher remained hesitant about creating them without outside assistance. The paraprofessional was more enthusiastic about their use and eagerly identified situations in which modified social stories could be used with adolescents. The concrete explanation of the desired behavior integrated with photographs of familiar individuals in the modified social story could apply to vocational situations and group home settings as well.

Limitations and Future Research

Previous studies implementing social stories have shown positive effects, but not universally for students with autism (e.g., Norris & Dat-

tilo, 1999; Staley, 2001). Although this study provides some positive effects for the use of modified social stories, limitations exist. Limitations involved the length of study phases, number of participants in a single class, and lack of baseline data in the other class settings. Only 11 weeks of data collection were permitted. Since a multiple baseline design was implemented, some participants received fewer than perhaps desirable days of intervention. As the three participants were in the same classroom, staff often appeared challenged with implementing all the modified social stories. Anecdotal notes and observations indicated that the behaviors occurred in other settings but baseline data were not collected in these settings; collection of generalization baseline data could help validate generalization effects. Generalization and maintenance phases should be extended to validate effectiveness outside of the classroom and over extended time. Although target behaviors were observed informally in a variety of settings for the three participants, baseline observation in the generalization settings could have provided precise measures of the extent of the other class setting effects. In addition, it is not known whether students achieved functional independence of the target behaviors. Further research could address these issues.

At present it is unclear precisely why social stories as previously presented by Gray and Garand or modified social stories, may be effective and what components of the social story package are most critical. Future research could examine more precisely the components of social stories. Are social stories more promising if presented through technology (Hagiwara & Myles, 1999), with photographs, or perhaps a comic strip presentation (Rogers & Myles, 2001)? Although limited research supports the use of social stories in the home (Lorimer et al., 2002), could they also be effective with older students in vocational settings? At present, many of these questions are still unknown and additional research is required.

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Milieu Therapy as a Communication Intervention: A Review of the Literature Related to Children with Autism Spectrum Disorder

G. Richmond Mancil
Western Kentucky University

Abstract: Several researchers have employed milieu therapy to address the communication needs of children with autism spectrum disorder (ASD). Thus, the purpose of this review is to examine milieu therapy, particularly, the environments and individuals involved in the training and the effectiveness of milieu therapy with children who have a diagnosis of ASD and to provide suggestions for practitioners and researchers. Milieu therapy consistently increases communication and generalizes to other settings, while maintaining over time; however, milieu therapy does not analyze connections to challenging behaviors and few studies have focused on teachers in the classroom or peers. Future research teams should continue to train parents and teachers while addressing the connection to challenging behavior and including peers in the interventions.

ASD is a developmental disorder affecting the lives of thousands of children. ASD was first described by Leo Kanner in 1943 through the case histories of 11 children. Kanner observed that the characteristics of these children differed significantly from other children; therefore, he suggested a separate diagnosis entity was needed to describe their unique characteristics. Since Kanner's first description of autism, the disorder has evolved into a spectrum disorder (i.e., ASD) with the number and percentage of diagnoses increasing each year (Autism Society of America, 2007).

According to the Autism Society of America (2007) and the Centers for Disease Control and Prevention (CDC), 1 in 150 children born today will eventually be diagnosed with ASD (Autism Society of America). The Autism Society of America (ASA) also notes that 1.5 million Americans including children and adults have ASD, while another 15 million Americans (e.g., family, educators, and health care workers) are affected by this disorder. In

Correspondence concerning this article should be addressed to G. Richmond Mancil, Kelly Autism Program, College of Education and Behavioral Sciences, Western Kentucky University, Tate Page Hall 347, 1906 College Height Blvd. #71030, Bowling Green, KY 42101-1030. Email: rich.mancil@wku.edu

sum, the incidence and prevalence rates of ASD appear to be growing at high rates.

The essential features of ASD include significant impairments in social interaction and communication skills and a highly restricted area of activities and interests (American Psychiatric Association, 2000). Social interaction problems may be exhibited through an impairment in nonverbal behaviors (e.g., eye to eye gaze, body postures, facial expressions) and/or failure to create developmentally appropriate peer relationships. For example, a child with ASD is less likely to initiate peer-related social interactions or respond to social bids from peers.

In addition to social interaction problems, children with ASD have communication skill deficits. Often, these deficits include a delay in or absence of spoken language (e.g., 40% never obtain speech). Children that do develop speech may have difficulty initiating or sustaining conversations with others. Further, these children may develop stereotyped and repetitive use of language or idiosyncratic language (e.g., repeating nonfunctional phrases over and over).

Coinciding with impairments in social interaction and communication, children with ASD may exhibit restricted, repetitive, and stereotyped patterns of behavior, interests, and activities. They often demonstrate a preoccu-

pation with idiosyncratic interests to a level considered abnormal in intensity and focus (American Psychiatric Association, 2000). For example, a child may know every fact about the makes and models of cars and sustain conversations related to this topic for hours, but remain unable to hold conversations about any other topic. They also may engage in inflexible, nonfunctional rituals and routines such as turning a doorknob over and over in each direction before leaving their home. Although these rituals and routines initially may appear to decrease anxiety, the routines typically impede an individual's ability to socialize and function properly within society (Heflin & Alaimo, 2006). Further, many children with ASD have stereotyped and repetitive motor mannerisms (e.g., hand flapping). For example, a child may engage in repeated hand flapping, for no apparent purpose.

Concurrent with the aforementioned features, many children with ASD exhibit high levels of challenging behaviors toward others or themselves that interfere with their learning, such as screaming, hitting, and biting (Sigafoos, 2000). For instance, some children may repeatedly bite themselves or they may aggress toward other children or adults (e.g., scratch others). Challenging behaviors such as biting create substantial obstacles for individuals responsible with their education and care (Durand & Merges, 2001). Many parents experience stress when their children engage in aggression or tantrums. Unlike other parents, parents of children with ASD may have difficulty determining the reason for the tantrum because of the child's deficits in communication. It is difficult for an individual who does not have any communication skills to explain what may be the cause of the tantrum. These characteristics (i.e., social interaction impairments, communication deficits, repetitive behaviors, and challenging behaviors) and their negative effects on the children and families combined with the increase in the prevalence of ASD present a critical demand for the field of special education to respond and provide effective practices to meet these children's needs at home and in educational settings.

One area of important research is investigating methods aimed at increasing communication skills, decreasing challenging behavior, and determining the relation between

communication abilities and challenging behaviors. A number of researchers have responded by examining the relation between challenging behaviors and communication abilities of children with ASD (e.g., see Bott, Farmer, & Rhode, 1997; Chung, Jenner, Chamberlain, & Corbett, 1995; Sigafoos, 2000; Schroeder, Schroeder, Smith, & Dalldorf, 1978). Chung et al. found an inverse relation between communication ability and the display of challenging behaviors such as self-injury and aggression in children with ASD. Similarly, Bott et al. (1997) determined that individuals with more developed speech skills exhibited a lower rate of challenging behaviors than those with impaired speech skills. Further, Sigafoos hypothesized in a more recent study that impaired communication development in children with ASD and other developmental disabilities may actually cause challenging behaviors. He suggested that when children lack the appropriate skills to communicate, they might actually use challenging behaviors for communication purposes.

To address the communication needs of children with ASD, several researchers employed milieu therapy. Milieu therapy is supported by a plethora of studies demonstrating that it has been effectively used to teach communication skills to children with developmental disabilities and/or communication disorders (e.g., Hester, Kaiser, Alpert, & Whiteman, 1995; Yoder & Warren, 2002) and to a lesser extent, children with ASD (e.g., Hancock & Kaiser, 2002; Ross & Greer, 2003). In milieu therapy, the focus is teaching children new skills and behaviors within their natural environments (Kaiser, 1993). The natural environment may refer to any setting that the child would naturally spend time regardless of his or her disability, including the home, school, or an inclusive educational setting (Schwartz, 2003). As demonstrated in the literature, teaching communication skills in natural environments has many advantages including: (a) increases in vocabulary (Yoder et al., 1995), (b) generalization (Hancock & Kaiser), (c) maintenance (Spradlin & Siegel, 1982), and (d) unprompted use of language (Yoder & Warren).

Milieu therapy includes the following basic procedures: (a) providing a model of desired

responses and correcting child responses, (b) providing a mand and then modeling/correcting if needed, (c) using a time delay, and (d) employing incidental teaching strategies (Hancock & Kaiser, 2002). One of the strategies used in milieu therapy to promote communication in natural environments is modeling correct responses and correcting the target child's responses. This involves modeling a target behavior and then providing correction to the child as necessary (Alpert & Kaiser, 1992). For example, while outside on the playground, a child may tap on the adult's arm and look at the toy dump truck. The adult gains the child's attention and provides a verbal prompt that matches the child's communication skill level, such as *Want truck?* If the child says, *Want truck*, the adult provides praise, repeats the child's phrase (e.g., *says, yes, want truck*) and provides the child the toy dump truck. Otherwise, the adult provides a corrective model repeatedly, *Want truck* until the target child correctly models the response. However, if the child does not respond in a reasonable time frame (e.g., two to three seconds), as predetermined by the researcher, parent, and/or teacher, the adult provides a model and gives the object to the child. The purpose of modeling and correcting responses is to provide the target child the necessary prompts and instructions in natural situations to assist in skill development.

Another component of milieu therapy is the mand-model technique. The mand-model technique involves giving a direct instruction (commonly referred to in the literature as a mand) within a naturally occurring activity and context (Charlop & Walsh, 1986). The mand is a vocal operant that is maintained by a reinforcer (e.g., obtaining a preferred item such as a toy car) and is evoked by the discriminative stimuli for that reinforcer (Skinner, 1957). For example, if a child says, *Water please* and receives the water, it is likely that this is a mand. Also, it is important to recognize that responses are deemed mands based on their controlling variables and not on their topography. Sign language and picture cards can function as mands the same as vocal responses function as mands. When necessary, this mand would be followed by a model and a correction similar to the description above. The mand-model is performed by first gaining

the child's attention and then providing a prompt for a target behavior. After the prompt, a guided model (i.e., assisting the child in performing the target behavior) is provided when necessary. For instance, a child is given apple juice for snack and reaches to pick it up with his hands. The adult provides a response block (e.g., blocks his hands), obtains the child's attention, and says, *Tell me what you want* (mand), places the communication card with the picture of juice on it in the child's hand, and physically guides his hand to the adult who has the apple juice (corrective model). If the child continues to ask for juice by using the picture card, the adult provides the juice paired with positive praise (e.g., *Good job asking*). If the child attempts to grab the juice again without using the communication card, the adult repeats the process. The purpose of the mand/model strategy is to develop independent skills by providing the child with a prompt and an example of performing the communicative response correctly. The adult continues with this procedure until a performance criterion is met (e.g., child perform the task correctly for two days).

Time delay is another procedure often used in milieu therapy that involves the adult providing a stimulus and then waiting approximately 5 to 30 seconds, based on the child's developmental and mental age, for a child-initiated response (Kaiser, 1993). Time delay typically is combined with other techniques such as the mand-model. If the child does not respond, the adult provides a mand-model. For example, a child may want his coat, but need help getting it from the shelf. While attending to the child, the adult waits for a period of 5 to 30 seconds (depending on the child's developmental level) for the child to request help. If the child requests by using a communicative response such as a picture card or vocalization, the adult provides immediate praise and a correct model, *you want your coat?* If the child does not independently request help within the time delay, the adult provides a mand-model. The amount of time delay chosen depends on the child's level. The longer the wait period, the greater the chance of losing the child's interest; therefore, care is needed in choosing the appropriate time delay. The purpose of time delay is to decrease the child's dependence on adult

prompting, instructions, and models; thus, promoting independent and spontaneous (i.e., unprompted) communication.

Incidental teaching is another strategy often employed within the framework of milieu therapy. Incidental teaching is a process where communication skills are learned in naturally occurring interactions or interactions arranged in natural contexts, which may be the reason the terms incidental teaching and milieu therapy have been used interchangeably at times. Hart and Risley (1968; 1975) described incidental teaching as an interaction between an adult (e.g., parent) and a child during unstructured situations such as free play where the child controls the incidences in which teaching occurs by signaling interest in the environment. For example, while playing with toy cars, a child may point to a car and say, *ca*. The adult reinforces this behavior by providing positive praise and giving the child the toy car. Incidental teaching typically is combined with the other procedures and is applied during situations when children are requesting either vocally or non-vocally. Prompts are provided if necessary. Further, access to desired objects is contingent upon correct responses, which are followed by behavior specific praise. For example, an adult may create a situation by “accidentally” forgetting to give a child her milk during snack (i.e., sabotaging the environment). The adult then would use the aforementioned techniques to enhance communication by giving a prompt when needed, praising the child for correct responses, and giving the child the milk (contingent access) for correct responses. The purpose of incidental teaching is to promote fluency and expand skills of children with delayed language skills, which may include children with ASD (e.g., see Hart & Risley, 1975; MacDuff, Krantz, MacDuff, & McClannahan, 1988).

In sum, milieu therapy is one practice that researchers have used to successfully demonstrate an increase in communication skills of children with ASD. The focus in milieu therapy research has been teaching children new skills and behaviors within their natural environments (e.g., home and school). The research has been done using various combinations of the four procedures described

above, which has resulted in skills generalizing to other settings and people. The majority of the research, however, has been conducted with children with language delays, not solely identified as having ASD, thus, making it difficult to generalize findings to children with ASD. Further, research has not focused on involving peers, which is crucial to increasing the social network of individuals and improving overall quality of life (Wagner, 1999). Thus, the purpose of this review is to examine milieu therapy, particularly, the environments and individuals involved in the training and the effectiveness of milieu therapy with children with ASD. First, analysis of the characteristics of the participants, environment, research designs, behaviors, interventions, major findings, reliability, and treatment fidelity across studies are provided. Second, a critique of the findings to address limitations and implications for future researchers and practitioners are provided.

Method

The literature review of research conducted in the area of milieu therapy began with searches of ERIC, Education, PsycINFO, and Academic Search Premier electronic data bases using various combinations of the following terms: milieu therapy, incidental teaching, time delay, embedded instruction, autism, autism spectrum disorder, and communication. Following the electronic data base search, a hand search was conducted of the following journals, covering the span of 1968 to the present: *Education and Training in Developmental Disabilities*, *Focus on Autism and Other Developmental Disabilities*, *Journal of Applied Behavior Analysis*, *Journal of Early Intervention*, *Journal of Positive Behavior Intervention*, and *Topics in Early Childhood Special Education*. Finally, after reviewing the retrieved articles, an archival search was conducted. These searches produced 28 articles in which components of milieu therapy were the primary intervention for increasing communication in children, of which eight included children with autism spectrum disorders. The following criteria were used for inclusion in this review: (a) at least one participant of the study was a child with an autism spectrum disorder diagnosis, (b) the

TABLE 1

Characteristics of the Study Participants of Milieu Therapy

| <i>Study</i> | <i>N</i> | <i>CA*</i> | <i>LA*</i> | <i>MA*</i> | <i>M</i> | <i>F</i> | <i>Diagnosis</i> | <i>Prior Speech Level</i> |
|--|----------|----------------|----------------|----------------|----------|----------|------------------|---|
| Charlop, Schriebman, & Thibodeau (1985) | 7 | 5.1–10.9 | N/A | U–6.1 | 7 | | Autism | 2-Nonverbal; 5-Echolalic |
| Charlop & Walsh (1986) | 4 | 6–8.8 | N/A | 3.6–6.2 | 4 | | Autism | 2-Echolalic 1-Limited speech 1-Extensive speech |
| Hancock & Kaiser (2002) | 4 | 2.9–4.5 | 1.7–2.2 | N/A | 3 | 1 | Autism | Limited speech |
| Johnson, McDonnell, Holzwarth, & Hunter (2004) | 1 | 8 | N/A | N/A | | 1 | Autism | Limited speech |
| Laski, Charlop, & Schriebman (1988) | 8 | 5–9.6 | N/A | 1.7–3.1 | 7 | 1 | Autism | 4-Nonverbal 4-Echolalic |
| McGee, Krantz, Mason & McClannahan (1983) | 2 | 12.6–15.8 | N/A | 5–5.7 | 1 | 1 | Autism | Limited speech |
| McGee, Krantz, & McClannahan (1985) | 3 | 6–9 | 3.0–5.7 | 2.2–5.3 | 3 | | Autism | Limited speech, often echolalic |
| Ross & Greer (2003) | 5 | 5.5–6.9 | N/A | N/A | N/A | | Autism | Limited speech |
| Total | 34 | <i>m</i> = 7.3 | <i>m</i> = 2.8 | <i>m</i> = 3.9 | 25 | 4 | | |
| Range | | (2.9–15.8) | (1.6–5.7) | (2.7–6.2) | | | | |

Note. CA = chronological age; LA = language age; MA = mental age; N/A = not available; U = untestable; func. = functional; M = male; F = female; *m* = mean

* age in years

primary intervention involved at least one of the identified milieu therapy techniques, and (c) the primary intervention was to increase communication in children.

The eight articles that met the criteria were reviewed to determine the effectiveness of milieu therapy with children with ASD. Particu-

larly, the studies were analyzed to determine the characteristics of the study participants, research setting, behavior, interventions, research designs, reliability, treatment fidelity, and major findings across studies are provided. These data are presented in Tables 1, 2, 3, and 4.

TABLE 2

Characteristics of the Environment of Milieu Therapy

| <i>Study</i> | <i>Therapy Implementer</i> | <i>Therapy Training Location</i> | <i>Description of Location</i> |
|-------------------------|----------------------------|----------------------------------|---|
| Charlop et al. (1985) | Researcher | Separate class | Partitioned area of classroom and clinic room |
| Charlop & Walsh (1986) | Researcher/Parent | Typical play area | Play room w/toys, outside in grass area |
| Hancock & Kaiser (2002) | Parent | Separate class | Clinic room |
| Johnson et al. (2004) | Paraprofessional | Classroom | N/A |
| Laski et al. (1988) | Primary caretaker* | Home | Various rooms of typical home |
| McGee et al. (1983) | Teacher | Group Home | Various rooms of typical home |
| McGee et al. (1985) | Teacher | Classroom | Typical classroom |
| Ross & Greer (2003) | Teacher | Classroom | Typical classroom |

Note. N/A = not available.

* Primary caretaker is a resident home parent

TABLE 3

Research Designs and Interventions of Milieu Therapy

| <i>Study</i> | <i>Research Design</i> | <i>Milieu Procedures</i> | <i>Dependent Measures</i> | <i>Communication Skill</i> |
|-------------------------|--|--|---------------------------|--|
| Charlop et al. (1985) | Multiple baseline Across participants | Time delay (2s–10s) | CS | Basic needs (e.g., “I want _____”) |
| Charlop & Walsh (1986) | Multiple baseline Across participants | Time delay (2s–10s), Model/Correct, and Mand/Model/ Correct | CS | Emotion phrase (i.e., “I like you”) |
| Hancock & Kaiser (2002) | Multiple baseline Across participants | Time delay (N/A), Mand/Model/Correct | CS | MLU |
| Johnson et al. (2004) | Multiple baseline Across CS | Time delay (4s), Model/Correct | CS | Basic needs (Use of device to request help, break, and snack) |
| Laski et al. (1988) | Multiple baseline Across participants | Mand/Model/Correct | CS | Basic needs (i.e., “I want car”); Description (i.e., “Block is big”); and Questions (i.e., “What do you want?”) |
| McGee et al. (1983) | Multiple baseline Across sets of objects | Incidental teaching | CS | Receptive labeling of objects |
| McGee et al. (1985) | Multiple baseline Across participants and pairs of prepositions | Incidental teaching | CS | Pairs of prepositions (on/ under, inside/next to, and in front of/in back of) |
| Ross & Greer (2003) | Multiple baseline Across participants | Time delay (5s), Mand/Model/Correct | CS | Basic needs/Vocal limitations |

Note. MLU = mean length of utterance; N/A = not available; CS = communication skill

Results

Characteristics of Study Participants

The majority of researchers reported gender along with chronological and mental ages, with only two research teams reporting language age. Twenty-five out of 34 (74%) of the participants were male; four (12%) were female, and the gender of five participants (14%) (Ross & Greer, 2003) were not reported. As shown in Table 1, participants ranged in age from 2.9 to 15.8 years, with the average age being 7.3 years. Mental age was not reported consistently across studies. The authors of one study reported IQ scores with a range of <50 to 95, with an average of 61 (Hancock & Kaiser, 2002). The authors of five other studies reported a mental age score with a range of 2.7 to 6.2 years, with an average of 3.9 years. Language/communication age was

reported for two studies with a range of 1.6 to 5.7, with an average of 2.8 years. Participants differed in their language levels prior to the studies, with all participants reported to have diagnoses of ASD. Of the prior speech levels reported for 20 participants, nine participants (9/20, 45%) demonstrated echolalia (i.e., repeated phrase over and over), four participants (4/20, 20%) were nonverbal, and six participants (6/20, 30%) had limited speech (i.e., one to two word phrases requesting basic needs such as food), one individual (1/20, 5%) had extensive speech and spoke spontaneously.

Characteristics of Research Setting

The type of settings the studies were conducted in was similar across the majority of the studies. Most studies were conducted in the

TABLE 4

Major Findings of Milieu Therapy

| <i>Study</i> | <i>TxF</i> | <i>IR</i> | | <i>Results</i> | <i>Gen.</i> | <i>Main.</i> |
|-------------------------|------------|--------------------|---|---|-------------|--------------|
| | | <i>Reliability</i> | <i>How Reported</i> | | | |
| Charlop et al. (1985) | High | 98% | By trial and blocks of 10 | All acquired CS within 60 trials | I, R, S | Y |
| Charlop & Walsh (1986) | High | 100% | # of correct responses per day | 2-CS quickly increased to criteria level 2-met criteria after time delay procedure | S | Y |
| Hancock & Kaiser (2002) | High | N/A | % of opportunities, MLU diversity, and PPVT-R | % of opportunities w/correct response increased, MLU increased | P, S | Y |
| Johnson et al. (2004) | High | 97–100% | % of correct responses | Help (100%), break and snack (80–100%) | I | Y |
| Laski et al. (1988) | Low | 79–98% | % of intervals | All children increased % of intervals in which vocalized | S | Y |
| McGee et al. (1983) | High | 94–100% | % of correct responses | 75–100% for all sets of objects for both participants | S, A | Y |
| McGee et al. (1985) | High | 87–100% | % of correct responses | 90–100% | S, A | Y |
| Ross & Greer (2003) | High | 89–100% | % of correct responses | 20–100% range, all increased dramatically from baseline | N | Y |

Note. Tx = treatment; CS = communication skills; TxF = treatment fidelity; IR = interrater; Gen. = generalization; Main, = maintenance; Y = yes; N = no; S = settings; P = Parents; I = items; A = activity

child’s natural environment (i.e., home and community setting) and the change agents included individuals who naturally interact with the target child (e.g., parents, teachers).

Trainers. As shown in Table 2, teachers, paraprofessionals, and parents implemented the majority of milieu therapy training. Only one study (12.5%) involved a researcher as the sole implementer, which was one of the earlier investigations with milieu therapy techniques (Charlop, Schriebman, & Thibodeau, 1985).

Training sessions. The majority of trainers conducted training sessions in the natural environment. For example, 75% (i.e., 6/8 studies) of the studies occurred in the target child’s natural environment, that is, two studies were conducted in homes and four in classroom settings. However, two studies (2/8,

25%) were conducted in settings that were not the child’s natural environment. For example, Charlop and colleagues (1985) conducted their study in clinic rooms arranged like classrooms and partitioned areas of classrooms while Hancock and Kaiser (2002) conducted sessions in a playroom in a university setting. However, Hancock and Kaiser then measured generalization in the home and demonstrated that three out of four children generalized training from the university’s playroom to the children’s respective homes.

Characteristics of Target Behavior, Interventions, and Research Designs

Researchers implemented various milieu therapy techniques to address the varied communication skill deficits demonstrated by partic-

ipants. Differences identified across the studies can be organized in the following categories: (a) targeted communication skills taught (i.e., behavior), (b) interventions (i.e., milieu procedures used), and (c) research designs.

Target behaviors. Since communication levels of participants varied, researchers taught different communication responses (i.e., behavior) to various participants and focused on a variety of communication skills across studies (see Table 3). These included basic need phrases (e.g., I want snack); emotional phrases (e.g., I like you); descriptive phrases (e.g., Block is big); pairs of prepositions (e.g., on, under); questions (e.g., What do you want?); receptive labeling (e.g., handing correct food item to teacher); and increases in the mean length of utterance (i.e., number of words spoken together in one phrase). As shown in Table 3, basic need phrases were taught to a higher percentage of participants (62%, 21 participants), while receptive labeling was taught to only two participants (6%). For example, Charlop et al. (1985) taught seven participants to say, I want cookie. Also, Ross and Greer (2003) taught five participants to say, cookie.

Interventions. Researchers used various milieu therapy techniques to address the communication difficulties of the participants in their respective studies. Typically, one or more of the following milieu techniques were used: (a) model/correct, (b) mand/model/correct, (c) time delay, or (d) incidental teaching. The strategies varied across studies. However, the majority of researchers used time delay and/or the mand/model/correct technique (i.e., 6/8, 75%). As shown in Table 3, time delay was used to teach twenty-one participants (62%) communication skills. For example, Charlop et al. (1985) used a 2s to 10s time delay and Johnson et al. (2004) used a 4s time delay to teach communication skills. Similarly, twenty-one participants (62%) were taught using the mand/model/correct technique. Laski, Charlop, and Schreibman (1988) used mand/model/correct to teach basic need phrases, description phrases, and questions. Also, Charlop and Walsh (1986) used mand/model/correct to teach emotional phrases. Further, time delay and mand/model/correct were used simultaneously for

13 participants (38%). For example, Hancock and Kaiser (2002) and Ross and Greer (2003) used both techniques to teach communication skills. In contrast, only one participant (3%) was taught using the model/correct technique, which was done by Johnson et al. simultaneously with a 4s time delay.

Research designs. In the studies reviewed, all researchers used a multiple baseline single subject methodology to evaluate the effectiveness of the milieu therapy intervention. The baseline phases in the studies were across participants, communication skills, and/or sets of objects. As shown in Table 3, five of eight (62.5%) research teams analyzed the intervention using a multiple baseline across only participants, one (12.5%) research team analyzed the intervention using a multiple baseline across only communication skills, one (12.5%) research team analyzed the intervention using a multiple baseline across participants and communication skills, and one (12.5%) research team analyzed the interventions using a multiple baseline across sets of objects (i.e., receptive language where children chose the correct object).

Major Findings

Regardless of the milieu strategies used, research teams reported similar findings, in that they were all successful in teaching children with ASD communication skills regardless of the combination of techniques used or the communication skills targeted. Further, the majority of the children with ASD participating in these studies generalized their communication skills across people and/or settings.

As shown in Table 4, the success of milieu therapy was demonstrated by an increase in targeted communication skills for all 34 participants. For example, Charlop et al. (1985) noted that all seven participants in their study achieved the targeted communication skills at 90% accuracy or higher. In another study, Hancock and Kaiser (2002) noted that all four participants mean length utterance (MLU) and diversity of words (i.e., nouns and verbs) increased following training. Similarly, McGee, Krantz, and McClannahan (1985) noted that all three participants achieved targeted communication skills. In addition to increasing targeted communication skills in the train-

ing setting, several researchers noted that these skills generalized. For example, Charlop and colleagues noted that six participants (86%) generalized communication skills to untrained objects and two participants (29%) generalized the communication skills to unfamiliar settings. Similar to the Charlop et al. study, generalization to another setting occurred in a study conducted by Hancock and Kaiser (2002). However, three participants (75%) generalized communication skills to another setting as compared to only 29% for the Charlop et al. study. One explanation could be because Hancock and Kaiser included the mand/model/correct technique in their study. Additionally, the parent conducted the trainings (see Table 4). In addition, McGee et al. noted that all three participants achieved generalization to another classroom after acquisition was achieved during teaching sessions.

Similarly, several researchers noted maintenance of targeted communication skills. For example, Hancock and Kaiser (2002) demonstrated that increases in target language were maintained for the four children in their study as indicated through follow-up observations conducted six months after the study ended. Similarly, Ross and Greer (2003) demonstrated that all participants in their study showed maintenance of vocalization skills during a follow-up probe three months after the study was completed.

Reported Reliability and Treatment Fidelity

Research results would be compromised unless the procedures were implemented with fidelity and observations were reliable. Fortunately all research teams with the exception of Laski et al. (1988) reported high treatment fidelity (i.e., consistence of implementation of the methods and procedures of treatment) within their prospective studies. The research teams reported that treatment fidelity was high based on direct observations. However, research teams did not report a percentage of steps completed correctly and simply stated that the treatments were implemented with high fidelity without providing the treatment data. They also reported high inter-rater reliability. For example, Charlop et al. (1985) reported reliability of 98% or greater for all

behavioral categories. Similarly, Johnson et al. (2004) had an average reliability of 99%, with a range of 97 to 100%. The other studies had similar findings.

Discussion

Children with ASD have significant impairments that influence their daily functioning. Two interrelated impairments typically exhibited are deficits in appropriate communication and behavior. Children with ASD typically have deficits in appropriate use of functional communication skills and often engage in challenging behaviors that serve a communicative function (Sigafoos, 2000). In an attempt to address communication and behavioral needs, researchers independently have addressed one or both of these problems.

Milieu therapy is an area of research that has focused on the development of communication skills, without attention to behavioral challenges. Milieu therapy is an approach researchers have used to improve communicative functioning of children with ASD. Researchers in this area have focused primarily on increasing targeted communication skills. They have investigated the effects that techniques such as time delay and incidental teaching have on the communication of children with ASD. As researchers examined milieu therapy, they successfully implemented the milieu intervention strategies in the natural environment, which resulted in an increase in communication skills. Although milieu therapy research has produced positive child outcomes, there are a few limitations. The strengths and limitations will be discussed next.

Strengths

Several strengths of milieu therapy are evident. First, various techniques such as time delay (Johnson et al., 2004) and mand/model/correct (Ross & Greer, 2003) have produced positive results such as increasing the response variation of children's communicative skills (Warren & Gazdag, 1990; Yoder & Warren, 2002). For example, Hancock and Kaiser (2002) showed an increase in the MLU (complexity) and vocabulary (diversity) of children with ASD. Second, the majority of

the milieu therapy research has been conducted in the children's natural environment. Six out of eight (75%) studies were conducted in a natural environment. Third, parents and teachers have demonstrated the ability to be effective natural change agents using milieu therapy (7 out of 8, 88%, research studies reviewed). For example, a mother implemented milieu therapy interventions in a study conducted by Hancock and Kaiser (2002). In a study conducted by Ross and Greer (2003), a teacher implemented the milieu therapy interventions. Finally, researchers consistently have demonstrated that communication skills taught to children with ASD using milieu therapy procedures generalize to other people and settings (McGee et al., 1985) and have greater maintenance than discrete trial procedures (Miranda-Linne & Melin, 1992).

Limitations

Although milieu therapy researchers have demonstrated numerous strengths of this intervention, a few limitations should be addressed. First, researchers have not evaluated milieu therapy's effects on challenging behavior. Research consumers do not know if improvements in challenging behavior occurred, which may affect decisions of consumers who are looking for comprehensive interventions. Second, there is a paucity of milieu therapy research involving peers of children with ASD. Researchers have not examined generalization to peers or training of peers. As shown in Table 4, although generalization occurred for seven of the eight studies, generalization was not checked to peers. The majority of generalization was done for items and settings. Thus, the social network (i.e., individuals that communicate and/or socialize with the child) of the children with ASD remains limited.

Implications for Researchers and Practitioners

Since one of the goals of education is to improve the quality of life for the child, research and training should address multiple domains and occur across settings and people. When considering this and the aforementioned strengths and limitations described of the mi-

lieu therapy literature, a logical extension of the milieu therapy research is to examine the connection to challenging behavior and the involvement of peers with children with ASD.

Connection to Challenging Behavior

As described previously, milieu therapy researchers have not systematically analyzed the relation between acquisition of communication skills and challenging behavior. One question for future researchers to consider is whether challenging behaviors continue to decrease across settings as the child's communication repertoire increases? The field cannot conclude what influence if any that milieu therapy has on children's challenging behavior, particularly for children with ASD.

The connection between milieu therapy and challenging behaviors can be accomplished by measuring the frequency and/ or duration of challenging behaviors after the implementation of milieu therapy interventions. For example, as a child's communication increases, the researchers may examine if the challenging behavior typically observed diminishes. The researchers also may measure the challenging behavior as they train parents and teachers who then implement the interventions in the classroom. In addition, the researchers may examine the effects the inclusion of peers in the milieu therapy interventions has on challenging behaviors.

Involvement of Peers

The communication between children with ASD and their age appropriate peers is needed to increase the social network of children, which can help lead to an improvement in their overall quality of life (Koegel & Koegel, 2006). Researchers can address the communication between children with ASD and peers by checking for generalization to peers and involving peers in interventions with children with ASD. As aforementioned, the majority of studies checked for generalization to adults. The researchers did not analyze whether the communication skills obtained by the children with ASD generalized to peers or the effects on the overall social interaction between children with ASD and their peers. It is important for children with ASD to have

regular and planned interactions with peers (Koegel & Koegel, 2006). Researchers and practitioners may schedule these interactions with peers to check for the generalization of learned communication skills obtained with milieu therapy interventions. Merely placing a child with ASD in the same place as typically developing peers, however, does not ensure acquisition of social and communication skills (Wagner, 1999).

Involving peers in other ways than checking for generalization also may prove beneficial in improving the overall quality of life for children with ASD (Lee & Odom, 1996; Royers, 1996). Including peers as part of the intervention is recommended by numerous researchers and clinicians who work with children with ASD (Koegel, & LaZebnik, 2004; Shaked & Yirmiya, 2003; Tager-Flusberg, 2003). Researchers can involve peers in the intervention at the child's school and home.

School. One way this inclusion can be accomplished is embedding interests of children with ASD in classroom activities and subsequently teaching the children to mand for the interests, thus enhancing communication. The children with ASD may be paired with other children in activities where they must mand for the interests. The peer also must request items, thus, modeling the reciprocity of communication and social interactions. For example, a child with ASD may have a restricted interest of cars. The peer may play with a toy car and require the child with ASD to request the car. After the child with ASD plays with the car for a period of time, the peer would request to play with the car. Prior to beginning, the teacher should train the peers how to respond to requests for items and request items from their peers with ASD. During the interactions, the teacher may need to prompt the children with ASD and their peers while reinforcing both children for appropriately interacting.

In addition to including interests in activities, teachers may use routines in the classroom to teach mands. For example, during coloring activities, the students may mand for markers or other desired tangibles from their peers. Once again, teachers may need to prompt peers to use their initiation strategies to facilitate play with their peers with ASD.

While prompting, the teacher should deliberately fade assistance to allow students to interact as naturally as possible.

Home. Similar to involving peers in the interventions in the school, researchers may involve peers and siblings in the training with parents at home. Perhaps the most promising way to accomplish this in the home is through play activities. Since many children with ASD like swinging (Crollick, Mancil, & Stopka, 2006), the parent could arrange for the child with ASD and the peer to take turns pushing one another on the swing. For example, the child with ASD could request to get on the swing and then request to be pushed. Similarly, the peer would request access to the swing and to be pushed by the child with ASD. However, the child with ASD may first need to be taught how to push someone on the swing. When designing the interventions, it is important to choose activities that the child with ASD is physically capable of performing. During the play activities, parents may need to prompt peers to facilitate play with the child with ASD. The parent, however, should deliberately fade assistance to allow children to interact as naturally as possible. These type peer-mediated interventions in the school and home may be promising practices for increasing social and communication skills (Royers, 1996; Strain, Kohler, & Goldstein, 1996).

Conclusion

In summary, milieu therapy is one approach researchers have used to address the communication needs of children with ASD. As researchers investigated the use of milieu therapy with children with ASD, they provided interventions in natural environments where parents and/or teachers conducted the majority of training. When implementing various milieu therapy procedures across research studies, researchers demonstrated that children with ASD improved their communication skills. Although Sigafos (2000) has noted that poor communication skills and challenging behaviors in children with ASD are highly linked, this review found no mention of challenging behaviors in the milieu therapy literature. Thus, readers may acknowl-

edge that milieu therapy increases communication skills and for many individuals, generalizes to other adults, items, and settings when training is conducted in the natural environment. Future research teams should continue to train parents and teachers, while simultaneously addressing the connection to challenging behaviors and including peers in the interventions.

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A Community-Based Accommodation Program for Adults with Autism and Mental Retardation

Robert A. Fox and Casey A. Holtz
Marquette University

Amie M. Moist
Milestone, Inc.

Abstract: There is a paucity of treatment literature for significant and intractable behavior problems in adults with autism and mental retardation. Four adults with autism, severe to profound mental retardation, and serious, long-term behavior problems participated in an accommodation training program as an adjunct to more traditional behavioral and medical treatments. The accommodation program consisted of designing highly structured and predictable daily routines to reduce the impact of environmental factors that had previously resulted in behavior problems. Following three to six years of participation in the accommodation program, a significant treatment effect size was obtained for all participants. The benefits of this approach for improving the treatment-resistant problem behaviors and quality of life for adults with autism and mental retardation in a community-based setting are discussed as well as directions for future research.

Autism and mental retardation commonly co-occur with approximately 75-80% of persons with autism also having varying degrees of mental retardation (Fombonne, 1999; Honda, Shimizu, Imai, & Nitto, 2005). Despite the finding that autism represents a life long disorder for most individuals, there presently exists a paucity of research on adults with autism (Brereton & Tonge, 2002). In a review of studies that have followed individuals diagnosed with autism into adolescence and adulthood, Seltzer, Shattuck, Abbeduto, and Greenberg (2004) found that only 15% had favorable outcomes. The most important predictors of positive adult outcomes were a relatively high IQ and the development of some form of communicative speech before the age of six years (Stein et al., 2001). Consequently, the prognosis for adults with autism and severe to profound levels of mental retardation remains

relatively poor. For these individuals with more significant intellectual impairments, behavior problems are common, impact the quality of their lives, and pose a significant challenge for staff members who care for them in residential settings and day training placements (Van Bourgondien & Elgar, 1990). These challenging behaviors may include stereotypies such as arm flapping, pacing, and body rocking, compulsive and ritualistic behaviors, noncompliance, disruptive behaviors such as repetitive vocalizations, property destruction, self-injurious behaviors, and aggression (Dartnall, Holmes, Morgan, & McDougle, 1999; Matson, Benavidez, Compton, Paclawskyj, & Baglio, 1996).

Treatment studies of adults with autism and mental retardation are rare (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Residential treatment programs developed specifically for adults with autism have emerged only recently and research on their effectiveness is limited (Van Bourgondien, Reichle, & Schopler, 2003). In one 2½ year study of eight men with autism and mild to severe retardation who were placed in a group home employing the Treatment and Education of Autistic and related Communication Handicapped Children model (TEACCH; Van Bourgondien &

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Correspondence concerning this article should be addressed to Robert A. Fox, Department of Counseling and Educational Psychology, Marquette University, P. O. Box 1881, Milwaukee WI 53201-1881. E-mail: robert.fox@marquette.edu

Reichle, 1997), Persson (2000) reported improvements in interpersonal behavior, leisure skills, vocational behavior and independent functioning. However of the 18 areas assessed, 12 showed no significant changes from the beginning to the end of the study. Also, one subject was excluded from the study for aggressive behavior. In one of the only studies with a control group, Van Bourgondien et al. (2003) found that providing a highly structured program based on the TEACCH model significantly improved the quality of treatment provided for six adolescents and adults with autism and mental retardation. While the participants' adaptive skills did not improve significantly over the course of the study, there was a significant reduction in behavior problems with the exception of stereotypies, which increased.

Autism in adults with severe to profound mental retardation presents one of the most significant clinical challenges facing practitioners in community-based settings. The severity and chronic nature of behavioral problems in this population combined with the consensus that no single approach is the best for all individuals with autism (Volkmar et al., 2004), suggests that additional strategies are needed to improve the overall quality of life for these individuals. As one adjunct to current treatment programs that emphasize contingency management training, Huynen, Lutzker, Bigelow, Touchette, and Campbell (1996) proposed planned activities training that focused on the antecedents rather than the consequences of behavior problems. This training program, which involved teaching maternal caregivers how to provide their children with structure, engaging activities, rules, and feedback, successfully increased the caregivers' skills and led to improvements in the children's behaviors. Similarly, Fox (2003) proposed an accommodation approach for adults with mental retardation and intractable behavior problems. Accommodation involves structuring an individual's environment to prevent or lessen the occurrence of challenging behaviors. More specifically, the primary focus of this accommodation approach was to identify precursors to problem behaviors and then through a structured routine of activities and staff approach behaviors, to alter these antecedents in order to reduce or eliminate their impact on the individual. In this vein,

Duker and Rasing (1989) altered the physical environment for three males with developmental disabilities and autistic-type behaviors (age range 16–26 years). By reducing the variety of visual stimulation available in the treatment setting, the researchers reported a decrease in self-stimulatory behavior and an increase in on-task behavior; other behavior problems such as aggression, self-injury, and disruptions were unchanged. Brown (1991) recommended that for adults with autism and mental retardation, in addition to behavioral strategies such as differential reinforcement of other behavior, a highly individualized daily schedule broken into 15 minute time increments should be designed to accommodate each person's unique characteristics and needs. One of the purposes of this structure was to have the individuals learn to recognize their routine by the sequence of predictable events that they experienced each day.

The purpose of the present study was to pilot an accommodation program for four adults with autism, severe to profound mental retardation and significant behavior problems. These individuals had a long history of treatment for their behavior problems including behavioral strategies and for three individuals, psychotropic medications. Despite these treatment efforts, staff members consistently reported that when external (e.g., room changes, new staff, disrupted routine) or internal changes occurred (e.g., medication change, illness, injury), these individuals often responded with a significant escalation in behavior problems including physical aggression, property destruction, self-stimulatory behaviors, increased general agitation, increased activity levels and self-abuse. To better accommodate these persons, a separate treatment environment including individualized daily activity schedules was created to meet each person's unique needs. In addition, potential environmental disruptions were minimized and procedures to more sensitively monitor internal changes were implemented.

Method

Setting and Participants

The setting for this study was a pre-vocational day training program for 75 adults with severe

to profound mental retardation, all of whom also were receiving residential care services. The day program was divided into 12 training rooms, each with five to eight individuals, two to three staff members, and an instructor who was responsible for supervising four training rooms. One of these existing training rooms was designated for the new accommodation program which eventually would include four individuals and two staff members. The selection criteria used to determine eligibility for the accommodation program included: (a) a diagnosis of severe to profound mental retardation based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM IV; American Psychological Association, 2000); (b) a DSM IV diagnosis of autism; and c) a history of significant challenging behaviors that were difficult for staff to manage and often interfered with peers in the other training rooms. Of the 14 individuals who met these criteria, four were selected based on discussions with staff. Direct care and supervisory staff members selected participants who were the most disruptive to the individuals in the other training rooms and the most challenging to manage.

Kurt, a 54 year-old male, was diagnosed with autistic disorder and severe mental retardation (IQ = 20). He had a long history of engaging in self-injurious behavior (SIB) that primarily involved him hitting and slapping his face. His SIB was very severe and had caused blindness in one eye, some damage to the other eye, and a number of bruises to the face and ears. While a combination of behavioral strategies and psychotropic medications implemented over several years had successfully reduced the frequency and severity of these episodes, the SIB continued to regularly occur. A functional behavioral assessment had determined that common triggers for Kurt's SIB were changes in routine (new staff member, another individual having a behavior problem) and personal changes (medication dosage change, ear infections).

Paul, a 31 year-old male, was diagnosed with autistic disorder and profound mental retardation (IQ = 13) with additional characteristics consistent with hyperactivity and obsessive compulsive disorder. Prior to the present study, Paul would frequently run out of his training room and attempt to exit the facility.

Paul also exhibited SIB, slapping himself repeatedly. A functional behavioral assessment indicated that these behaviors appeared to help Paul avoid or escape from anxiety-provoking situations such as loud noises and excessive commotion, staff intruding in his self-defined space, and spending too much time in one confined setting.

Bill, a 34 year-old male with Down's syndrome, was diagnosed with autistic disorder and profound mental retardation (IQ = 10), with a significant hearing loss in one ear. Bill had a history of aggressive behaviors including hitting, kicking, and shoving others. He also destroyed property and threw objects. Observations conducted within a functional analysis framework indicated that these behaviors occurred when Bill did not want to follow a staff member's request, when his demands were not met immediately, or in response to another individual's aggressive behavior.

Chris, a 43 year-old male, was diagnosed with autistic disorder and profound mental retardation (IQ = 11) with additional characteristics consistent with obsessive compulsive disorder and pica. Previous treatment programs had successfully addressed a number of behavioral issues including smearing and ingesting feces and property destruction. An ongoing behavioral issue was Chris' agitated body rocking and twirling. He would sit on the floor in a crouched posture and rock back and forth or stand and spin in circles for extended periods of time. A functional analysis suggested that these behaviors were largely self-stimulatory in nature and also served to help Chris avoid participating in training activities. The frequency and long duration of these episodes clearly interfered with Chris' ability to benefit from the training offered at the pre-vocational setting.

Participants starting time in the accommodation program was staggered to lessen the potential disruption in the new program and allow sufficient time for the staff to meet each individual's needs. Kurt and Paul began the program at the same time, followed three months later by Bill, and 10 months later by Chris.

Accommodation Program

The overall goal in the design of the accommodation program was to create a highly pre-

dictable environment, tailored to the unique characteristics and preferences of each individual, in order to strengthen adaptive and pre-vocational skills and to prevent the onset of challenging behaviors. The training room was arranged to respect each individual's space and preferences. For example, one individual preferred to work in a cushioned rocking chair at a table located away from others. Another individual preferred to sit close to the door so he could observe people going by as he worked on his tasks. Precursors to each individual's behavior problem were identified and eliminated or minimized as much as possible. For example, one participant became upset if another individual was having a behavior problem. His resulting accommodation procedure was to temporarily remove him from the training room until the other individual's behavior issue was resolved. One participant would become agitated if someone entered his personally defined space, made eye contact and spoke in a loud voice. As part of his accommodation program, staff always said his name before approaching him, and then spoke to him in a soft voice without making significant eye contact. Another individual would become aggressive if he saw foods or liquids. Consequently, these items were not kept in the training room and when they were brought in as reinforcers or snacks, he was offered his first. In addition to these accommodation procedures, daily tasks such as self-care skills, sorting, collating, shredding paper, and recycling cans were chosen to promote the development of their adaptive and pre-vocational skills. Preferred individual activities such as listening to music, looking at magazines, and rocking in a chair also were selected based on staff's historical knowledge of the individuals and the completion of a reinforcement survey for each participant (Fox & DeShaw, 1993). Also, each individual had a contingency management program that had been developed by an interdisciplinary team to strengthen prosocial behaviors and reduce challenging behaviors in both home and day training settings. Finally, the normal, ongoing activities at the prevocational setting such as snacks, lunch, and outings, were included and tailored to each individual's preferences (e.g., eating in a quiet setting, sitting in a favorite chair). All selected

tasks and activities were arranged within a highly structured daily routine, divided into 15 minute time segments that were rigorously adhered to. Posters displaying each individual's daily schedule were conveniently located for easy staff reference on the training room walls. The accommodation program was run year round, five days a week, from 8:30 a.m. to 2:30 p.m. Sample elements from each individual's accommodation program are provided below.

Kurt's accommodation program was designed to prevent SIB episodes. Staff felt this could be best accomplished by a predictable routine with tasks and activities that Kurt enjoyed. Following completion of pre-vocational tasks, Kurt was allowed to engage in a preferred activity such as bouncing a ball, sitting in a rocking chair, having a cup of coffee, or twirling a favorite towel. In addition, Kurt was given regular periods throughout the day when no demands were placed on him. An internal factor that contributed to Kurt's SIB was discomfort associated with wax build-up in his ears as well as ear infections. Consequently, a nurse checked his ears weekly and provided treatment (irrigation) when necessary.

Similar to Kurt, Paul's accommodation program was designed to prevent self-injury. Paul liked looking at magazines. Therefore, interspersed between prevocational tasks throughout the day, he was given the opportunity to look through a magazine. Paul also became quite anxious when he observed other individuals leaving the training room at the end of the day to return home. As a result, Paul's day was shortened and he was provided transportation home earlier than the others.

Bill's routine was designed to prevent the triggering of his aggressive behaviors. Like the other individuals, Bill's daily schedule was designed to provide him a predictable sequence of activities to strengthen and maintain his adaptive and pre-vocational skills. Throughout the day, when Bill completed each task in his daily routine such as washing hands, sorting items, and arts and crafts without resorting to pushing, hitting, kicking, or throwing items, he was rewarded with verbal praise and/or some form of sensory stimulation (battery-operated massager). As Bill had a history of fixating on battery-operated items and be-

coming aggressive when a staff member tried to retrieve one from him, Bill had access to only one such item and for a limited duration of time.

Chris, the individual with the agitated twirling and rocking behaviors, was given regular times interspersed throughout the day to spend engaging in sensory-stimulation activities such as holding a vibrating hand massager, listening to music, and sitting in a vestibular swing. He also had regular rewards for transitioning from one activity to another as these times had led to the spinning and rocking behaviors in the past.

Staff Training

The accommodation training room was staffed by two staff members with an instructor who supervised the classroom on an intermittent basis. The staff members were selected from the staff at the pre-vocational setting based on their proven ability to manage clients with challenging behaviors and a consistent attendance record. These staff members received specialized training that began with an overview of autism and its implications for working with these individuals. The rationale and procedures for the accommodation program were then reviewed. Next, each participant in the accommodation program, his daily schedule of tasks and activities, and details regarding how to best approach each individual to prevent and manage challenging behaviors were described in detail. The next training phase involved staff members learning to follow each individual's daily routine. This was accomplished through simulated exercises with a supervisory staff member role playing each participant in the accommodation program. As mentioned previously, posters were developed that showed the time and activity for each individual for the entire day. In addition, each individual had a daily data sheet that staff used to document task completion and program delivery as well as to record any challenging behaviors that occurred. These data sheets were also used to monitor the individuals' progress in the program and to make refinements in their daily schedules. For the next phase of training, staff members implemented the daily schedule with one individual while being shadowed by an instructor.

Once the staff member was comfortable implementing the daily program with one individual, other individuals were added until each staff member was familiar with the programs for all four individuals. In the final phase of training, the staff members independently implemented the accommodation program. During this phase, they were monitored several random times each week and provided feedback by the instructor for their consistency in following the individuals' daily schedules and for the accuracy and completeness of their data recording. In addition to ongoing staff meetings to discuss program implementation issues that arose, a monthly meeting was held with the consulting psychologist to assess program effectiveness and make any needed changes in the individuals' accommodation programs.

Behavioral Measures

The following specific challenging behaviors for each individual were identified to assess the effectiveness of the program: Kurt and Paul – episodes of SIB, each which often included several individual behavior incidents varying in severity; Bill – incidents of aggression including pushing, hitting, kicking, and throwing objects at others; and Chris – episodes of agitated rocking and body twirling which varied from less than a minute to several minutes in length. Prior research has demonstrated that training procedures and feedback increased the reliability of problem behavior recording in residential treatment facilities (Mazingo, Smith, Riordan, Reiss, & Bailey, 2006). Therefore, all of the individuals' behaviors were clearly defined for the staff members and a portion of the staff training included learning and demonstrating accurate behavior recording. The daily data sheets were used to record these behaviors. The baseline data was collected in each individual's original training room prior to entry into the accommodation treatment program. The same data was collected for each individual during their entire participation in the accommodation treatment program.

Results

The baseline period varied between 4 and 14 months depending on the individual's start-

TABLE 1

The average number of behavioral episodes for each individual for the baseline period and each year of participation in the accommodation treatment program.

| Person | Challenging Behavior | Baseline Period | | Treatment Program Years | | | | | | |
|--------|----------------------|-----------------|------|-------------------------|------|------|-----|-----|-----|-----|
| | | Months | Mean | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Kurt | Self-Injury | 4 | 28.0 | 23.6 | 27.8 | 28.6 | 3.4 | 8.9 | 0.0 | 0.0 |
| Paul | Self-Injury | 4 | 8.5 | 8.3 | 3.0 | 0.8 | 0.4 | 0.2 | 0.1 | 0.0 |
| Bill | Aggression | 7 | 2.0 | 3.5 | 1.8 | 3.0 | 1.6 | 1.1 | 0.0 | 0.0 |
| Chris | Rocking | 14 | 6.9 | 9.3 | 3.8 | 2.6 | 0.8 | 2.8 | 0.2 | 0.0 |

ing date in the accommodation treatment program. The treatment program and data collection continued for seven years. Baseline and treatment data for each individual’s behavioral measure is shown in Table 1. We also computed a treatment effect size by comparing each individual’s average baseline data with the average data obtained each year for the entire treatment period. The effect sizes were computed using the mean baseline reduction formula (Campbell, 2004), which is calculated by subtracting the mean behavioral episodes during each treatment year from the mean episodes during baseline and then dividing by the mean baseline episodes and multiplying by 100. There was a consensus among staff members that the criterion to establish a significant treatment effect should be set at an 80% reduction in the targeted behavior problem for each individual.

As shown in Table 1, Kurt’s SIB episodes remained frequent for the first three years he was involved in the accommodation program with monthly SIB episodes ranging from four to 58. At times, there were a number of factors that clearly contributed to Kurt’s increased agitation and related SIB including an ongoing adjustment to the new program, regular ear infections, medication changes, introduction of new staff members, entry of other individuals in the program, and change in schedule due to weather, among others. At others times, no contributing factors could be identified. Staff also reported that the nature of Kurt’s SIB was changing over time. He often entered the training room and would have an immediate SIB episode and then have no more incidents for the remainder of the day. Moreover, following the first few years in the

program, the staff considered the intensity of his SIB episodes as mild with no new injuries resulting from the SIB. Kurt met the 80% treatment effect size in his fourth year in the treatment program (effect size = 87.9 %). However, during the fifth year of treatment, his effect size reduced to 68.2%. For the final two years of treatment, Kurt achieved a 100% effect size. As shown in Table 1, Paul’s SIB showed minimal change during the first year of the program. During this initial adjustment period, he ranged from one to 19 SIB episodes per month. However, by the second year, his SIB reduced by 64.7% and he met the 80% criteria during his third year in the program. While occasional episodes continued to occur over the next three years, the frequency of SIB episodes reduced each year. By the seventh year in the program, Paul achieved a 100% reduction in his SIB. Bill responded to the accommodation program with an initial increase in aggressive behaviors. During baseline, his monthly incidents ranged from 0–5 but increased to 15 in his third month in the accommodation program. During the subsequent months, his incidents again decreased in frequency and severity. At the beginning of the third year of treatment, Bill had become increasingly agitated and difficult to manage. After a medical examination, staff found that Bill had a fractured bone which clearly contributed to his increased agitation and aggression. Over the next two years, the frequency of his aggression gradually decreased and staff consistently reported that his aggression was less intense and more easily managed when it did occur. Bill did not achieve the 80% treatment effect criterion until his sixth year in the program where he obtained a 100% reduction

in his episodes that also were maintained in the final year of the program. Like Bill, Chris initially responded to the accommodation program with an increase in his agitated rocking behaviors that staff reported as very difficult to redirect. After the first year in the program, his behaviors improved. Staff attributed the change to the incorporation of the vestibular swing to Chris' daily routine. Chris met the 80% treatment effect size in his fourth year in the treatment program (effect size = 87.9 %). However, during the fifth year of treatment, his effect size reduced to 59.4%. By year six, his effect size increased 97.1% and he finally achieved a 100% reduction in his agitated rocking in the seventh year in the program.

Discussion

The four individuals in this study were grouped in the same treatment setting to reduce disruptions to their daily routine. This approach of creating a separate treatment environment was consistent with other comprehensive treatment programs for adults with autism and mental retardation (Persson, 2000; Van Bourgondien et al., 2003). Using a pre-established criterion-based treatment effect size to assess the participants' progress in the accommodation program, all participants met the 80% problem behavior reduction criterion in three to six years. Moreover, all participants achieved a treatment effect size of 100% by the final year of the program. Participant age and severity of behavior appeared to contribute to the need for a prolonged treatment period. For example, Kurt was 54 and had a long history of very significant self-injury. A consistent, predictable and sustained treatment environment over a four year period was required to impact his chronic and resistant behaviors. Ongoing disruptions to the individuals' lives also prolonged treatment. While every reasonable effort was made to reduce disruptions to the individuals' daily routines, this was not always possible. An initial period of adjustment to the new treatment setting and procedures, staff member absences and vacations, participants' illnesses and injuries, and medical and dental appointments were just a few of the myriad of possible factors that could have contributed to the in-

dividuals' agitation and related behavior problems.

While the present study focused on behavior problems, other benefits accrued from the accommodation program. With improved behavior, individuals were now consistently meeting their goals for the prevocational training programs that were implemented as part of their daily routines. Also, we were able to introduce new training programs such as recycling aluminum cans and shredding paper within the daily routines. Direct care staff members also were motivated to participate in the program. These staff received special training and support through regular meetings to review the participants' progress in the program. Their input regarding how to improve the program was valued and over time, the staff assumed more ownership for the success of the accommodation program. The staff turnover rate for the accommodation program was lower than the rates for staff in the other training rooms. In fact the two primary treatment staff stayed with the program for most of its duration. In addition to high staff satisfaction in working in this training setting, they also consistently reported that the accommodation program was having a positive impact on the quality of life for the individuals who participated (e.g., improved affect, greater level of participation in activities, reduced severity of behavior problems).

There also were limitations in this pilot program. While Paul's behaviors showed a steady decline over each year in the program, the other three individuals each experienced a one year relapse where behavior episodes increased after significant reductions had occurred the previous year. While all individuals eventually achieved 100% behavioral reduction levels by the final year of the program, it is reasonable to conclude that in the absence of the accommodation program, their behavior problems would reoccur and perhaps over time could increase to baseline levels. In agreement with Van Bourgondien et al. (2003), it makes sense to consider the accommodation program as a prosthetic device that "helps individuals with autism compensate for their deficits (similar to glasses or hearing aides)" (p. 139). As such, it may be necessary to continue this program indefinitely at least

for some individuals in order to maintain the highest quality of life possible for them.

The program evaluation format that was used to assess the impact of the accommodation program also had inherent limitations. For example, inter-rater reliability data was not collected on the behavioral measures. However, given that the behavior measures addressed clearly defined behavior problems that usually required staff intervention, we have confidence that our data were accurate. We also did not include a return to baseline condition or a control group. Both of these desirable research design features were not considered appropriate for this community-based treatment program. Also, given the severity of the behaviors we were treating, a return to baseline condition did not seem clinically prudent. Future studies that assess this accommodation treatment should consider using a multiple baseline design across individuals or settings to establish better research control. The latter design also would help determine whether the positive effects of this program generalized to other settings that the individuals experience (e.g., residence). Anecdotal evidence suggested that this generalization across settings did occur for our participants. Future research also needs to expand the outcome measures used to include changes in adaptive and other prosocial behaviors, prevocational skills, and staff and guardian satisfaction measures, to name a few. For now, the present study provides beginning evidence that accommodation is a promising adjunctive treatment to traditional contingency management and psychotropic medication treatments. In addition, this program can be implemented by direct care staff in community-based agencies and have a positive impact on adults with autism and mental retardation.

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Presenting Chained and Discrete Tasks as Non-Targeted Information When Teaching Discrete Academic Skills through Small Group Instruction

Karen Jones Falkenstine
Woodford County Schools

Belva C. Collins, John W. Schuster, and Harold Kleinert
University of Kentucky

Abstract: Special education teachers often search for effective strategies to teach a variety of skills to students with moderate to severe disabilities through small group instruction. The investigators examined the acquisition of academic skills as well as chained and discrete tasks presented as nontargeted information by a small group of students with moderate to severe disabilities. The investigators assessed each student's acquisition of targeted stimuli, acquisition of discrete and chained nontargeted information presented through instructive feedback, and observational learning of targeted tasks and discrete and chained nontargeted information presented to other students in the group and found that the students each learned their targeted tasks as well as much of the nontargeted information.

Special education teachers often search for effective strategies to teach academic skills to students with moderate to severe disabilities. Systematic instruction using response prompting strategies, such as progressive or constant time delay, system of least prompts, or simultaneous prompting, decreases errors (thus increasing access to reinforcement) and promotes independence by only providing assistance when it is needed. There is evidence that response prompting strategies have been effective in teaching a variety of skills to students with moderate to severe disabilities in both one-to-one and small group formats (Wolery, Ault, & Doyle, 1992). Teaching in a small group format is advantageous because it makes efficient use of teacher time by deliver-

ing instruction to two or more students at the same time and allows the opportunity for students to learn from each other through observation (Collins, Gast, Ault, & Wolery, 1991). In addition to encouraging observational learning, the efficiency of instruction also can be increased by the addition of nontargeted information as instructive feedback (Werts, Wolery, Holcombe, & Gast, 1995) because this practice also increases the amount of learning that may occur. This type of nontargeted information can be placed in the antecedent (e.g., Roark, Collins, Hemmeter, & Kleinert, 2002), in the prompt hierarchy (e.g., Doyle, Schuster, & Meyer, 1996), or in the consequent event (e.g., Wolery, Schuster, & Collins, 2000) of the instructional trial.

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Correspondence concerning this article should be addressed to Dr. Belva C. Collins, University of Kentucky, Department of Special Education and Rehabilitation Counseling, 229 Taylor Education Building, Lexington, KY 40506-0001. Email: bcoll01@email.uky.edu

There is evidence that students with disabilities can acquire both discrete and chained targeted and nontargeted information that is presented during systematic one-to-one instruction. For example, Roark et al. (2002) used a constant time delay procedure to teach 4 students with multiple disabilities the targeted discrete task of receptively identifying grocery words. In addition, they provided manual signs as discrete nontargeted information included as instructive feedback in the

task direction. Three of the students acquired the targeted task, and the fourth student was making progress on the task when the investigation ended. All of the students acquired some of the nontargeted information to which they had been exposed. Smith, Collins, Schuster, and Kleinert (1999) used a system of least prompts procedure to teach 4 secondary students with moderate to severe disabilities the chained task of cleaning tables. In addition, they provided an opportunity for the students to observe the chained tasks of the instructor getting out and putting away the materials needed to the clean tables as nontargeted information. All of the students acquired the targeted task. They also acquired the ability to perform some of the nontargeted tasks through observational learning. In both of these investigations, the acquisition of the nontargeted information meant that the instructor would have less to teach in the future. This has been substantiated by Wolery et al. (2000) who demonstrated that students with disabilities acquire targeted information more quickly when they have had previous exposure to its presentation as nontargeted information.

In addition to acquiring nontargeted information in one-to-one instruction, there also is evidence that students with disabilities can acquire both targeted and nontargeted information that is presented during systematic small group instruction (Collins, Branson, & Hall, 1995; Collins & Stinson, 1995; Fickel, Schuster, & Collins, 1998; Schuster, Morse, Griffen, & Wolery, 1996; Whalen, Schuster, & Hemmeter, 1996). Including nontargeted information in a small group format has the added advantage of allowing students to acquire additional information that is inserted in their own targeted tasks as well as nontargeted information that is inserted in the targeted tasks taught to others in the group. If students in the group are taught the same tasks including the same nontargeted information, observational learning increases the potential for a quicker rate of learning to occur. If students in the group are taught different tasks including different nontargeted information, observational learning increases the potential for a greater amount of learning to take place. For example, Fickel et al. (1998) use a simultaneous prompting procedure to teach differ-

ent discrete tasks to a small heterogeneous group of middle school students; three of the students had disabilities (i.e., mild disability, moderate disability, and severe disability), and one of the students did not have a disability. With the students seated around a table, the instructor taught a different task to each student (i.e., identification of states, math facts, identification of picture symbols, and identification of national flags). All 4 students acquired their targeted tasks with a high rate of maintenance and generalization. Through observational learning, all of the students also acquired and maintained some of the nontargeted tasks taught to other students in the group.

In summary, students with disabilities have acquired skills taught with systematic instruction (e.g., progressive or constant time delay, system of least prompts, simultaneous prompting) in both one-to-one and small group formats. In addition, the efficiency of instruction has been increased when students have acquired discrete nontargeted information inserted as instructive feedback during the delivery of instructional trials (e.g., inserted in the task direction, prompt level, or consequence). The efficiency of instruction also has been increased when students have acquired discrete or chained nontargeted information through observational learning. To date, nontargeted information included as instructive feedback during the presentation of instruction has been limited to the presentation one or two discrete skills. No investigations have included chained tasks as instructive feedback; in addition, no investigations have included chained tasks in conjunction with discrete skills as instructive feedback. Therefore, the purpose of this investigation was to increase the efficiency of instruction by adding both discrete and chained nontargeted information as instructive feedback during instruction on targeted tasks and by encouraging observational learning by presenting targeted tasks and nontargeted information in a small group format. Thus, the investigation addressed the following questions:

1. Will a CTD procedure be effective in teaching discrete academic skills to secondary students with moderate to severe disabilities?
2. When taught in a small group setting,

- will the students demonstrate observational learning of their peers' targeted stimuli?
3. Will the students learn chained tasks presented in the consequent event as non-targeted information?
 4. Will the students learn discrete tasks presented in the consequent event as non-targeted information?
 5. Will the students learn the chained non-targeted information of other students through observation?
 6. Will the students learn the discrete non-targeted information of other students through observation?
 7. Will the students maintain targeted stimuli?
 8. Will the students generalize targeted stimuli?

Method

Participants

Students. Three students with moderate disabilities participated in this investigation. The students were part of a program for students with functional mental disabilities (i.e., moderate to severe disabilities) in a secondary school. As part of the program, the students were paired with various peers without disabilities throughout the day to attend general education classes, to participate in school-based activities (e.g., homeroom, lunch, pep rallies), to participate in community-based instruction, and to work on life skills in a resource room. A special education teacher managed this program, trained the peers without disabilities, monitored ongoing data collection, and conducted direct instruction, as needed. The teacher selected the students to participate in this investigation based on their potential for benefiting from the proposed instruction, their availability to participate in small group instruction within their daily schedule, and her ability to obtain permission from their parents. Each of the participants qualified for and was included in the alternate portfolio assessment conducted by the state.

Susan was a 16-year-old female with a moderate mental disability determined by a Full Scale IQ score of 42 on the Wechsler Preschool and Primary Scale of Intelligence–

Revised (Wechsler, 1989). Susan's IEP annual goals included the following academic and community objectives: (a) demonstrating verbal and rote counting to 50, (b) computing math problems using a calculator, (c) answering five comprehension questions after reading a five-sentence paragraph, (d) verbally defining the definitions of 30 words, (e) asking for directions when lost, (f) reading money amounts up to \$10.00, (g) making eye contact when speaking with someone, and (h) initiating conversation throughout the school day. Susan's strengths included, but were not limited to, counting from 1 to 50, writing her first and last names, and brushing her teeth. Her weaknesses included writing numbers in the wrong order, writing letters backwards, and initiating tasks only after repeated directions. Susan received physical and occupational therapy on a consultation basis and sang in the school choir.

Tim was 16-year old male with a moderate mental disability determined by a Full Scale IQ score of 49 on the Wechsler Preschool and Primary Scale of Intelligence–Revised (Wechsler, 1989) and 47 on the Wechsler Intelligence Scale for Children–Third Edition (Wechsler, 1992). Tim's IEP annual goals included the following independent living, academic, and vocational objectives: (a) identifying safety signs, (b) identifying emergencies and how to react, (c) planning three nutritious meals and snacks for one day, (d) calculating the amount of change to receive back from a purchase, (e) reading sight words and abbreviations, (f) purchasing items using the next dollar strategy, (g) calculating the discounted price from coupons, (h) identifying jobs where he met qualifications, (i) increasing on-task attention, (j) following a five-step task directions, and (k) completing a job application. Tim's strengths included, but were not limited to, writing in cursive, computing complex addition problems, staying on task during academic and recreation tasks, and completing daily living skills. His weaknesses included displaying inappropriate behavior to gain attention and occasionally talking inappropriately to peers. Tim received speech therapy and was included in a general education class.

Alex was 16-year old male with a moderate mental disability determined by a Full Scale

TABLE 1

Specific stimuli per set presented to Susan

| | <i>Targeted Stimuli</i> | <i>Nontargeted Information</i> | |
|-------|-------------------------|--------------------------------|-----------------|
| | | <i>Discrete</i> | <i>Chained</i> |
| Set 1 | 9:45 | Quarter until 10 | Set wrist watch |
| | 12:45 | Quarter until 1 | Set wrist watch |
| | 6:15 | Quarter after 6 | Set wrist watch |
| | 7:30 | Half past 7 | Set wrist watch |
| | 5:45 | Quarter until 6 | Set wrist watch |
| Set 2 | 12:30 | Half past 12 | Set wrist watch |
| | 6:45 | Quarter until 7 | Set wrist watch |
| | 1:15 | Quarter after 1 | Set wrist watch |
| | 2:30 | Half Past 2 | Set wrist watch |
| | 5:15 | Quarter after 5 | Set wrist watch |
| Set 3 | 9:15 | Quarter after 9 | Set wrist watch |
| | 10:30 | Half past 10 | Set wrist watch |
| | 8:15 | Quarter after 8 | Set wrist watch |
| | 3:15 | Quarter after 3 | Set wrist watch |
| | 4:45 | Quarter until 5 | Set wrist watch |

IQ score of 52 on the Wechsler Preschool and Primary Scale of Intelligence–Revised (Wechsler, 1989) and 49 on the Wechsler Intelligence Scale for Children–Third Edition (Wechsler, 1992). Alex’s IEP annual goals included the following independent living, academic, and vocational objectives: (a) identifying the parts of a utility bill, (b) identifying emergencies and how to react, (c) planning three nutritious meals and snacks for one day, (d) calculating the amount of change to receive back from a purchase, (e) reading a passage and answering comprehension questions, (f) calculating the amount of tax on a purchase, (g) calculating the discounted price from coupons, (h) identifying jobs where he met qualifications, (i) increasing attention on-task, (j) following a five-step task direction, (k) completing a job application, and (l) identifying the parts of a paycheck. Tim’s strengths included, but were not limited to, writing in cursive, figuring complex addition problems, staying on task during academic work, and completing daily living skills. His weaknesses included not initiating a leisure activity with a peer during free time, staying off-task during leisure activities, and requesting repeatedly to go to the bathroom or to get a drink of water throughout the school day.

Alex was included in a general education class.

Staff. The classroom teacher (first author) conducted all sessions. The instructional assistant in the life skills classroom assisted in collecting reliability data throughout the investigation. The teacher trained the instructional assistant to collect both dependent and independent variable reliability data.

Targeted Skills

The special education teacher selected the targeted academic skills for each student based on their interests and their IEP objectives. In selecting the skills shown in Tables 1–3, it was her goal that the acquisition of these skills would enable the students to be more independent and to appear more competent in the eyes of their peers when they were in general education settings, thus increasing the possibility for more social acceptance. For example, teaching Susan to tell time would enable her to follow daily schedules with more independence in school and community settings. In addition, teaching Tim to read arts and humanities words would prepare him to participate to a fuller degree in his inclusive class and would improve his

TABLE 2

Specific stimuli per set presented to Tim

| | | <i>Nontargeted Information</i> | |
|-------|-------------------------|---|-------------------------|
| | | <i>Discrete</i> | <i>Chained</i> |
| | <i>Targeted Stimuli</i> | | |
| Set 1 | artist | Someone who paints | Find word in dictionary |
| | canvas | A strong cloth used for painting | Find word in dictionary |
| | sculpture | A three-dimensional form of art | Find word in dictionary |
| | frame | A border around a picture | Find word in dictionary |
| Set 2 | palette | A board for artists to arrange their colors | Find word in dictionary |
| | dance | Moving your body to music | Find word in dictionary |
| | museum | A building to store historical objects | Find word in dictionary |
| | waltz | A ballroom dance | Find word in dictionary |
| Set 3 | exhibit | A display in a museum | Find word in dictionary |
| | ballet | A dramatic form of dance | Find word in dictionary |
| | painting | To put colors on a surface | Find word in dictionary |
| | colors | Different shades of paint like blue and red | Find word in dictionary |
| | performance | To act out a play | Find word in dictionary |
| | stage | A raised platform for performances | Find word in dictionary |
| | symbols | Objects, places, and things | Find word in dictionary |

score on his alternate portfolio assessment. Finally, teaching Alex to recognize geography terms would prepare him to participate in activities in his general education social studies class, especially those involving the interpretation of maps. Through collaboration with

their general education teachers, the special education teacher determined that the skills she selected for instruction were valued in the students' general education classes. The criterion for each targeted skill was 100% accuracy within 4 s for three consecutive sessions.

TABLE 3

Specific stimuli per set presented to Alex

| | | <i>Nontargeted Information</i> | |
|-------|-------------------------|--|------------------|
| | | <i>Discrete</i> | <i>Chained</i> |
| | <i>Targeted Stimuli</i> | | |
| Set 1 | IN | Capital of Indiana is Indianapolis | Spell state name |
| | SC | Capital of South Carolina is Columbia | Spell state name |
| | NC | Capital of North Carolina is Raleigh | Spell state name |
| | OR | Capital of Oregon is Portland | Spell state name |
| Set 2 | NJ | Capital of New Jersey is Trenton | Spell state name |
| | WV | Capital of West Virginia is Charleston | Spell state name |
| | VT | Capital of Vermont is Montpelier | Spell state name |
| | NY | Capital of New York is Albany | Spell state name |
| Set 3 | IL | Capital of Illinois is Springfield | Spell state name |
| | OK | Capital of Oklahoma is Oklahoma City | Spell state name |
| | RI | Capital of Rhode Island is Providence | Spell state name |
| | AK | Capital of Alaska is Juneau | Spell state name |
| | TN | Capital of Tennessee is Nashville | Spell state name |
| | AZ | Capital of Arizona is Phoenix | Spell state name |
| | VA | Capital of Virginia is Richmond | Spell state name |

Nontargeted Information

As shown in Tables 1–3, the teacher presented both chained and discrete information to all participants as instructive feedback during their instructional trials. In each case, the nontargeted information was related to the student’s targeted skill. Each chained or discrete nontargeted task selected for a student was one that the student could not perform. Other students in the group, however, may have been able to perform all or part of the tasks presented to each other.

The task analysis for setting a wristwatch included (a) pulling out the button on the side of the watch, (b) setting the hour hand, (c) setting the minute hand, and (d) pushing in the button on the side of the watch. The tasks analysis for using the dictionary included (a) finding for the first letter of a word at the top of a page, (b) finding for the second letter of a word at the top of a page, (c) finding for the third letter of a word at the top of a page, and (d) pointing to the word on the page. The task analysis for spelling a state name consisted of stating each letter of the word in sequential order (e.g., I-N-D-I-A-N-A).

It should be noted that some tasks can be considered as either discrete or chained based on the manner in which they are broken down for instruction and data collection. In this investigation, students had to state the time, state the entire definition, or state the name of a state capitol for the response to be considered correct. For this reason, these tasks were considered to be discrete. For the tasks of setting a watch, looking up a word in a dictionary, or spelling a state name, responses for each component of the task were counted as correct or incorrect until a student made an error. For example, a student could state three out of five letters correctly in spelling the name of state before making an error. For this reason, these tasks were considered to be chained. In each case, the task analyses were adequate for the skills that were performed.

Prerequisite Skills

Prior to the investigation, the teacher conducted student observations to assess the following prerequisite skills: (a) visual acuity,

(b) auditory acuity, (c) verbal imitation, (d) ability to follow directions, (e) ability to wait for a prompt, (f) attention to task for up to 10 min, and (g) ability to perform necessary skills. In addition, the teacher verified that each student had a record of consistent school attendance.

Instructional Setting and Arrangement

The teacher conducted all sessions at a small table in the special education resource room that the students attended each day to receive life skills instruction. During screening and probe sessions, the teacher worked with the participants in a 1:1 format. During instruction, maintenance, and generalization sessions, the teacher sat across from the students and presented massed trials to each student in a small group format. The participants periodically changed seats during each group session so that the target student always sat in the middle, giving the other participants a clear view of the student during instruction. To decrease distractions, an instructional assistant, an employment coordinator, or peer tutors worked with other students in other areas of the classroom. The number of additional students in the room was typically less than three.

Materials and Equipment

The teacher used an analog clock to teach time telling. To teach sight words and abbreviations, the teacher used 3 x 5 index cards with the letters handwritten with a black permanent marker. When presenting the nontargeted information, the teacher used a wristwatch and a dictionary. To assess generalization, the teacher used a digital clock, a map of the United States, and a typed reading passage.

Screening Procedures

Prior to instruction, the teacher conducted a 1:1 screening session with each student to select the targeted stimuli and the nontargeted information. To select 15 targeted stimuli per student, she first presented 30 stimuli two times each during a screening session (total of 60 trials per session). The teacher also con-

ducted screening sessions with each student to determine whether they recognized the targeted stimuli selected for the other students in the group since this would be assessed later to determine observational learning. Finally, she conducted screening sessions to determine if students knew the chained and discrete tasks that would be presented as nontargeted information during instruction. The teacher conducted all screening trials in the same manner: (a) presentation of stimuli (e.g., flash card), (b) presentation of task direction (e.g., “What word?”), (c) delay interval of 4 s to initiate and 4 s to complete each response, and (d) verbal praise for correct response or ignoring of incorrect response. On the date sheet, the teacher recorded a “+” for each correct response and a “-” for each incorrect response or failure to respond. At the end of the session, she praised each student for his or her attending behavior. To be selected for presentation in the investigation, the student had to score 0% correct on their targeted skill and on the discrete and chained nontargeted information related to his or her targeted skill. It was not a requirement for students to score 0% correct on the skills to be presented to other students in the group.

Baseline/Probe Procedures

The teacher conducted a minimum of three 1:1 probe sessions with each student during each probe condition to determine acquisition of targeted skills. The investigation contained four probe conditions: (a) prior to instruction on the first set of stimuli, (b) prior to instruction on the second set of stimuli, (c) prior to instruction on the third set of stimuli, and (d) following instruction on the third set of stimuli. Each probe session consisted of the presentation of 15 targeted stimuli (one trial per stimuli).

The teacher began each probe session by presenting an attentional cue (e.g., “It is time to begin.”) and waiting for an attentional response (i.e., sitting at table and making eye contact with teacher). Next, the teacher presented the targeted stimulus and the task direction (e.g., “What time?”). The teacher waited for a response interval of 4 s for the student to initiate and 4 s for the student to complete the response. The teacher recorded

two types of responses during probe sessions: (a) a “+” for a correct response and (b) a “-” for an incorrect response or failure to respond. The teacher praised correct responses and ignored errors. In addition, she praised each student for attending behavior at the end of the session.

The teacher also conducted one probe session per probe condition to assess the amount of nontargeted information acquired through observational learning or instructive feedback. She conducted these sessions in the same manner as other probe sessions and assessed the acquisition of a number of skills. First, she assessed acquisition of chained and discrete skills presented as instructive feedback. For example, she asked Susan how to set a wrist watch and to provide another way to state 1:30 (i.e., “half past one”). Second, she assessed observational learning of targeted skills taught to other members of the group and the instructive feedback presented to other students in the group (i.e., discrete and chained tasks).

In summary, probe sessions allowed the teacher to assess the acquisition of a number of skills. These included the following:

1. targeted skill
2. discrete nontargeted information presented as instructive feedback
3. chained nontargeted information presented as instructive feedback
4. observational learning of others’ targeted skills
5. observational learning of others’ discrete nontargeted information presented as instructive feedback
6. observational learning of other’s chained nontargeted information presented as instructive feedback

When all of the targeted stimuli and nontargeted information are added together, it was possible for each student to acquire 51 pieces of information during the investigation. Note that students received three probe sessions per condition on the skills targeted for instruction and only one probe session per condition on nontargeted skills. This was done in order to decrease the amount of time devoted to probe sessions and to discourage the learning of nontargeted skills through trial and error.

Instructional Procedures

Instructional sessions began following a minimum of three probe sessions with stable data. The teacher conducted two instructional sessions per day during the fourth block (1:30 to 3:00 p.m.) of the student's daily schedule and allowed a minimum of a 15-min break between sessions. She implemented a constant time delay procedure with massed trials to teach the targeted skills within a small group format. The teacher taught three sets of targeted stimuli (5 stimuli per set for a total of 15 stimuli per student) to each participant within the context of a multiple probe across behaviors design. Instructional sessions consisted of two trials per stimuli per student (total of 10 trials per student).

The teacher began each session by presenting an attentional cue (e.g., "It is time to begin our group.") and waited for an attentional response (i.e., sit at table and give eye contact to teacher). Working with one student within the group at a time, she then presented massed trials in the following manner: (a) presentation of task direction (i.e., "What word?"); (b) response interval of 0 s during first session and 4 s during all subsequent sessions; and (c) verbal prompt, if correct response not given (e.g., "Indiana"). The teacher recorded five types of possible responses on the student's data sheet. If the student stated the correct response within 4 s following the task request, the teacher recorded a "+" in the "before" column and praised the student. If the student stated the correct response within 4 s following the verbal prompt, the teacher recorded a "+" in the "after" column and praised the student. If the student stated an incorrect response within 4 s following the task request, the teacher recorded a "-" in the "before" column and corrected the error. If the student stated an incorrect response within 4 s following the verbal prompt, the teacher recorded a "-" in the "after" column and corrected the error. If the student failed to respond after the verbal prompt, the teacher recorded a "0" in the "after" column and restated the prompt. Immediately following each instructional trial, the teacher delivered the chained nontargeted information and stated the discrete nontargeted information. The teacher asked

the students to attend to nontargeted information but did not require them to respond in any way.

Examples of how the teacher presented nontargeted information follow. The teacher told Susan, "Here is how you would set a watch to 1:15. Pull out the button on the side like this, set the hour hand like this, set the minute hand like this, and push the button back in like this (while demonstrating). Another way to say 1:15 is to say a quarter past one." The teacher told Tim, "Here is how you would look up ___ in the dictionary. Turn the pages until you find the first letter of the word on this card at the top of the page like this, look for the next letter in the word and turn the pages until you find it at the top of the page like this, look for the third letter in the word on this card at the top of the page like this, and run your finger down the page until you come to the word like this (while demonstrating). The dictionary says the definition of ___ is ___." The teacher told Alex, "Indiana is spelled I-N-D-I-A-N-A. The capital of Indiana is Indianapolis."

As each student completed five instructional massed trials (with exposure to discrete and chained nontargeted information on each trial), the teacher told the students to rotate seats so the next target student would be in the middle and then began the next series of massed trials with that student. Once all students met criterion on their targeted set of skills (i.e., three consecutive days with 100% accuracy), the teacher conducted probe sessions in a 1:1 format before proceeding to small group instruction on the next set of targeted skills.

Maintenance Procedures

The teacher continued to conduct maintenance probe sessions during the month after each student met criterion on all three sets of target stimuli. She assessed maintenance in the same manner in which she conducted all probe sessions with the exception that she provided verbal praise on a variable ratio of three instead of on a continuous reinforcement schedule.

Generalization Procedures

At the end of the investigation, the teacher conducted sessions to assess generalization in the same manner as intervention sessions with the exception that she used different materials. Specifically, she presented Susan with a digital clock instead of a watch, she presented Tim with a reading passage containing the targeted sight words, and she presented Alex with a map of the United States containing abbreviations for state names.

Experimental Design

The teacher implemented a multiple probe design with conditions across behaviors replicated across participants during the investigation. Four probe conditions and three intervention conditions occurred during the duration of the investigation. This established experimental control on the acquisition of the targeted tasks. She conducted pre- and post-intervention probe sessions to determine the acquisition of nontargeted information through instructive feedback and observational learning.

Reliability

After being trained by the teacher, the instructional assistant in the resource room collected reliability data throughout the investigation on both the dependent and the independent variables. She collected these data once per week per condition per student. If the data fell below 90%, the teacher identified and addressed the problem (e.g., reviewing procedures with the assistant). The teacher used a point-by-point method (Tawney & Gast, 1984) to calculate dependent variable reliability agreement with the following formula: number of agreements divided by number of agreements plus disagreements multiplied by 100. The teacher calculated independent variable reliability (Billinsley, White, & Munson, 1980) with the following formula: number of observed behaviors divided by number of planned behaviors multiplied by 100. The specific independent variable behaviors included having materials ready, presenting the attentional cue, presenting the material (i.e., timepiece or flashcard), presenting the task

direction (e.g., “What time?”), waiting for an appropriate delay interval (i.e., either 0 or 4 s) before prompting, presenting correct consequences (i.e., praise, correct, or ignore response), and presenting nontargeted information (i.e., instructive feedback on chained and discrete tasks).

Dependent variable reliability. The instructional assistant collected dependent variable reliability data during 33% of the probe sessions (i.e., four sessions per student) and during 15.2% of the intervention sessions (i.e., five sessions per student). The reliability agreement on the dependent variable was 100% across probe, intervention, and maintenance sessions.

Independent variable reliability. As with dependent variable reliability, the instructional assistant also collected independent variable reliability data during 33% of probe sessions and 15.2% of intervention sessions. The average reliability agreement on the independent variable was 99.9% during probe sessions and 100% during intervention and maintenance sessions.

Results

Effectiveness Data on Target Tasks

As shown in Figures 1–3, all students reached criterion on their targeted tasks. The total number of sessions to criterion across three sets of stimuli for each student ranged from 30 to 35. Instructional time to criterion on three sets of stimuli across students ranged from 5 hrs to 5 hrs 50 min, although, once they met criterion on individual sets, students could remain in the group until the other students reached criterion as well. Student errors were low throughout the investigation and ranged from 3% to 5.3%. Additional instructional data are shown in Table 4.

Nontargeted Information

All participants made increases in each of the discrete and chained nontargeted tasks through exposure to instructive feedback and observational learning, as shown in Table 5. At the end of the investigation, participants acquired through observational learning an average of 82.2% of the target stimuli directly taught to the other participants in the group

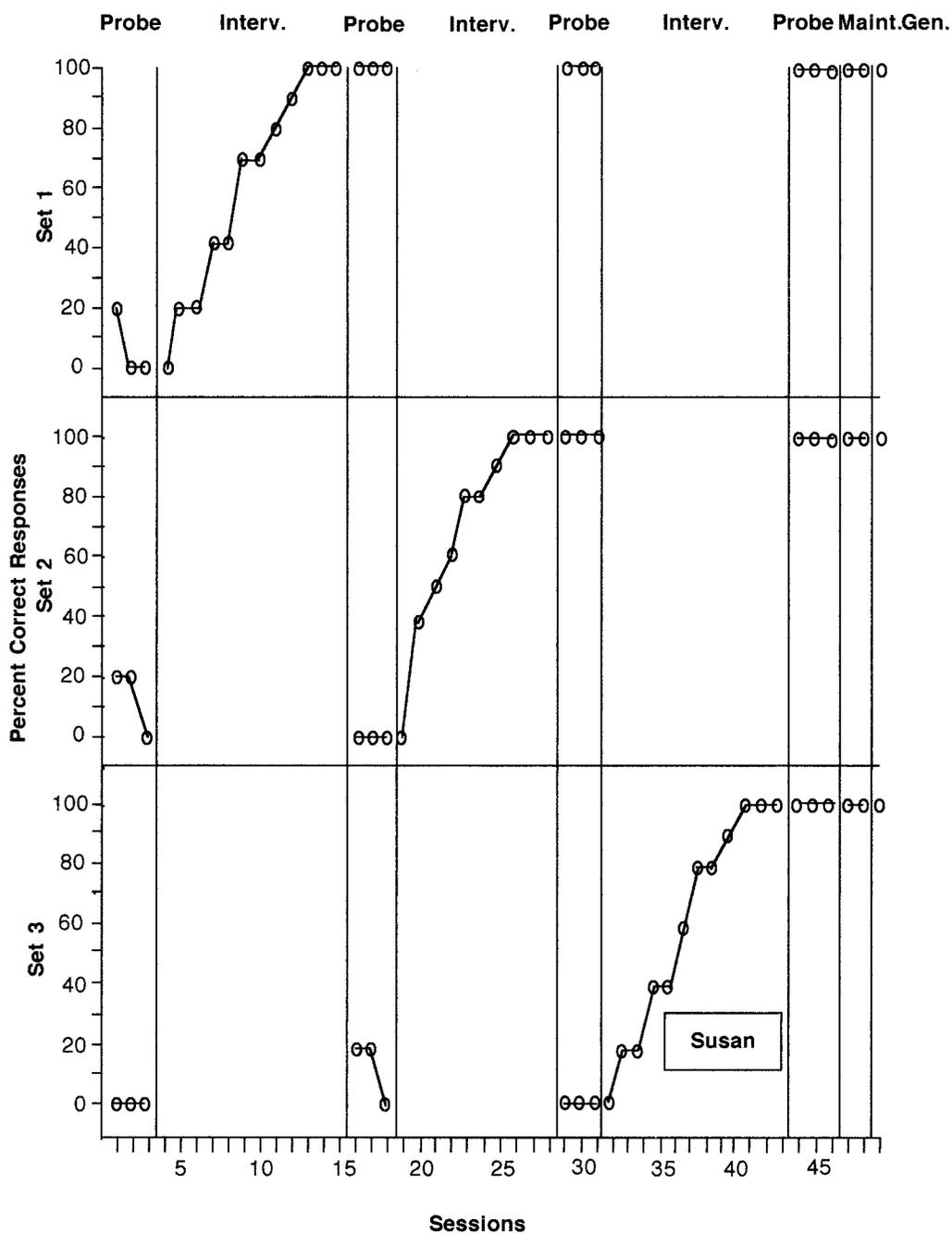


Figure 1. Graphic data for Susan's targeted task of telling time.

with an average increase over baseline condition of 46.5%. Furthermore, all participants acquired an average of 78.1% of the discrete tasks and 77.4% of the chained tasks presented as nontargeted information during

the investigation. Specifically, participants met 100% criterion on the following skills presented as nontargeted information: (a) Susan—stating times on the clock in alternate terms (discrete instructive feedback presented with

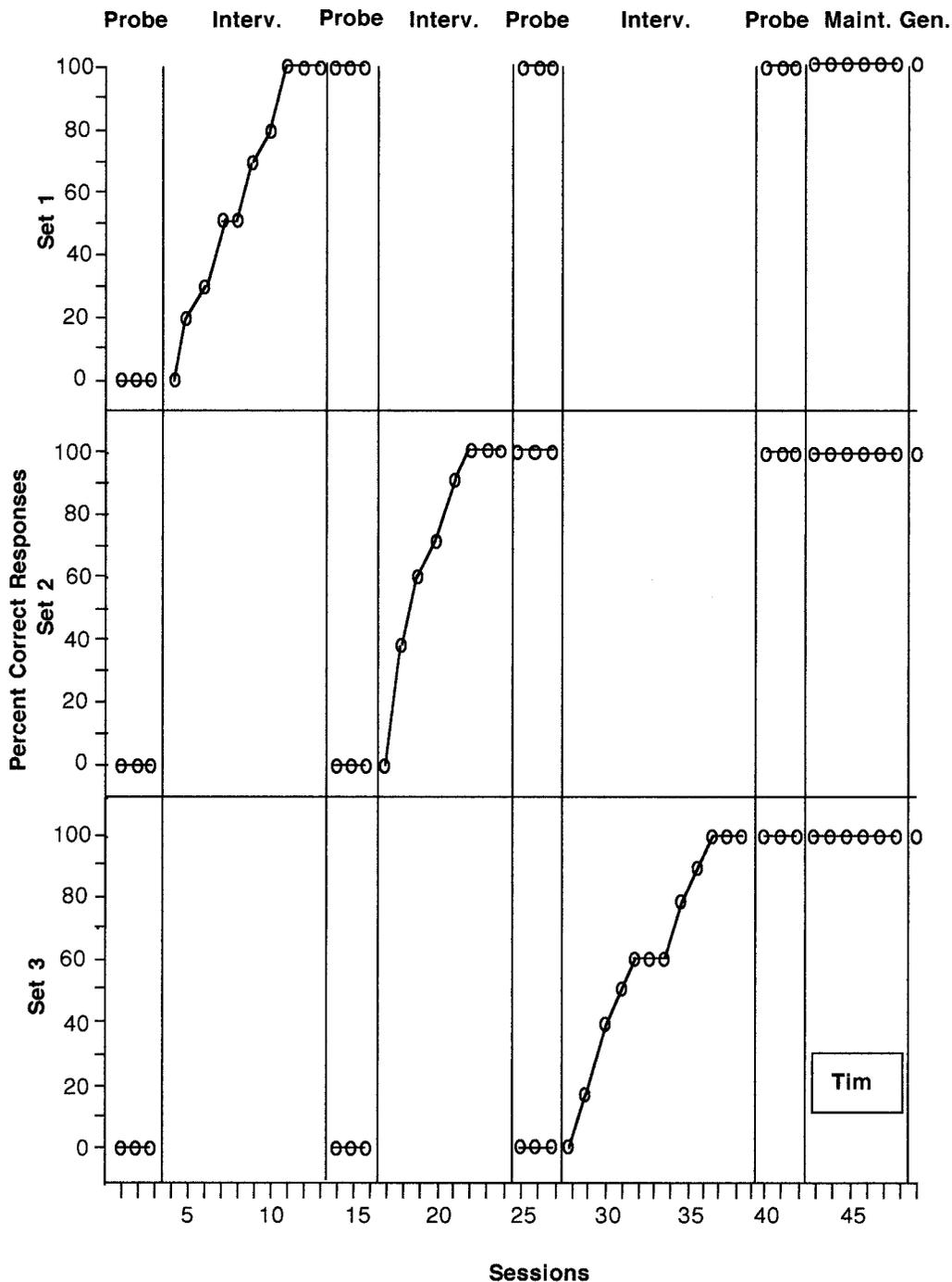


Figure 2. Graphic data for Tim's targeted task reading arts and humanities sight words.

targeted skill) and stating the capitals of 15 states (discrete instructive feedback acquired through observation learning); (b) Tim—stat-

ing 15 definitions of arts and humanities terms (discrete instructive feedback presented with targeted task), looking up definitions in

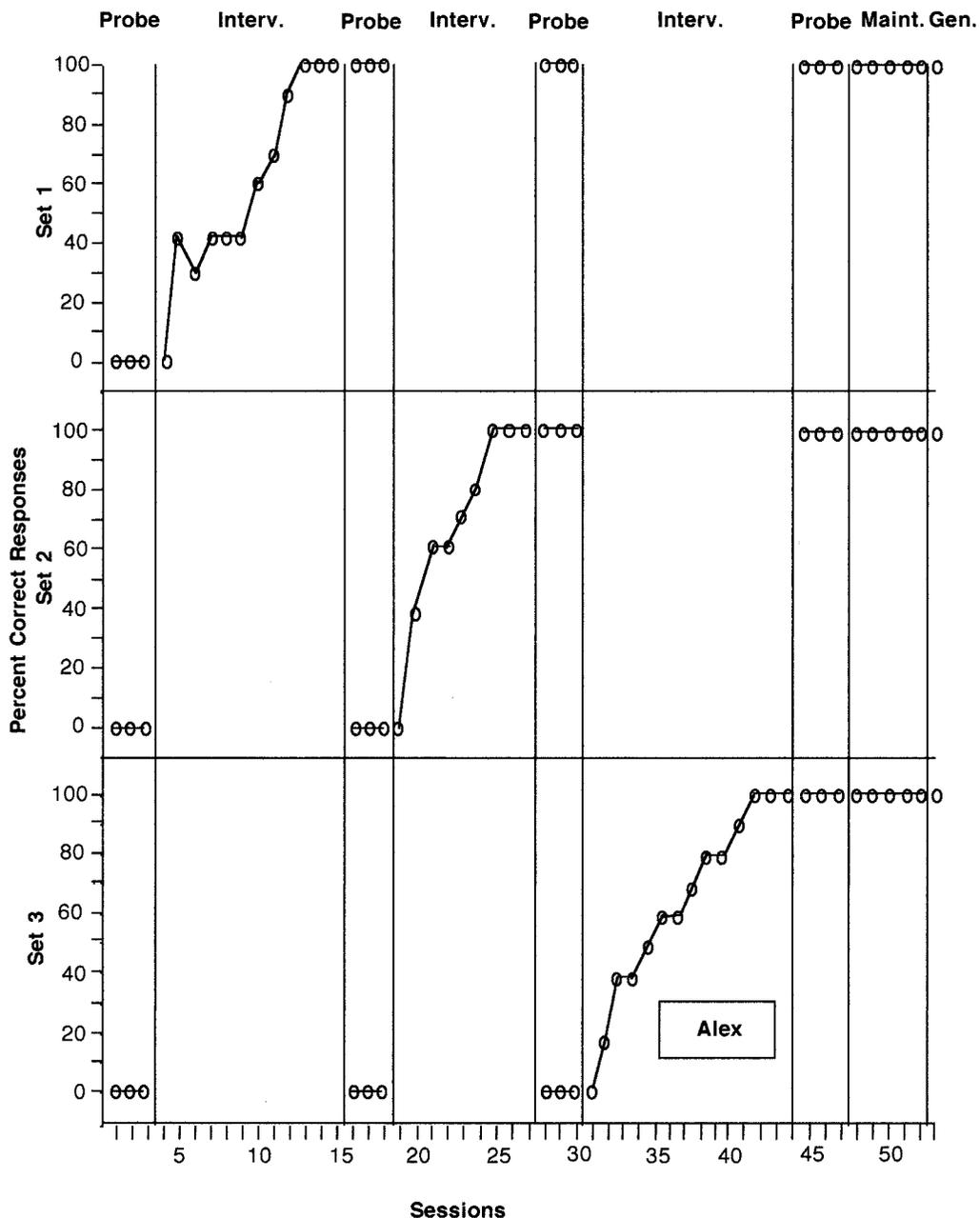


Figure 3. Graphic data for Alex's targeted task of identifying state abbreviations.

the dictionary (discrete instructive feedback presented with targeted task), and setting a wristwatch (chained instructive feedback acquired through observational learning); and (c) Alex—reading 15 arts and humanities terms (observational learning of targeted task),

stating capitals of 15 states (discrete instructive feedback presented with targeted task), and stating definitions of arts and humanities terms (observational learning of discrete instructive feedback). (Note that, prior to the investigation, Alex demonstrated Susan's

TABLE 4

Instructional Data on Target Tasks

| <i>Student</i> | <i>Set 1</i> | <i>Set 2</i> | <i>Set 3</i> | <i>Total</i> | <i>Mean</i> |
|---------------------------------|--------------|--------------|--------------|--------------|-------------|
| Susan | | | | | |
| # of sessions to criterion | 12 | 10 | 12 | 34 | 11.3 |
| % of errors to criterion | 9.2 | 1 | 5 | | 5.3 |
| Instructional time to criterion | 2 hr | 1hr 40 min | 2 hr | 5 hr 40 min | 2 hr 1 min |
| Tim | | | | | |
| # of sessions to criterion | 10 | 8 | 12 | 30 | 7.5 |
| % of errors to criterion | 4 | 1.25 | 3.3 | | 3. |
| Instructional time to criterion | 1 hr 40 min | 1hr 20 min | 2 hr | 5 hr | 1 hr 40 min |
| Alex | | | | | |
| # of sessions to criterion | 12 | 9 | 14 | 35 | 11.7 |
| % of errors to criterion | 4.2 | 2.2 | 3.6 | | 3.4 |
| Instructional time to criterion | 2 hr | 1 hr 30 min | 2 hr 20 min | 5 hr 50 min | 2 hr 5 min |

chained instructive feedback of setting a watch and Tim’s chained instructive feedback of looking up words in a dictionary.)

Maintenance

Once students met criterion in the final probe session, they continued to participate in daily maintenance sessions. All participants maintained their targeted stimuli with 100% accuracy for up to 1 wk during this condition. Tim and Alex participated in more maintenance sessions than Susan because they reached criterion on their individual sets of stimuli before she did. Participants chose to continue participation in group sessions on each set of tasks until all participants met criterion, thus facilitating maintenance on targeted tasks and allowing an equal number of exposures to nontargeted information.

Generalization

After meeting criterion on their targeted tasks, all participants generalized their targeted tasks across materials with 100% accuracy during a single generalization session. Tim was able to read targeted sight words within a typed text, and Alex was able to state the names of states when shown the abbreviations on a map. It cannot be stated, however, that Susan’s ability to state the times shown on a digital clock was a true measure of general-

ization for the targeted task of telling time to the quarter hour on an analog clock.

Discussion

In response to the first research question in this investigation, all participants acquired their targeted stimuli taught with the CTD procedure. In spite of the complexity of teaching different tasks to different students, the teacher implemented the procedure with a high percentage of reliability agreement. As in other investigations using CTD and other systematic response prompting procedures, the error rate was low. Although participants met individual criterion, they learned their individual targeted tasks at approximately the same rate; this created equal opportunities for each student to observe and acquire the targeted tasks of the other students in the group. The similarity of the students’ learning curves across sets of stimuli appears to be similar, with little variance in the number of sessions to criterion per set. Since all of the students had a history of instruction with the CTD procedure prior to the investigation, it is not surprising that the “learning to learn” phenomenon is not apparent in this investigation. In addition, the ability of the students to wait for a prompt reduced the percentage of errors that they made. All participants selected to participate in the investigation had similar abilities and were those that the teachers an-

TABLE 5

Percent of nontargeted information acquired by participants

| <i>Name</i> <i>Nontargeted Information</i> | <i>Set 1</i> <i>Pre/Post</i> | <i>Set 2</i> <i>Pre/Post</i> | <i>Set 3</i> <i>Pre/Post</i> | <i>Total</i> <i>Pre/Post</i> |
|--|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Susan | | | | |
| Observational learning of Tim's task | 0/60 | 0/60 | 20/80 | 6.7/66.7 |
| Observational learning of Alex's task | 60/100 | 60/60 | 80/100 | 66.7/86.7 |
| Discrete task presented as IF | 0/100 | 0/100 | 0/100 | 0/100 |
| Chained task presented as IF | 0/100 | 0/70 | 0/60 | 0/76.7 |
| Observational learning of Tim's discrete IF ¹ | 0/100 | 0/80 | 0/60 | 0/80 |
| Observational learning of Alex's discrete IF | 0/100 | 0/100 | 0/100 | 0/100 |
| Observational learning of Tim's chained IF | 0/25 | 0/25 | 0/25 | 0/25 |
| Observational learning of Alex's chained IF | 0/40 | 0/20 | 0/20 | 0/26.7 |
| Tim | | | | |
| Observational learning of Susan's task | 0/20 | 0/40 | 0/20 | 0/26.7 |
| Observational learning of Alex's task | 0/0 | 0/40 | 0/60 | 0/33.3 |
| Discrete task presented as IF | 0/100 | 0/100 | 0/100 | 0/100 |
| Chained task presented as IF | 0/100 | 0/100 | 0/100 | 0/100 |
| Observational learning of Susan's discrete IF | 0/20 | 0/40 | 0/20 | 0/26.7 |
| Observational learning of Alex's discrete IF | 0/0 | 0/40 | 0/60 | 0/33.3 |
| Observational learning of Susan's chained IF | 25/100 | 25/100 | 25/100 | 25/100 |
| Observational learning of Alex's chained IF | 0/20 | 0/20 | 0/0 | 0/13.3 |
| Alex | | | | |
| Observational learning of Susan's task | 100/100 | 60/100 | 100/100 | 86.7/100 |
| Observational learning of Tim's task | 0/100 | 0/100 | 0/100 | 0/100 |
| Discrete task presented as IF | 0/100 | 0/100 | 0/100 | 0/100 |
| Chained task presented as IF | 0/60 | 0/40 | 0/40 | 0/46.7 |
| Observational learning of Susan's discrete IF | 0/40 | 0/80 | 0/40 | 0/53.3 |
| Observational learning of Tim's discrete IF | 20/100 | 20/100 | 20/100 | 20/100 |
| Observational learning of Susan's chained IF | 100/100 | 100/100 | 100/100 | 100/100 |
| Observational learning of Tim's chained IF | 100/100 | 100/100 | 100/100 | 100/100 |

¹IF = Instructive Feedback

participated would progress in the investigation without exhibiting behavioral problems.

Research questions 2 through 6 centered on whether or not the students who participated in the investigation would acquire nontargeted information. While teaching targeted tasks, the teacher included a chained task and a discrete task as instructive feedback for each participant in the group. These were related to their targeted tasks. Students appeared to enjoy learning this nontargeted information because they attended to the instructive feedback that followed instructional trials and were anxious to demonstrate their ability to perform the additional tasks during probe sessions.

Use of a small group format for delivering instruction facilitated the observational learning of both targeted and nontargeted tasks. Students paid attention to the instruction of

each member of the group throughout the investigation. This, in turn, increased their acquisition of nontargeted information without individual direct instruction. Although past investigations have shown that students can acquire nontargeted information through observation and instructive feedback, this investigation adds to the professional literature by showing that students can acquire multiple bits of nontargeted information. Through observational learning, each student was exposed to (a) two discrete tasks taught to the other members of the group as targeted stimuli, (b) two nontargeted discrete tasks presented to the other members of the group through instructional feedback, and (d) two nontargeted chained tasks presented to the other members of the group through instructional feedback.

In most cases, the students did not learn

100% of the nontargeted information by the end of the investigation. However, all students showed an increase over baseline condition. Based on the previous research (e.g., Wolery et al., 2000), exposure to the nontargeted information should increase the pace of future learning of the nontargeted skills, thus saving instructional time in the long run. Again, it should be noted that Alex already could perform two of the chained tasks presented as nontargeted information prior to intervention (i.e., setting a wrist watch and looking up a definition in the dictionary). Participating in a group format gave him the opportunity, however, to review those skills during instructional sessions and to practice those skills during probe sessions. These are practices that can facilitate maintenance.

The tasks selected for this investigation raise an issue of current concern in teaching students with moderate to severe disabilities. With the current emphasis on accessing core content from general education under No Child Left Behind and IDEA (Browder et al., 2004), teachers are sometimes confused as to how to balance the instruction of core content with the instruction of functional skills. This investigation demonstrates that both core content from the general education curriculum and functional skills from students' IEPs can be addressed within the same lesson. The teacher collaborated with general education teachers in the student's inclusive classes to select targeted objectives based on the state's core content (i.e., state names from social studies and vocabulary words from arts and humanities) and also selected functional skills based on individual assessment of adaptive behavior (i.e., telling time and setting a watch). By structuring instruction for observational learning to occur, the students with targeted tasks from the core content also had the opportunity to learn a functional skill, and the student with a targeted functional task had the opportunity to learn tasks related to academic core content. While the teacher could have taught definitions by rote, she decided that it was better to present definitions within the context of looking them up in a dictionary, thus exposing the students to a valuable skill that could be used in a broad array of settings across disciplines.

Research questions 7 and 8 focused on the students' ability to maintain and generalize the targeted information that they had ac-

quired. During all maintenance and generalization sessions, students performed at 100% criterion. It is a limitation in this investigation that maintenance and generalization data were not collected on the nontargeted information that the students acquired and that generalization data were not collected across people or settings. A second limitation of this investigation is that the generalization component was weak. The investigators failed to conduct a pre-test measure of generalization or to assess generalization across persons and settings. In particular, the assessment of generalization from an analog clock to a digital clock was not as strong an assessment of generalization as using a different type of analog clock (e.g., one with different types of numbers) would have been. Future investigations could benefit from expanded generalization measures. In particular, generalization assessment conducted within inclusive settings would reveal if students could use the skills they had learned during activities conducted by general education teachers with peers without disabilities.

Although this investigation was successful in answering the research questions, there are other ways in which future investigations could build on the results presented here. For example, participants in the investigation were limited to a group of secondary students with moderate disabilities. Future replications of this investigation could include students with mild or severe disabilities or students at the elementary or middle school level. In addition, the investigation could be replicated in a heterogeneous group format or with a larger group of participants, such as the investigation conducted by Fickel et al. (1998) in which four students with various levels of ability participated in group instruction. Also, this investigation focused on tasks for each student that were related to specific content areas (i.e., math, arts and humanities, social studies). Both unrelated and related tasks for each student could be included in instructional sessions as well. For example, the target task could be telling time on a clock, the discrete nontargeted information could be identifying science sight words, and the chained nontargeted information could be recording and graphing personal performance data. Other members of the group could learn different targeted tasks and nontargeted information.

In summary, the use of a CTD procedure proved effective in teaching discrete academic skills to three students with moderate to severe disabilities in this investigation, and each of the students acquired both discrete and chained nontargeted information through instructive feedback and observational learning. Based on these results, special education teachers may wish to structure small group instructional sessions to include exposure to a variety of tasks (both functional and core content) as a way to increase the efficiency of instruction.

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Treatment of Pica Using a Pica Exchange Procedure with Increasing Response Effort

Stacy L. Carter
Texas Tech University

Abstract: The effects of a pica exchange procedure were evaluated on the pica of a female with severe mental retardation. A BAB design revealed that the pica exchange procedure was effective at reducing the occurrence of pica. In addition, the pica exchange procedure was effective throughout six increasingly more difficult response effort conditions. Results suggest that extended periods of treatment using successive approximations may overcome initial resistance to increases in response effort.

Response effort has been shown to be a factor in the development of treatments for automatically reinforced behaviors (Piazza, Roane, Keeney, Boney, & Abt, 2002; Shore, Iwata, DeLeon, Kahng, & Smith, 1997; Zhou, Goff, & Iwata, 2000). Piazza et al. examined the effects of response-effort on access to pica items and access to alternative items for three individuals. Response effort was manipulated for accessing the pica item and for accessing the alternative reinforcer. Overall, findings revealed that the allocation of pica and the alternative response shifted depending on the degree of response effort associated with each response.

Research on treatments for pica has been mostly limited to analog conditions which does not allow for an examination of the external validity of the findings (Piazza et al., 1998; Piazza et al., 2002). Goh, Iwata, and Kahng (1999) developed a pica exchange procedure comprised of differential reinforcement of an alternative response with response interruption which was implemented in the participants' natural setting. The procedure consisted of teaching the individuals to turn cigarettes over to staff in exchange for highly preferred edible items. While the pica exchange procedures were considered effective for three of the four participants across several

settings and therapists, the procedure required that a therapist remain nearby with an outstretched hand ready to receive the pica item. The immediate availability of the therapist to exchange the pica item appeared to be a necessary component of treatment in order to maintain low response effort for the participants to complete the alternative response.

The current study attempted to evaluate varying levels of response-effort associated with a pica exchange procedure over an extended period of time within the participant's natural environment. Pica exchange with increasing response effort was used to decrease the frequency of pica for a woman whose pica consisted of multiple substances. The study demonstrated how a pica exchange procedure could be developed into a topography of behaviors that would act upon the environment in a more effective manner while minimizing the need of a therapist to be immediately available to exchange the pica item.

Method

Participant and Setting

Barbara was a 72-year old woman who had lived in a state residential facility for persons with developmental disabilities for most of her life. Barbara had been diagnosed with profound mental retardation, diabetes, obesity, and bilateral cataracts. She ambulated by using a wheelchair and communicated using unintelligible vocalizations and pointing at

Correspondence concerning this article should be addressed to Stacy L. Carter, Texas Tech University, College of Education, P.O. BOX 41071, Lubbock, TX 79409-1701. Email: cart26@hotmail.com

items. She had been referred for treatment of pica based on staff observations and by x-ray of stomach content. Pica items consisted of small metal objects (paper clips, staples, etc.), strings of fabric, and candy wrappers. Functional analysis sessions were conducted in an observation room with a one-way mirror. All other sessions were conducted on the grounds of the residential facility during day programming activities and evening leisure activities.

Response Measurement and Reliability

Pica was defined as picking up and moving a non-edible item to within less than six inches of the mouth. Pica exchange was defined as Barbara placing a non-edible item in the hand of a staff member and receiving an edible item in return. Data on Barbara's behaviors were collected using an event recording procedure with paper and pencil on preprinted 30-min interval data sheets. Inter-observer agreement was assessed by having a second observer independently collect data during 30% of training sessions (168/567) and 27% of days outside of training sessions (227/852). Agreement was calculated for pica and pica exchange by dividing the smaller frequency observed by the larger frequency observed and multiplying by 100%. Mean exact agreement for pica during training sessions was 98.6% and 94.1% outside of training sessions. Mean exact agreement for pica exchange was 84.7%. Inter-observer agreement was collected during 100% of the functional analysis conditions and the mean exact agreement for the nonoccurrence of pica was 100%. Data were evaluated using a BAB design with variations in the response effort associated with the treatment. This design was considered necessary in order to avoid withholding treatment. In addition, the withdrawal condition was initiated due to unavoidable circumstances related to Barbara's health which limited her dietary intake and mobility during the 6th month following treatment. During the 7th and 8th month following treatment her health was considered stable, but treatment re-introduction was delayed due to concerns regarding her physician's orders to limit physical exertion during this time period.

Functional Analysis

A functional analysis consisting of attention, demand, play, and alone conditions was conducted using procedures based on those outlined by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). Throughout all conditions numerous inedible items which were previously identified as having been ingested by Barbara were placed around the room where they could be easily accessed by Barbara. In addition, a therapist remained in the room with Barbara at all times in order to intervene and prevent actual ingestion of a pica item if necessary. The presence of the therapist modified the alone condition to a no interaction condition with a therapist present. This modification was considered necessary to prevent injury and to address concerns regarding the ethical issue of attempting to elicit pica behavior during the functional analysis (see Hastings and Noone, 2005 for further discussion). Results of the functional analysis were inconclusive because no target behaviors occurred during five 10 minute sessions.

Preference Assessment

A formal preference assessment using forced choice methods outlined by Piazza, Fisher, Hagopian, Bowman, and Toole (1996) was used to determine possible items for use during training sessions. Both edible and nonedible items were included in forced choice pairings. Results showed that chocolate, cookies, coffee, crackers, and diet soda were highly preferred and these items were preferred over inedible items.

Training

Training for pica exchange was conducted using the procedures outlined by Goh et al. (1999) in which Barbara had to use a pica item placed within arms reach to perform the exchange within 10 s of an initial verbal request. After 10 s a sequence of gestural, verbal, or physical prompts were used to ensure the exchange. Any attempt to ingest a pica item was physically blocked. The need to increase the response effort associated with exchanging the pica item was considered necessary to shape the pica exchange procedure into a

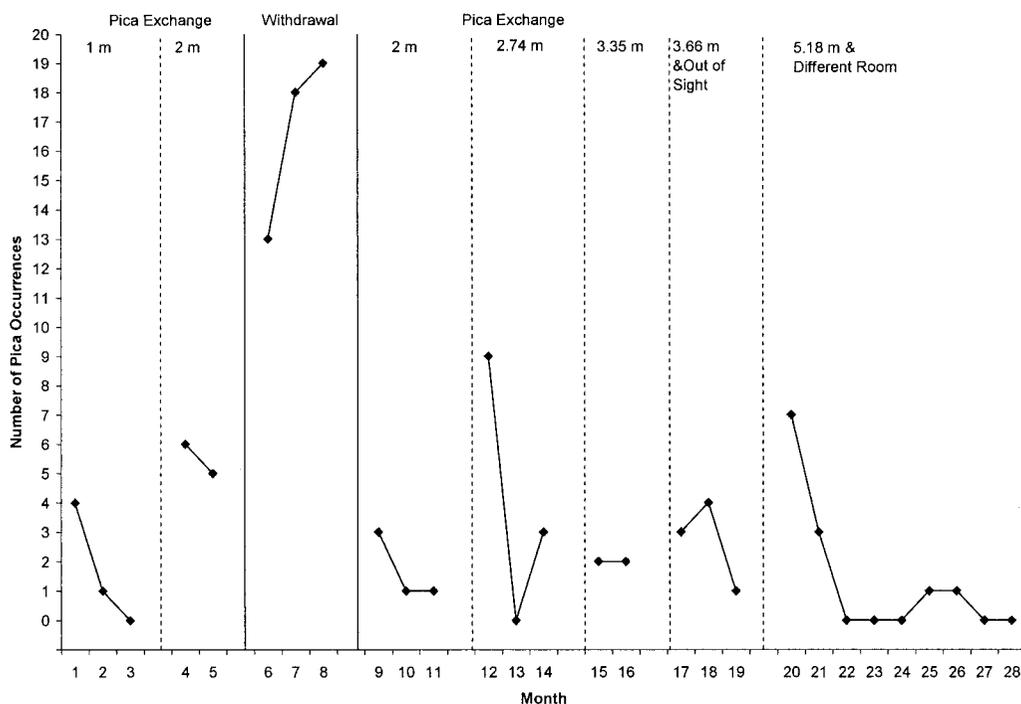


Figure 1. Number of pica occurrences per month.

topography of behaviors that would act upon the environment in a more effective manner. Essentially, Barbara would need to perform the pica exchange at times when a staff member was not immediately available to receive the pica item and deliver the edible.

Procedures similar to those used by Shore et al. (1997) were incorporated to measure response effort using the approximate distance Barbara had to roll her wheelchair to complete the pica exchange. The distances evaluated for completing the pica exchange were as follows: 1 m, 2 m, 2.74 m, 3.35 m, 3.66 m, and 5.18 m. In addition, at 3.66 m Barbara could not see the therapist and at 5.18 m she had to enter another room in order to complete the pica exchange. Twenty trials per day were conducted during the first three distances, while at 3.35 m and 3.66 m the number of trials was reduced to 10 per day and at 5.18 m the number of trials was reduced to four per day.

Results and Discussion

Figure 1 shows the frequency of pica across the varied treatment conditions and the with-

drawal condition. Pica was observed to occur at lower frequencies during all of the treatment conditions in comparison to the withdrawal condition. Immediately following each increase in response effort, except for the 3.35 m condition, the occurrence of pica increased from the previous condition. Each increase in number of pica occurrences was followed by a month with a lower number of pica occurrences within that same response effort condition. Figure 2 shows the percentage of independent pica exchanges. The percentage of pica exchanges decreased following each increase in response effort except for the 3.35 m condition. Pica exchange ranged from 65% independent performance to 100% independent performance.

Previous findings reported by Piazza et al. (2002) suggested a negative correlation between the allocation of responding with pica or an acceptable alternative behavior and levels of response effort. This study demonstrated some similar results but emphasized that associated diminishing allocation of appropriate responses with increased response effort may be temporal in nature. Following

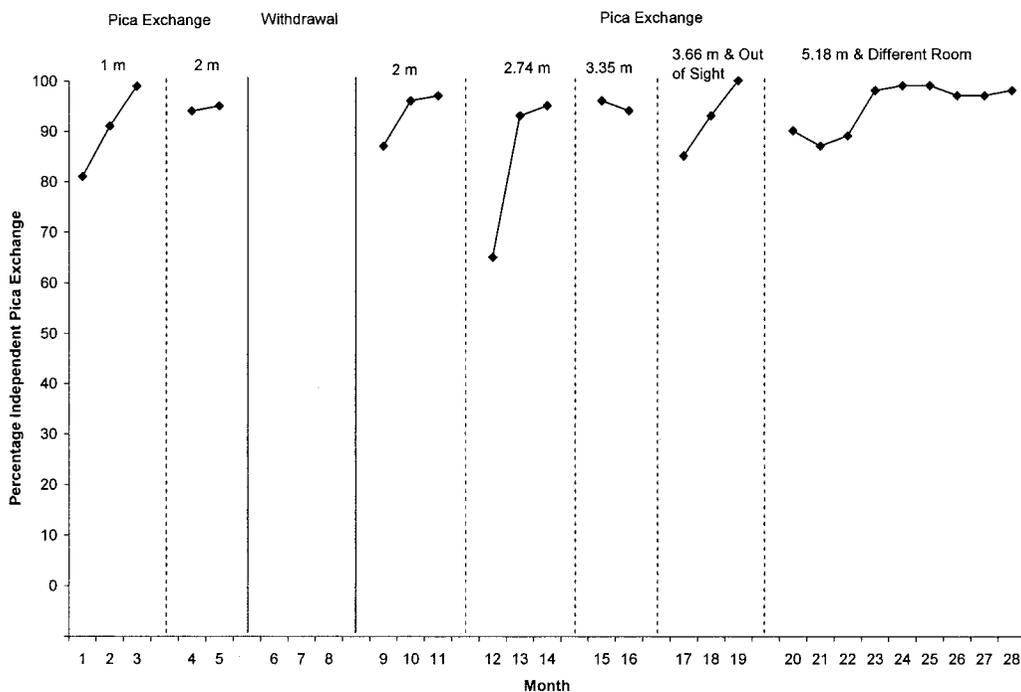


Figure 2. Percentage of independent pica exchanges.

all but one condition of increasing response effort (3.35 m), an increase in the frequency of pica was observed. This increase in pica was shown to be temporal or reactionary to the initial increase in response effort by lower observed frequencies of pica under the same response effort conditions and subsequent higher response effort conditions.

External validity has been a limitation of several previous studies on pica (Piazza et al. 1998; Piazza et al. 2002). The current study addressed this limitation by evaluating a pica exchange treatment across several settings within the participant's natural environment. Additionally, pica behavior was reduced over a two year period using a pica exchange procedure. While reinforcer preference has been demonstrated to vary over time (Bowman, Piazza, Fisher, Hagopian, & Kogan, 1997; Stafford, Alberto, & Fredrick, 2002), the current study demonstrated stability of reinforcement over a two year period, similar to findings reported by Zhou, Iwata, Goff, and Shore (2001).

One limitation of this study was that the procedure took a long period of time to pro-

duce near zero rates of pica. This was considered acceptable in this situation due to the potentially long history of reinforcement associated with pica and the health restrictions that limited the quantity and quality of food reinforcement available. Another limitation was that the withdrawal of the pica exchange procedure was not planned but was rather a result of health related issues which prevented the continuation of the procedure. Her health issues introduced some confound to the interpretation of the data during the first month of the withdrawal of treatment, although during the following two months in which the treatment was withdrawn, her health was stable and there were no obvious confounds noted with these data.

Future studies should evaluate the possibility that a negative correlation between response allocation and response effort may be temporal. The possibility of a temporal nature of these correlations may be most evident in behaviors considered to have an automatic function. Vollmer (1994) indicated that behaviors referred to as having an automatic function are not controlled by therapists but

responses are allocated based on the reinforcement received from performing the behavior. Piazza et al. (2002) indicated that automatically reinforced behaviors produce a choice arrangement in which an individual may choose to engage in the automatically reinforced behavior or another behavior based on the parameters associated with each such as quality, volume, etc. Individuals displaying automatically reinforced behavior may have the potential to shift their response allocation over a lengthy period of time to a response requiring higher response effort. Future research should examine the behavioral economics of automatically reinforced behaviors over extended periods of time.

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