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A COMPARISON OF ONE-TO-ONE AND SMALL GROUP INSTRUCTION FOR
YOUNG CHILDREN WITH AUTISM: FOCUS ON EFFECTIVE TEACHING
AND BEHAVIOR MANAGEMENT

by

Kathy Marie Bertsch

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
December 2002

A COMPARISON OF ONE-TO-ONE AND SMALL GROUP INSTRUCTION FOR YOUNG CHILDREN WITH AUTISM: FOCUS ON EFFECTIVE TEACHING AND BEHAVIOR MANAGEMENT

Kathy Marie Bertsch, Ph.D.

Western Michigan University, 2002

Over the past two decades, research has focused on identifying successful instructional methods and appropriate programming for young children with autism. Much of this early research focused on the effectiveness of intensive one-to-one behavioral programs. Support for intensive one-to-one instruction for children with autism began a long-term debate over the effectiveness, efficiency and appropriateness of one-to-one instructional strategies for young children with autism. In response, researchers and educators began considering and studying small group instruction, a less restrictive alternative to intensive one-to-one instruction.

While support is mounting for the use of small group instructional strategies, there continues to be limited evaluation of the comparative effectiveness between one-to-one instruction and small group instruction. In addition, there is a need to assess the effectiveness of the instructional components that these arrangements utilize.

The present study was designed to compare one-to-one instruction with small group instruction for young children with autism. First, this study reviews and compares the two instructional strategies. Second, this study focuses on identifying effective instructional strategies that maximize learning opportunities in both individual and small

group instruction. Third, this study focuses on comparing the effectiveness of the specific instructional components used in small group and one-to-one instruction.

While the effectiveness and efficiency of one-to-one and small group instruction are compared, the study also analyzes: (a) behavior management including effects on acquisition, teacher behavior, and instructional efficiency; (b) generalization of skills learned during instruction; and (c) the effects of observational learning during group instruction.

Results indicate that when effective instructional strategies are maximized, small group instruction is more efficient and as/more effective than one-to-one instruction. While small group instruction offers fewer direct learning opportunities, results indicate faster rates of acquisition during group instruction than one-to-one instruction. Results also indicate group instruction to be more efficient in terms of time and resources than one-to-one instruction. While small group instruction is as/more effective and more efficient than one-to-one instruction, it may be more demanding for teachers to manage and implement. Future research directions include assessing teacher management requirements more thoroughly.

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ACKNOWLEDGEMENTS

This project would not have come about without the assistance and support of many people. First, I wish to express my appreciation to the faculty and students at Kalamazoo Regional Educational Service Agency, Croyden Avenue School, for their participation and support throughout this study. This project could not have been accomplished without their contribution.

Second, a special note of thanks goes to Katherine Holverstott-Cockrell and Sara Bliffert for their participation as research assistants for this study. Their participation in this project was essential to its completion.

Third, I would particularly like to thank my graduate committee, Kristal Ehrhardt, Alan Poling, Steven Ragotzy, and Ruth Ervin for taking the time to assist me in developing and implementing this project. Their assistance in bringing this project together has been invaluable.

Lastly, I would like to thank my friends and family for their support throughout the course of this study. They have been understanding, encouraging, and patient through times when this research has kept me from enjoying their company as much as we all would like. Their praise of my educational accomplishments is appreciated with heartfelt sincerity. You all know your role in this project and I thank you for everything.

Kathy Marie Bertsch

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CHAPTER I

INTRODUCTION

In order to identify effective and efficient instructional methods for young children with autism, one must have an understanding of: (a) the unique characteristics of children with autism, (b) current instructional practices for young children with autism, and (c) general effective teaching practices. The purpose of this chapter is three fold. First, this chapter will provide an overview of the unique characteristics of young children with autism. Second, it will review the most researched instructional approaches for young children with autism, one-to-one instruction and small group instructional arrangement. Third, a review of effective teaching practices and their implication for small group instruction for students with autism will follow. This review should provide a basis for identifying current effective practices for young children with autism and future areas of investigation.

Characteristics of Children with Autism

Autism is a Pervasive Developmental Disorder (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, 1994) that is characterized by severe impairments in the areas of (a) social interaction, (b) communication, and (c) presence of stereotypic, or repetitive, behaviors (Bristol et al., 1996; Shriver, Allen, & Mathews, 1999). Autism is broad in spectrum and is therefore often referred to as Autism Spectrum Disorder (ASD). This definition of autism includes the classical form of the disorder as well as closely related disabilities that share many of

the core characteristics (DSM-IV, 1994). Additional disabilities which fall into the category of autism include: (a) Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), often a less severe or extensive form of autism; (b) Rett's syndrome, a genetic disorder affecting females; (c) Asperger syndrome, characterized by more intact language skills; and (d) Childhood Disintegrative Disorder, which is characterized by normal development which regresses to more extensive autistic characteristics. The terms autism and ASD are often used interchangeably.

Children with autism display deficits and/or excesses in communication, symbolic or imaginative play, reciprocal social interaction, and interests and activities. Autism encompasses a wide range of deficits and/or excesses. Some individuals exhibit severe mental retardation while some are extremely gifted in their intellectual and academic accomplishments. While many individuals prefer isolation and tend to withdraw from social contact, others show high levels of affection and enjoyment in social situations. Additional characteristics of individuals with autism include repetitive, and perseverative behavior (including stereotyped, self-stimulatory, and ritualistic behaviors), resistance to changes in routines, and oversensitivity or undersensitivity to specific kinds of stimulation. Most children with autism have significant difficulty learning, and while developmental and standardized tests are frequently carried-out on children with autism, these data are generally invalid due to competing communication and/or behavior problems (Maurice, Green, & Luce, 1996).

Autism has a significant and early impact on a child's development. Because of its early and pervasive onset, autism may significantly impair a young child's rate of development in social, adaptive and communicative functioning. Autism is often not

diagnosed until two to three years of age; however, instruction for young children should begin as soon as areas of deficit/difficulty emerge.

Early Intervention for Young Children with Autism

Impact on the Child

The argument in favor of early intervention for autism is not different than that in favor of early intervention for any child with a developmental disability. Smith (1988) notes that 50 years of research supports early intervention's role in increasing developmental and educational gains for children with disabilities. Because rate of development is most rapid in the preschool years, a child may become deficit in a skill very quickly. Children may go through stages of readiness where they are most teachable for certain skills. Without early intervention, the child with autism may risk missing opportune times to learn (Harris & Handleman, 1994; Lovaas, 1987; Mesibov, 1997).

Impact on the Family

Early intervention may also significantly affect the family of a child with a disability. Smith (1988) notes families of children with handicaps have increased rates of divorce, suicide, and abuse as compared to families of children without handicaps. Early intervention can result in families who are more informed about instructional strategies for children with autism, families with more time for leisure and employment, and overall, families with improved relations.

Impact on Society

Lastly, early intervention programs may benefit society. While services required to make developmental gains can be costly on a short-term basis, these programs may decrease the child's need for support as an adult, and therefore decrease long-term costs

to the community. For example, McNulty, Smith, and Soper's (1983) evaluation of Colorado's state-wide early intervention services report a cost savings of \$4.00 for every dollar spent within a three year period of early intervention. This type of programming results in both economic and social benefits.

Supportive Research

The research base specific to early intervention for young children with autism is relatively small. This research centers on reviews and follow-up results from various comprehensive programs for young children with autism (See Anderson, Avery, DiPietro, Edwards, & Christian, 1987; Birnbrauer & Leach, 1993; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). While, Gresham and MacMillan (1998) note early intervention programs have the potential to be effective interventions for young children with autism, they note significant methodological concerns with studies in the forefront of early intervention (Lovaas, 1987; McEachin et al., 1993). While these studies suggest intensive programming that results in about fifty percent of children with autism reaching relatively "normal" levels of functioning, Gresham and MacMillan (1998) purport significant methodological concerns regarding these treatment outcomes. Bristol's et al., (1996) comprehensive NIH report indicates a need for studies to compare the efficacy of various treatment approaches for young children with autism. For example, while programs for young children with autism have compared the intensity of their own procedures, there has been little or no comparison between different types of programming and instructional options specific to young children with autism. Gresham and MacMillan (1998) urge parents and educators to "adopt an attitude of healthy

skepticism” (p. 5) when considering treatment programs, especially programs and studies which report phenomenal gains without admittance to methodological limitations.

Overall, while the research basis for early intervention for children with autism is small, there is strong evidence that behavioral interventions, beginning before the age of five, are optimal to non-behavioral interventions and interventions beginning after the age of five (Green, 1996). Additionally, the optimal age, to begin behavioral interventions, may be as early as two to three years of age (See Birnbrauer & Leach, 1993; Lovaas, 1987; McEachin et al., 1993). Aside from debate within the area of interventions for young children with autism, research supports early interventions for children with developmental disabilities. Additionally, taking a problem solving perspective, there is no reason to delay intervention as soon as a deficit is identified, even if the educational or clinical diagnosis of autism is not yet given.

Instructional Programs for Young Children with Autism

There are numerous comprehensive programs for young children with autism. These include home-based, center-based, school-based, university-based and combined programs. Overall, much of the literature has viewed program effectiveness from a long-term program evaluation perspective. Programs demonstrating large percentages of children moving into the “normal” range of functioning were deemed the most effective (Birnbrauer & Leach, 1993; Lovaas, 1987; McEachin et al., 1993). Program effectiveness has also been measured by the size of the instructional group such as those studies comparing effectiveness of one-to-one instruction with group instruction (Favell, Favell, & McGimsey, 1978; Koegel & Rincover, 1974; Polloway, Cronin, & Patton, 1986; Storm & Willis, 1978). Viewing effectiveness from this perspective does not allow

identification of specific instructional strategies that are key to learning. More importantly than viewing programs from a global perspective, it is important to assess the specific intervention components that allow early intervention programs to be effective (Rotholz, 1990). To identify the actual strategies that may allow young children with autism to become more successful, a component analysis of the instructional strategies used within one-to-one and small group instruction is necessary.

In the following sections, the overall effectiveness of one-to-one and small group instructional programs will be reviewed. We will study the advantages and limitations of these instructional options as well as research comparing small group and one-to-one instructional strategies. Lastly, because there have been few attempts to determine the specific critical instructional components of effective early intervention, we will thoroughly review effective teaching strategies and how these strategies may benefit young children with autism.

One-to-One and Discrete-Trial Instructional Arrangements

While there is debate as to the necessary intensity and structure of interventions for young children with autism, it appears that early and intensive interventions based on the principles of behavior analysis are most likely to produce substantial benefits. Utilizing an intensive behavioral approach, Ivar Lovaas began treating children with autism in 1970. Lovaas' treatment program, referred to as The Early Intervention Project (EIP), and now called The UCLA Young Autism Project (YAP), is described in the book, Teaching Developmentally Disabled Children: The Me Book (Lovaas, 1981). Results of this project were reported in Lovaas' 1987 empirical article.

The YAP instructional program is based on principles of operant learning and

primarily utilizes discrete trial discrimination learning. YAP was intended as a home-based intervention for young children with autism, and was designed to take place 365 days a year for 40 or more hours a week (Lovaas, 1987). Student teachers as well as parents were trained in instructional strategies. Instruction during the first year focused on gaining compliance, teaching imitation behaviors, and reducing aberrant behaviors through use of primarily one-to-one discrete trial instructional sessions. During the second year of instruction, language and social skills were taught. Treatment in the third year focused on pre-academic skills, expressing emotions and involving peers in academic tasks (Lovaas, 1987). The degree to which one-to-one instructional strategies as opposed to group strategies are used in the second and third year of instruction is unclear in the literature. In The Me Book, Lovaas (1981) describes latter curriculum components that involve groups of peers or students as well as strategies to implement discrete trial procedures within small groups.

Lovaas' program primarily utilizes discrete trial discrimination learning. This procedure, described in more detail in The Me Book (Lovaas, 1981) and in video-tapes Lovaas supplied with the book, involves systematic and precise manipulation of the controlling, motivating, and maintaining variables within a student's environment. With discrete trial training, a teacher presents stimuli to a child, records responses, and delivers consequences. Each trial begins with presentation of a stimulus that is discriminative for a particular response. Reinforcing feedback is provided upon the child's correct response, while corrective feedback is provided upon an incorrect response. If no response occurs within a specified time, prompting is used to evoke a response. Once responses to prompts become consistent, the prompts are systematically faded. Trials are

repeated frequently and arranged each day in intensive one-to-one sessions. Decisions about instruction are based on data recorded from each session. After the student consistently responds to the training stimulus, the target of instruction typically changes to another stimulus similar to the last, or to one that combines two of the most recent learned concepts. Instruction may also focus on maintenance of learned skills through frequent review (Lovaas, 1987).

Lovaas' Young Autism Project was at the forefront of developing strategies for children with autism. In 1987 and 1993 the EIP reported follow-up results indicating intensive, long-term behavioral treatment resulted in nearly 50% of children with autism achieving normal intellectual and educational functioning. In addition, another 40% achieved significant increases in functioning. This data was compared to that of the non-experimental group in which only 2% of the children achieved normal functioning (Lovaas, 1987, 1993; McEachin et al., 1993). Because of these reports, parents across the nation pushed school districts through legal dispute to provide the intensive behavioral program supported by Lovaas. In 1997, Gresham and MacMillan reported significant methodological problems that would place the EIP outcome results into suspicion. Gresham and MacMillan (1997a, 1997b) conclude that while the EIP and YAP procedures show much promise as effective strategies for young children with autism, the program is "at best experimental, does not have enough empirical data to support its wholesale adoption, and requires independent replications before it can be considered a standard treatment for autism" (p. 186).

One-to-One Advantages

Overall, one-to-one instruction's popularity and controversy can be accounted for

by examining the advantages and disadvantages of this instructional approach. Rotholz (1990) provides the rationale for the use of one-to-one instruction. First, he indicates that one-to-one instruction provides for undivided teacher attention, thus minimizing distracting stimuli, and enabling stimulus control. Whereas prerequisite skills are necessary for increased likelihood of success in small group instruction, minimal prerequisite skills are required for one-to-one instruction, and one-to-one instruction can provide a relatively distraction free setting to obtain instructional control.

Second, one-to-one instruction is often easier to implement compared to group instruction. This was evidenced in Kamps, Walker, Maher, and Rotholz (1992), where teachers scored group instruction less satisfactorily than one-to-one due to the preparation required for group instruction. Although individual student behavior in the group was similar to individual behavior during one-to-one instruction, teachers also indicated less satisfactory ratings of group instruction due to student behavior. This is likely due to the combined effect of individual student behavior during the group.

A third advantage of one-to-one instruction is that it provides a setting where learning opportunities can be maximized. During one-to-one instruction, learning opportunities are continuously focused on the target child, whereas during small group instruction students are often required to take turns. When learning opportunities are increased rate of acquisition is maximized.

One-to-One Limitations

While much focus in the literature is placed on one-to-one strategies, three primary disadvantages emerge from the literature. First, skills taught during one-to-one instruction do not often generalize to larger groups or other persons (Fink & Sandall,

1980; Koegel & Rincover, 1974; Oliver & Scott, 1981; Rincover & Koegel, 1977;).

Koegel and Rincover (1974) taught young autistic children ages 4 to 13 attending skills in a one-to-one training session. These children failed to generalize training to groups of two and eight without explicit small increases in group size and retraining of attending skills. Similarly, Oliver and Scott (1981) found generalization to be 45% less for subjects taught in one-to-one as opposed to those taught in a group. Several factors may effect generalization rates from one-to-one instruction. For generalization to occur, skills must be taught with multiple exemplars or taught “loosely”. Because one-to-one instruction often takes place in an unnatural setting with no other peer models of behavior and fewer exemplars, stimulus over-selectivity may occur which decreases opportunity for generalized responding. Because children with autism often have a tendency toward routine and repetitive behavior, teachers must be careful to plan for generalization. One-to-one instruction provides less opportunity for such programming opportunities.

A second concern about one-to-one instruction is the degree to which one-to-one instruction prepares children with disabilities for peer social interactions or integration in less restrictive settings (Fink & Sandall, 1980). Alberto, Jobes, Sizemore, and Doran (1980) found that peers provided positive feedback and encouragement to each other during group instruction. One-to-one instruction does not offer these social reinforcers or the development of these types of reinforcers. Similarly, one-to-one instruction may impede the development of peer social interactions and school related behaviors such as turn-taking, teacher-getting behavior, independent work behaviors and observational learning. While some children with autism may benefit from observational learning, (Kamps et al., 1992) one-to-one instruction does not offer children the opportunity to

enhance their observational learning skills, and therefore decrease their potential opportunity to integrate in normalizing activities with typically developing peers.

Lastly, and probably the most researched concern related to one-to-one instruction is the lack of efficiency and cost-effectiveness of one-to-one instruction (Collins, Gast, Ault, & Wollery, 1991; Polloway et al., 1986; Rotholz, 1990). While students with autism must be offered a continuum of services, schools need cost effective programming that can be applied in public school classrooms. Public schools typically have limited resources for classroom associates, and limited space for individual instruction. Therefore, the feasibility of one-to-one instruction is greatly limited in the public school setting (Favell et al., 1978; Kamps et al, 1991). Favell et al. (1978) found one-to-one instruction three times less efficient in terms of teacher time as compared to group instruction. Kamps et al., (1992) found fewer reinforcement opportunities during one-to-one instruction. Overall, one-to-one instruction is less efficient in terms of the time required for materials to be learned as compared to group instruction (Polloway et al., 1986).

In summary, while intensive one-to-one behavioral approaches may hold promise for young autistic children with severe aberrant behaviors, these strategies are highly criticized. Within the realm of school-based settings, one-to-one strategies make inefficient use of teacher time. This inefficiency is costly in terms of time and personnel. In response to inherent problems with one-to-one instruction, research has focused on validating alternative instructional arrangements for young children with autism.

Small Group Instructional Arrangements

One of the primary alternatives, to intensive one-to-one instruction, has been

small group instruction. Rotholz (1990) defined group instruction as the teaching of a group of students in close physical and temporal proximity. The type of small group instructional arrangement can significantly affect learning opportunities and the effectiveness of small group instruction. Reid and Favell (1984) identified three general arrangements for group instruction. They are: (1) sequential arrangements, where students in the group are taught individually, while group members attend to instruction or work on other tasks; (2) concurrent arrangements, where students in the group are taught concurrently and at times individually as in sequential; and (3) tandem arrangements, where students are taught in a one-to-one fashion and more students are gradually faded into the group. Collins et al. (1991) also defined types of groups for students with moderate to severe handicaps. While also referring to sequential types of groups, they referred to a one-to-one supplement arrangement where the teacher provided instruction in a group arrangement and conducted one-to-one sessions to provide additional learning opportunities. Lastly, Kamps et al. (1991) noted a fifth group type that is similar to the concurrent arrangement. Kamps et al. (1991) called this group collective group instruction and indicated students would respond in unison to instructional requests. This type of group differs from the concurrent group in that all responding is unison in the collective group whereas in the concurrent group, responding opportunities include unison and individual and/or student-to-student. Programs considering small group instruction as their primary instructional method must consider the advantages and disadvantages of this kind of programming.

Small Group Advantages and Limitations

Behavior. First, students with autism often possess characteristics that prevent

them from being successful in small groups or with other typically developing peers. This is especially the case for young children with autism. Children with autism often lack the social skills to participate and pay attention in group instructional arrangements. Some children demonstrate severe self-injurious, self-stimulating, escape and disruptive behavior. Research suggests student behavior can be an obstacle in group instruction (Kamps, Walker, Locke, Delquadri, & Hall, 1990; Kamps et al., 1991; Lovaas, Koegel, Simmons, & Long, 1973; Rotholz, 1990). Rotholz found small group required more effort to maintain student attention and groups were more challenging to program for students with heterogeneous learning needs. Kamps et al. (1992) found similar results when asking teachers about their preference for instruction. While teachers believed group instruction was good for students, they scored group instruction less satisfactorily compared to one-to-one instruction due to preparation time and behavior management. Storm and Willis (1978) found decreases in behavioral control for profoundly retarded individuals during the first 180 minutes of small group instruction.

Some positive effects for behavior have also been reported for small group instruction. Alig-Cybriwsky, Wolery, and Gast (1990) reported preschool children with mild developmental disabilities had high attending behaviors throughout 16 minute small group sessions. In Kamps et al. (1992), while teachers reported small group behavior more challenging to manage than one-to-one instruction, they found on-task behavior increased at similar levels and rates for autistic children in both one-to-one instruction and group instruction. These results would indicate that it is the management of the combined student behaviors in a group that may make small group instruction more challenging.

When assessing factors influencing student behavior in small groups it is important to consider more than simply the size and configuration of the group. The specific instructional strategies of the group can have a significant impact on student behavior in the small group. Kamps, Dugan, Leonard, and Daoust (1994) reported students with autism were less likely to be disruptive in small group during enhanced instruction consisting of choral and student-to-student response opportunities, frequent rotation of materials, and random response sequences as opposed to small group with round-robin trial presentations.

Another variable, which may impact student motivation, is the predictability of trial presentation in the group. Ault, Wolery, Gast, Doyle, and Martin (1990) found mixed results for student attention during predictable and unpredictable trial sequences during small group instruction. While some students had better attending behaviors during predictable sessions, some had better attending behaviors during unpredictable presentation. It is hypothesized that unpredictable trial presentation requires students to attend more consistently to the stimulus presentation and may enhance observational learning as well as enhance student behavior.

An additional factor, which can significantly impact student motivation, is the constancy of acquisition tasks during instruction. Research suggests students who receive interspersed acquisition tasks along with maintenance tasks during instruction are more motivated, have better acquisition rates, and have fewer escape motivated behaviors than students who receive constant acquisition tasks (Dunlap & Koegel, 1980; Koegel & Koegel, 1986; Neef, Iwata, & Page, 1980; Winterling, Dunlap, & O'Neill, 1987). While research studying interspersed versus constant acquisition tasks for students in small

groups is not available, the research would suggest this to be a viable instructional strategy to maintain student motivation and behavior during small group instruction.

Overall, while students with autism often have behaviors that when combined can make small group management challenging for teachers, it is important to consider small group instructional strategies that may reinforce student attending behaviors and decrease difficult behaviors. Review of studies addressing student behavior during small group would suggest careful consideration of the use of small group instruction for students with behavioral needs.

Observational Learning. A second factor when considering the utility of small group instruction is the impact of small group instruction on observational learning. While small group instruction may offer fewer learning opportunities, learning can be enhanced through observational learning exposures. Shelton, Gast, Wolery, and Winterling (1991) defined observational learning as the extent to which the members of a group learn material that is presented to other members of the group as a function of watching them receive reinforcement for their performance. Within a group, observational learning can occur when a member of the group is presented with learning trials as other members of the group attend to the learning opportunity while waiting their turn.

Observational learning is vital to social behaviors (Dunlap, Koegel, & Burke, 1981). The opportunity to learn observational learning skills is an important advantage of learning in a group; however, over-selectivity may prohibit observational learning for students with autism (Dunlap et al., 1981). Dunlap et al., (1981) indicates students with autism may over-selectively respond to irrelevant stimuli during a teaching situation and

thus only acquire part of a modeled response or even an incorrect response. Similarly, off-task behavior may limit observational learning for students with autism. Dunlap et al. (1981) therefore recommends strategies to enhance the benefits of observational learning. Strategies include using orienting cues for non-target students within the group, and using a within-stimulus prompt, or exaggerated model, to assist students with autism in orienting toward relevant stimuli. Additional strategies, which may decrease stimulus over-selectivity, include frequent rotation of materials and teaching loosely with multiple exemplars.

While research suggests students with mild, moderate and severe disabilities can benefit from observational learning in a group, (Alig-Cybriwsky et al., 1990; Favell et al., 1978; Fickel, Schuster, & Collins, 1998; Oliver & Scott, 1981; Schoen & Sivil, 1989; Schoen & Ogden, 1995; Shelton et al., 1991; Singleton, Schuster, & Ault, 1995; Venn, Wolery, & Greco, 1996; Wolery, Ault, Doyle, Gast, & Griffen, 1992; Wolery, Ault, Gast, Doyle, & Mills, 1990) research supporting observational learning for young children with autism is more limited. Kamps' et al., (1990) study found mixed results for observational learning. One of three students demonstrated good observational learning while the other members of the group demonstrated no or little observational learning. Varni, Lovaas, Koegel, & Everett (1978) found chronological age related to the amount of learning through observation. They determined the youngest children only acquired some limited features through observational learning. Handleman and Harris (1983) and Liebek (2000) also found minimal observational learning for children with autism.

While observation learning may be more difficult for students with autism, observational learning may also depend upon how group instruction is arranged, as well

as on the characteristics of participants. While it is important to screen students with autism for their readiness for small group instruction, it may also be beneficial to cue nontarget students to attend to stimuli presented to the target student (Handleman & Harris, 1983; Wolery et al., 1990).

Generalization and Social Interaction. A third group instruction factor to consider is that of generalization. One-to-one instruction is often criticized for its lack of skill generalization (Koegel & Rincover, 1974; Rotholz, 1990) and limitation of natural social interactions (Polloway et al., 1986). Koegel and Rincover (1974) found young children with autism had difficulty generalizing their attending skills from individual instruction to group instruction. Similarly, Oliver and Scott (1981) found generalization 45% greater for individuals taught in a group compared to those taught in one-to-one instruction.

Various types of skills have been demonstrated to have generalizing effects when taught through group instruction. Schepis, Reid, and Fitzgerald (1987) found generalization of life skills after teaching adults with profound disabilities in a group and Alig-Cybriwsky et al. (1990) found generalization of sight word reading skills when preschoolers with mild developmental disabilities were taught in a group.

Several factors may significantly influence generalization during group instruction. First, because group work increases in common school situations, group instruction provides a more normalizing experience toward integration (Fink & Sandall, 1978,1980). Groups offer opportunities for peer social interactions and more natural forms of reinforcement than one-to-one instruction (Rotholz, 1990). Alberto et al. (1980) reported that young children with disabilities provide verbal and physical encouragement to their peers during group instruction. Opportunities for generalization are enhanced by

group instruction because group instruction is more similar to the natural setting than one-to-one instruction. Losardo and Bricker demonstrated this in their 1994 study where they found that skills taught during activity-based intervention generalized more effectively than those taught during group instruction.

Overall, the research supports teaching in multiple-natural conditions with multiple exemplars and varied stimuli material to enhance generalized skills (Fickel et al., 1998; Handleman & Harris, 1980; Kamps et al., 1991; Oliver & Scott, 1981). Teaching in a small group much closer approximates instruction in the regular classroom (Kamps, Walker et al., 1991). It provides a looser training procedure, opportunities for social reinforcement, and characteristics similar to other learning environments. Rotholz (1990) recommends after attending skills are established, group methods, which closely approximate the natural environment, should be selected to promote generalization.

Efficiency. A fourth factor to consider in group instruction is that of effectiveness and efficiency. Venn et al. (1996) define effectiveness as the degree to which strategies allow students to learn and efficiency as the degree to which strategies allow students to learn more rapidly and learn more behaviors. While effectiveness is a measure of acquisition, efficiency takes into consideration both amount of behavior learned, amount of time required to learn behavior and in turn amount of resources required to learn behavior. In this section, efficiency in time and resources is reviewed.

First, practical considerations make group instruction more efficient. Teachers in special education classes are often required to work with students with autism in group formats (Schepis et al., 1987). Public schools typically have limited resources for classroom associates, and limited space for individual instruction. Group instruction

provides a viable alternative to one-to-one instruction (Favell et al., 1978; Kamps et al., 1991).

Favell et al. (1978) found group instruction three times more efficient in terms of teacher time as compared to one-to-one instruction. Fink and Sandall (1980) found small group instruction with young children two times more efficient in terms of teacher time compared to one-to-one instruction. Kamps et al. (1992) found more learning trials, more prompts and more reinforcement opportunities in small group instruction compared to one-to-one instruction.

While small group instruction may be more efficient in terms of resources, Kamps et al. (1990) indicates concerns about the pacing of instruction during small group. The slower pace of small group instruction may be due to additional cueing, reinforcement and correcting that is necessary during small group with multiple members. This in turn may make small group sessions longer than one-to-one sessions. However, while sessions may be longer, Kamps et al. (1990) indicates group combined session time is still shorter than total session time for all individualized instruction.

Overall, the research indicates group instruction is more efficient in terms of the resources required to learn as compared to one-to-one instruction (Polloway et al., 1986). However, because session length and pace of instruction can significantly effect learning, especially for students with significant behavior difficulties, research must address strategies to decrease session length while increasing learning opportunities and learning rates.

Effectiveness of Small Group Instruction

Over the next section of this paper, the effectiveness of small group instruction

will be examined. First, early research on the effectiveness of group instruction will be reviewed. Second, a review of studies directly comparing small group instruction to one-to-one instruction will be completed. Third, effective components of small group instructional arrangements will be reviewed. Fourth, this section will end with a summary of implications for teaching young children with autism.

Early Efficacy Studies. Koegel and Rincover (1974) were one of the first to report efficacy of small group instructional arrangements for children with autism. They used an arrangement with components of both concurrent and tandem instruction. In their study, they described procedures to slowly increase the size of the group from one-to-one up to a small group size of eight students. Through this procedure, students responded chorally, and as the group size increased, the schedule of reinforcement was thinned. This study concluded that movement from a one-to-one instructional arrangement to a group arrangement with two students or more is not recommended. Their results indicated a tandem arrangement, with slower increases in group size, may be a more effective method in transitioning to small group instruction. Since this study, sequential, concurrent, and combined groups have been used to effectively teach individuals with developmental disabilities in a group (See Alberto et al., 1980; Alig-Cybrivsky et al., 1990; Favell et al., 1978; Fickel et al., 1998; Fink & Sandall, 1978; Kamps et al., 1990, 1992; Oliver & Scott, 1981; Rincover & Koegel, 1977; Schepis et al., 1987; Sindelar, Bursuck, & Hall, 1986; Singleton et al., 1995; Storm & Willis, 1978; Wolery et al., 1992).

Efficacy of Sequential Small Group Instruction. Although group arrangements have been demonstrated to be effective at teaching a variety of skills, the effectiveness of

small group arrangements must be compared to that of one-to-one to identify its degree of efficacy. Research supports the efficacy of small group instruction. In 1978, Favell, Favell, and McGimsey demonstrated the effectiveness of small group instruction as compared to one-to-one instruction. They utilized a sequential small group arrangement to teach individuals aged 9 to 25 years. They concluded that while students instructed in the sequential small group arrangement received significantly fewer learning trials (17 as compared to 53 in one-to-one) this group had similar rates of acquisition as the students instructed in one-to-one instruction. In addition, these researchers noted that group instruction was three times more efficient in terms of teacher time. Oliver and Scott (1981) found similar results when teaching adults in a sequential group.

Other studies comparing one-to-one instruction to sequential small group instruction have shown results that are more mixed. Alberto et al. (1980) found sequential instruction more effective during table tasks as opposed to motor tasks. Additionally, research suggests that prerequisite and readiness skills are important variables in determining outcome for young children with autism who participate in sequential instruction (Handleman & Harris, 1983). Handleman and Harris (1983) compared sequential instruction to one-to-one instruction for students with autism and found the group instruction had adverse effects for two of the students while one learned more quickly during group and one showed little difference. Similar results were found for autistic students in Liebek (2000).

While these studies supported the use of small group instruction as an effective alternative to one-to-one instruction for some children with autism, they raise concerns about the use of small group strategies for children with autism. Several factors may play

in limiting the effectiveness of sequential small group instruction for young children with autism. First, specific prerequisite skills may be necessary for young children with autism to maximize learning in small group arrangements. Without prerequisite skills, challenging behaviors may interfere with learning. Second, sequential instruction provides fewer learning opportunities than one-to-one instruction. During sequential instruction non-target students are exposed to observational learning opportunities, however, participate in significantly fewer learning opportunities.

To increase learning opportunities, concurrent components have been used in small group instructional arrangements. In 1978, Fink and Sandall compared one-to-one instruction with small group concurrent instruction for young children with handicaps. They found students learned at a similar pace in the small group setting as the one-to-one setting. In 1987, Schepis, Reid, and Fitzgerald found a combined sequential concurrent group to effectively teach profoundly impaired adults.

Research also supports combined sequential concurrent group instruction for children with autism. In 1990, Kamps et al. compared small group instruction with concurrent and sequential components to that of one-to-one instruction for elementary-aged children with autism. They determined on-task and self-stimulatory behaviors to be relatively stable across conditions and found that group was as or more effective than one-to-one for these children with autism. In 1992, Kamps et al. replicated these findings with children with autism and developmental disabilities between 5 to 21 years-of-age. They also concluded that students were able to transition successfully from one-to-one instruction to small group instruction, and school-age children with autism may only require a few one-to-one sessions to benefit from participation in small group instruction.

Summary of Efficacy of Small Group Instruction. Overall, while current research supports the use of small group arrangements as effective alternatives to one-to-one instruction, studies comparing these two types of instruction continue to show variability in their conclusions especially for young children with autism. There are several variables that may account for these differences in outcome results. Potential variables include (a) the age of participants; (b) student prerequisite skills or length of experience in one-to-one instruction; (c) the experience of the teacher; and (d) the type of individual and group instructional strategies that are utilized. Thus far, results from Kamps et al. (1990; 1992) and previous research studying the effects of sequential group instruction would indicate that the specific small group instructional strategies are key in the effectiveness of group strategies.

Sindelar et al. (1986) taught young elementary children with mild disabilities, and compared the effectiveness of sequential instruction in a group to that of concurrent (choral) instruction in a group. They concluded small but reliable effects favoring the concurrent condition and determined that “. . . unison responding generates more substantive teacher interaction than does ordered responding” (p. 65). Similarly, Wolery et al. (1992) used a small group arrangement to compare effectiveness of concurrent responding with individual responding. They determined concurrent responding appeared to be superior to individual responding when exposure was the same; however, individual responding appeared to be superior to choral responding when the opportunities to respond were equivalent. While this study favors neither individual nor concurrent responding as more effective, efficiency favors the concurrent condition. Although children performed similarly in the concurrent and the individual conditions,

children were presented with two times more instructional trials (response opportunities and observational learning exposures) in the individual responding condition. This would indicate that individual instruction in the group would require about twice as much time to complete as concurrent instruction.

While these results are supportive of small group instruction for students with disabilities, further investigation is necessary to determine the degree to which various group strategies are effective for young children with autism. Numerous instructional strategies are available for use in small group instruction. These include, but are not limited to, strategies for attention cueing, trial presentation, and response type. Kamps et al. (1994) combined choral cues and responding trials, student-to-student responding trials, frequent rotation of materials, and random responding to effectively instruct students with autism in small group arrangements. First, while research suggests combinations of these strategies may be effective in a small group setting, there is a lack of evidence studying the potential differences in effectiveness between the individual components of small group instruction (Kamps et al., 1994; Rotholz, 1990). The following section summarizes the research on effective teaching and identifies potential instructional components of small group arrangements.

Review of Research on Effective Teaching Strategies

While instruction in less restrictive settings may foster generalization of behaviors and provide the opportunity for observational learning, (e.g., Alig-Cybriwsky et al., 1990; Wolery et al., 1992) a criticism and fear of small group instruction is that it may be unproductive. In 1981, Lovaas et al. indicated a primary problem with group instruction was that it generally had fewer opportunities to practice target skills. Lovaas and

colleagues were referring to one of the most critical features of good teaching, the use of instructional strategies that impact student behavior to promote Academic Learning Time (ALT). Gettinger (1995) notes that the amount of time that students are actively engaged in appropriate learning activities is highly related to student achievement. In addition, active engagement, where students actually practice skills, is a better predictor of student achievement than passive engagement, where students watch other children respond. Lovaas (1981) indicated concern that small group instruction would dilute instruction by spreading it more thinly across the group than what is available in one-to-one instruction.

Therefore, research must focus on instructional strategies which (a) increase student attending during individual instructional trials, and (b) maximize student response opportunities. In the following sections we will review and summarize research on effective teaching strategies that may be incorporated as components of small group instruction.

Attentional Cueing

First, in order to maximize attending behavior and observational learning opportunities, students in the group must attend to their peers' trial presentation. Alig-Cybriwsky et al. (1990) indicate the extent to which students in the group attend to the critical features of other students' group behavior may significantly influence observational learning during individual instruction in the group. When presenting stimuli to the group, an attentional cue can be given to teach student attending behavior during non-target trials. Cues can be either general or specific in nature. General cues generally consist of specific directions to "look" at the teacher or materials, while specific attentional cues require a specific response related to the stimulus materials (i.e. "Let's

say the letters.”). Alig-Cybriwsky et al. (1990) compared the effectiveness of general and specific attentional cues and found observational learning rates significantly higher with use of the specific attentional cue. They reported attending behavior was high throughout the study and was not effected by the type of cue presented. While this study demonstrated support for the specific attentional cue, additional studies indicate more mixed results for type of cueing strategy (Schoen & Ogden, 1995; Wolery et al., 1990). Additional investigation is necessary to determine if specific cueing is more effective depending on the type of response being taught. In effect, studies typically implement a general cue when expecting observational learning from group members (Ault et al., 1990; Dunlap et al., 1981; Kamps et al., 1994; Schoen & Sivil, 1989). Overall, this cue consumes less time and is more easily managed in a small group.

Trial Presentation

The way in which trials are presented to a group can significantly impact learning and behavior. Trials can be presented predictably or unpredictably, acquisition tasks can be presented constantly or interspersed with maintenance tasks, trials can be massed so materials are used repeatedly or can be distributed and materials can be frequently rotated during the group.

Predictable and Unpredictable Presentation

First, during individual instruction in a group, trial sequences can be predictable or unpredictable. Predictable sequence in the group generally consists of presenting trials to students in a round-robin fashion with no more than 4 trials in a row before moving to the next student. During unpredictable trial sequence up to four trials may be presented to a child in the group, however, rotation through the group is random (Fickel et al.,

1998; Kamps et al., 1994; Shelton et al., 1991; Wolery et al., 1990).

Ault et al. (1990) compared predictable and unpredictable trial sequences during small-group instruction in three separate experiments and found mixed results. During study 1, each student received one learning trial before the next student was instructed. Some students had slightly better observational learning in the predictable condition. During study two where each student received 4 trials in a row, two of the students required twice as many learning trials during the unpredictable condition and student attention was greater in the predictable condition. Study three was similar to study two; however, the teaching strategy was changed from time-delay to model-test. During this study, mixed results were found with attention being better for some during unpredictable and some during predictable. These results suggest pace of instruction may be an essential variable in attention to task. Summative results indicate learning and attention were better when trial presentation was quicker. During study one each student would have been called on about once every five trials whereas in study two each student was called on once every 20 trials. Similarly, using a model-test teaching method would increase rate of instruction because no time delay is required to wait for correct responding. Overall, while additional research is necessary to replicate outcome results when unpredictable and predictable sequences are presented at a high rate of instruction, these results suggest some students may benefit from unpredictable trial sequences when instruction rate is high and turn taking is frequent.

Constant and Interspersed Acquisition Tasks

Second, trials can also be presented so acquisition tasks are constant or acquisition tasks are varied or interspersed with maintenance tasks. Koegel and Koegel

(1986) compared constant acquisition to interspersed acquisition during instruction with a young stroke victim. Maintenance tasks were interspersed with acquisition tasks at a 1:1 ratio. Results indicated improvements in motivation and correct responding with the interspersal training. While these improvements could be accounted for by the density of reinforcement during the interspersal condition, Neef et al. (1980) have found higher learning and retention rates with interspersal training compared to high density reinforcement. In 1987, Winterling and colleagues replicated interspersal training findings with elementary-age children with autism in one-to-one instruction. Their findings indicated significantly lower levels of aberrant behavior during the interspersed condition and higher levels of correct responding for one of the two students. Therefore, interspersed maintenance tasks produce higher levels of motivated performance and task acquisition than constant tasks. In addition, they note that the constant task may produce escape motivated behavior. They indicate a need to study the effects of interspersed acquisition in a group (Winterling et al., 1987).

Frequent Rotation of Stimulus Materials

A third strategy that aims to vary tasks during instruction involves frequent rotation of stimulus materials. Dunlap and Koegel (1980) compared a constant task where one target task was repeatedly presented throughout the session, to a varied task, where no task was presented more than two trials in a row. Their results indicated children with autism showed declining rates of accurate responding during the constant task. During the varied task, children with autism demonstrated increased accuracy and one of the children with autism demonstrated behaviors that are more compliant. Affect ratings decreased over time for the constant condition, while the affect was rated

relatively high and stable throughout the varied task. Reasons for differences in responding may be due to boredom with the constant condition or the novelty of the varied condition. Oliver and Scott (1981) indicate potential effects of varied instruction on generalization. They indicate the variation of tasks during group instruction may function as a loose training procedure and thus facilitate generalization. Fickel et al. (1998) varied tasks during group instruction due to the heterogeneity of group members. Results from this study indicate positive effects for observational learning as well as generalization. Other methods of introducing stimulus variation may also be useful in motivating autistic children.

Massed and Distributed-Trial Instruction

A fourth form of stimulus variation is varying the concentration of learning trials such as that done during massed-trial, distributed-trial, every-day, and every-other day instruction. Massed-trial instruction is when learning trials are massed into a single session while during distributed trial, a few learning trials are interspersed throughout the child's day during transitions and other learning tasks (Chiara, Bell, Schuster, & Wolery, 1995). Chiara et al. (1995) compared massed-trial to distributed-trial instruction for preschool children with developmental disabilities and found lower error rates and fewer trials to criterion for students during the distributed trial condition. They found no differences for maintenance and generalization and recommend that the contextual appropriateness of distributed-trial be considered. While distributed trial may be an effective stimulus variation strategy; it may be challenging to manage during group instruction. Further research is necessary to address efficient use of distributed-trial strategies with groups of students.

Every-Day and Every-Other-Day Instruction

Every-other day instruction is another method of stimulus variation that can effect learning. Venn et al. (1996) taught groups of preschool students and compared every-day instruction to every-other day instruction. They determined every-other day instruction to require fewer sessions, trials and minutes of instruction to criterion.

In summary, the research suggests stimulus variation may serve to heighten responsivity to stimuli. It may increase student motivation, learning rates and subsequently efficiency of instruction. While inconsistent results are demonstrated for predictable versus unpredictable trial sequences, unpredictable sequences may benefit some students under certain circumstances. Additional research supports the use of varied acquisition tasks, frequent rotation of stimulus materials and distributed-trial instruction to increase student motivation, acquisition and efficiency of instruction. These effective teaching strategies should be considered as potential components when instructing students individually as well as within a group.

Student Response Type

In addition to cueing and presentation strategies, the type of response required from students within a group may significantly effect exposure to learning, learning opportunities, and rates of acquisition and observational learning. In school settings, instruction in a group is often laden with excessive passive learning opportunities and limited active learning opportunities where the teacher may talk more than students respond. During group instruction, students can be expected to take part in numerous behaviors. They include listening to the teacher, listening to other students taking turns, participating by raising their hand to take a turn, participating by asking a peer to take a

turn, taking an individual turn, and responding with the group in a choral or unison turn. Because choral and individual response opportunities provide the highest degree of active engaged time, in the next section of this paper, choral and individual responding will be reviewed. The strategies will be compared and recommendations and areas of future investigation for small group instruction will be summarized.

Wolery et al., (1992) defined choral and individual responding. They indicated, “Choral responding means that the students in the group respond in unison when the teacher gives a signal; individual responding means that one student at a time responds when the teacher signals him or her” (p. 290). Choral responding is the primary focus on concurrent group instruction (Reid and Favell, 1984) and although referred to as unison oral responding in direct instruction, it is a primary component of direct instruction teaching (Carnine, Silbert, & Kameenui, 1997). Carnine et al., (1997) indicated active student involvement is a critical feature of efficient small group teaching in the early primary grades. They indicated that unison responding facilitates active involvement. During choral responding, all students participate in each learning opportunity, whereas during individual instruction the target student participates in the learning opportunity while the non-target students are exposed to the learning opportunity. Advantages of choral responding include students having more opportunities to practice the skill, teachers having more opportunity to view student progress, and providing more active involvement for young students and students with attending difficulties.

Several studies have directly compared the effectiveness of individual and choral response opportunities. In 1978, Fink and Sandall compared one-to-one instruction with choral instruction in a group for preschool children with handicaps. They determined all

students learned at a similar pace during both conditions. Sindelar and colleagues (1986) compared individual instruction in a group to choral instruction in a group for elementary-aged children with mild disabilities. They found a small but reliable effect for choral responding and determined that choral responding generated more teacher interactions and provided children more opportunities to respond. Wolery et al. (1992) completed three studies comparing individual and choral responding within group instruction. They determined choral responding appeared to be superior to individual responding when exposure was the same; however, individual responding appeared to be superior to choral responding when the opportunities to respond were equivalent. While this study favors neither individual nor choral responding as more effective, efficiency favors the choral condition. Although children performed similarly in the choral and the individual conditions in study 3, children were presented with two times more instructional trials (1/4 response opportunities and 3/4 observational learning exposures) in the individual responding condition. This would indicate that individual instruction in the group would require about twice as much time to complete as concurrent instruction. These results would indicate that choral responding is at least as effective and possibly more efficient than individual responding in the group.

Overall, it is recommended that teachers use the type of responding best suited to their teaching style and characteristics of their students (Wolery et al., 1992). Sindelar et al., (1986) suggests using choral to individual responses in a 70:30 ratio during group instruction. Three studies have demonstrated use of choral responding as a component of group instruction for children with autism. Kamps et al. (1990) taught children between 8 and 11 years-of-age in a small group with both choral and individual learning

opportunities. They compared this type of group instruction to one-to-one instruction and determined that the group instruction was as or more effective than one-to-one.

Observational learning was not measured during this study. In 1992, Kamps and colleagues found similar findings with better gains during small group instruction.

Again, observational learning or generalization was not measured. In addition, while they indicated similar rates of on-task behavior during small group and the one-to-one condition they indicated a need to study management behavior required from the teacher more closely. Finally, in 1994, Kamps et al. used choral responding as a component of enhanced small group instruction to teach children with autism. This instruction had several effective teaching components in addition to choral responding. They determined most students to be less disruptive and display higher rates of responding during intervention groups. However, they indicated a need for further investigation in several areas. These are as follows: (a) to determine why one fourth of their students showed no increased learning during enhanced group instruction, (b) to study student behavior trends during enhanced group, (c) to assess generalization effects, and (d) to provide a component analysis of treatment variables and specific effects.

In summary, when considering small group instruction, it is important to utilize effective teaching strategies as components of instruction. Instructional strategies must aid in increasing student attending during individual instructional trials and maximize student response opportunities. First, cueing strategies may be beneficial compared to providing no attentional cue, additional investigation is necessary to determine if specific cueing is more effective than a general orienting cue. At this time a general cue is more efficient and should be sufficient for observational learning. Second, research suggests

stimulus variation may serve to heighten responsiveness to stimuli. It may increase student motivation, learning rates and subsequently efficiency of instruction.

Unpredictable trial sequences, varied acquisition tasks, frequent rotation of materials, and distributed-trial instruction appear to increase student motivation, acquisition and efficiency of instruction. These effective teaching strategies should be considered as potential components when instructing students individually as well as within a group.

Summary and Future Research Directions

This review has provided a thorough analysis of effective instructional strategies for young children with autism. The research indicates that instruction for children with autism has moved beyond the confines of one-to-one instruction and toward using effective teaching strategies as components of small group instruction. This trend is found throughout the effective teaching research for students with developmental disabilities as well. Although small group strategies appear to be at least as effective and possibly more efficient than one-to-one instruction, it is the inefficiency of one-to-one instruction that provides the true push toward group instruction. Schepis and colleagues (1987) state this controversy simply:

In many cases, the question of the relative effectiveness [between one-to-one and group instruction] is moot because teachers are required to work with students in group situations due to logistical demands. Hence, effective group instruction strategies are needed regardless of whether they are superior to individual teaching approaches. (p. 97)

While various small group arrangements have been found to be beneficial for teaching young children with autism, studies are beginning to incorporate multiple effective

teaching strategies into small group instruction. For example, Kamps et al. (1994) combined choral cueing, choral and individual responding, student-to-student responding, frequent rotation of materials, and unpredictable trial sequences to effectively instruct students with autism in small group arrangements. While the research suggests combinations of these strategies may be effective in a small group setting, further investigation is needed to confirm effective components of small group instruction (Kamps et al., 1994). Strain (1987) indicates, "Assuming less than infinite resources for early intervention, component analysis are the best data-based source for 'running lean' but effective" (p. 99). In order to provide efficient effective instruction in the group, the individual components of small group instruction must be assessed.

There are several additional areas that require continued investigation. They are as follows: (a) assessment of the effects of small group instruction on observational learning and generalization (Kamps et al., 1992; Polloway et al., 1986), (b) assessment of the effects of student on/off-task behavior on small group instruction (Kamps et al., 1990, 1992, 1994), (c) assessment of teacher management behavior during group instruction (Kamps et al., 1990, 1992; Rotholz, 1990), and (d) the overall efficiency of small group instruction utilizing combined response formats (Rotholz, 1990).

Lastly, there is a lack of support for the use of small group strategies with young children with autism. The majority of the research has focused on elementary age students as opposed to preschool-kindergarten age students. Unique circumstances are involved in instruction of preschool/kindergarten students with autism. Factors, which may effect instruction, include limited experience in small group settings, newly learned task-related behaviors, and limited functional communication skills.

The present study was designed to compare one-to-one instruction with small group instruction for young children with autism. First, this study focused on identifying instructional strategies that maximize learning opportunities in both individual and small group instruction. Second, this study focused on comparing the effectiveness of individual instructional components for small group instruction and one-to-one instruction. Third, this study focused on the impact of behavior management on student acquisition rates, teacher behavior, and instructional efficiency. Lastly, this study focused on the potential advantages of observational learning, maintenance, and generalization as a result of small group instruction. The following research questions were addressed:

1. Does small group instruction result in more rapid learning and/or greater maintenance of learned responses than one-to-one instruction?
2. Does instructional strategy effect student level and/or rate of acquisition?
3. Does observational learning occur in small group arrangements?
4. Does the size of instructional arrangement affect generalization and maintenance of skills?
5. Does the size of instructional arrangement affect the attending behavior of students with autism?
6. Is small group instruction more efficient than one-to-one instruction?

Lastly, it is our hope that this study aids in identifying effective components for small group instruction and assists practitioners in selecting strategies that best suit their student's individual instructional needs while allowing for efficient instructional arrangements.

CHAPTER II

METHOD

Subjects and Setting

Three children (56-69 months old) with an educational diagnosis of autism participated in this study. They will be referred to as Katie, Lee, and James throughout the study.

Katie was 5 years, 9 months old at the start of this study. She had an educational diagnosis of autism with speech and language impairment. She was working on several Individualized Educational Plan (IEP) goals relevant to participation in the small group study. These goals included generalizing object identification, attending/following directions, and improving play skills. Katie entered the autism preschool at 2 years, 8 months-of-age. Katie demonstrated significant repetitive behaviors. These consisted of staring, exaggerated facial expressions, tiptoe walking, crying or becoming giddy during transitions and when receiving physical contact, out-of-seat behavior during groups, and screaming or squealing. Katie was very good at imitating adult behavior, including verbal and motor responses. Katie's expressive language consisted primarily of single-word and two-word phrases for wants and needs ("pretzel please," "hat please," "bathroom please"). Katie liked wearing a hat, which the classroom staff used to reinforce Katie's use of a quiet voice (instead of crying or giddiness). Katie also enjoyed brief physical contact from adults, pretzels and cookies, and access to a set of picture cards.

The second student, James, was 4 years, 8 months old, at the start of this study. He had an educational diagnosis of autism with speech and language impairment. He was working on several IEP goals relevant to participation in the small group study. IEP goals relevant to the study included opportunities to participate in group activities with less redirection, sit in seat with hands in lap, and improve play skills. James entered the autism preschool at 3 years, 8 months-of-age. James' repetitive behaviors included rubbing his fingers on his face or the table, squinting, hand flapping and brief screams, and rubbing his head. These behaviors appeared to distract James from group participation. James had expressive language limited to one and two-word phrases for needs and wants. James was a very quite and cheery little boy. He liked working for pretzels. In the classroom, he liked wearing a school identification badge belonging to one of the classroom teachers.

The third student, Lee, was 5 years, 8 months old. He had an educational diagnosis of autism and entered the autism preschool at 4 years, 4 months-of-age. Relevant IEP goals, which he was working toward included: (a) improving responsiveness to instructions, (b) sitting in assigned seat during group instruction, and (c) improving on-task behavior and control of emotions. Lee's behaviors included repetitive arm movements (twisting his arms together), repeatedly hitting his fists together, hitting his chin, touching his neighbors (laying on them, playing with their elbows or arms), stealing items from neighbors, picking his lip, and laughing during work time. Lee's expressive language was very limited. He started using the Picture Exchange Communication System during limited times of the day during the current school year to facilitate his language development. At the time of the study, Lee could verbally request

desired items (e.g., "cookie please"). He used gestures for additional wants and needs. Additional student information including developmental age and amount of time in structured programming can be found in Table 1.

Table 1
Student Information

Student	CA ^a	DA ^b	EL ^c	RL ^d	Age Entered Program ^a	Time In Program ^a
Katie	5-9	3-0	2-0	2-0	2-8	3-0
Lee	5-8	2-6	2-1	2-6	4-4	1-4
James	4-8	NA	NA	NA	3-8	1-1
^a Chronological Age ^b The Birth To Three Developmental Profile ^c The Early Intervention Developmental Scale ^d Receptive Language						

All 3 students were enrolled in a self-contained special education classroom in a public school for students with developmental disabilities. Lee and James attended a discrete-trial classroom for students with autism. They participated in full-day one-to-one discrete-trial instruction and a half-day discrete-trial summer program. Katie attended a preprimary impaired classroom in the morning and discrete-trial instruction in the afternoon. Both the discrete-trial classroom and the preprimary impaired classrooms were located within a low-incidence school associated with programming run by a Regional Education Service Agency in a medium sized mid-western city.

Students attending the discrete-trial classroom were generally preschoolers with moderate to severe autistic characteristics including significant delays in language and adaptive behavior. These students took part in one-to-one discrete-trial instruction,

functional skill sessions (e.g., hand washing, toileting), snack group, speech and language groups, music groups, fine and gross motor activities including pool, structured free play, and gym. The discrete-trial classroom contained one licensed classroom teacher, one paraprofessional, one practicum supervisor, one or two practicum monitors, and several discrete-trial tutors. Students in this classroom received one-to-one discrete-trial instruction during most of their school day. Discrete-trial teachers were undergraduate psychology majors participating in the university-sponsored semester-long practicum experience. These teachers were trained, supervised, and monitored as part of a university-based psychology practicum. Preschool students participating in this program had between one or two different practicum teachers each semester and new teachers at the beginning of each subsequent semester.

The preprimary impaired classroom was a small group instruction classroom primarily for students with autism and speech and language disorders. Here, students participated in group sessions with one-to-one and group instruction, music groups, free-play time, and art groups. They also had additional time for storybooks, puzzles, and other typical preschool activities.

All participants had limited small group experience. While Lee and James attended the discrete-trial classroom for the entire school day, their small group experiences were limited to music group, snack groups and speech and language groups. Snack and music groups occurred daily while language groups occurred one to two times per week. One-to-one teachers attended groups with their assigned student, generally sitting directly behind to assist them by guiding responses, correcting incorrect responses, and reinforcing correct responses.

Because Katie participated in the preprimary impaired classroom for half of her school day, she had the most experience in a small group setting. During the time she participated in this classroom, she took part in free play activities, small group practice of language skills, and some turn taking activities. Katie had mastered most of the discrete-trial classroom curriculum. She generally appeared happy, but she continued to have significantly high levels of crying, tantrumming, and screaming.

Instructional sessions for this study were conducted in analog fashion in a small classroom adjacent to the children's regular classroom. The classroom contained a child-sized table and chairs. Instructional sessions were conducted by the primary and secondary investigators, while discrete-trial undergraduate practicum teachers participated in data collection.

Consent and Assent

Approval was obtained from the Regional Education Service Agency Research Committee (See Appendix A). Upon approval of the agency, the parents of the 3 potential participants were contacted and provided with informed consent forms that described the study (see Appendixes B and C). Parents were told that their child would be participating in small group instruction for approximately 20 to 40 minutes daily over the course of 8 to 12 weeks.

Three parents received consent forms. All parents agreed to have their child involved in the small group study. In addition to consent for participation, parents were also requested to provide consent for their child to be videotaped during the study's instructional sessions as part of the monitoring procedures. All parents agreed to videotaped monitoring.

In addition to parent consent, student assent was requested daily prior to instructional sessions. Assent was considered granted when students came willingly with teachers to the small group study classroom.

Participant Selection and Screening Procedures

The students were selected for participation in the study based on a set of prerequisite skills and nomination by the autism preschool's classroom teacher. Prerequisite behaviors included the following: (a) consistent responding to auditory and visual stimuli (i.e., pointing response, touching response, looking response); (b) consistent sitting and attending behaviors; (c) motoric and/or verbal imitation; (d) prerequisite group skills (i.e., consistent responding to "everyone do this"). The first three prerequisite behaviors were assessed via review of previous student goals and each student's placement in the classroom curriculum. Additionally, the classroom teacher recommended students who demonstrated these skills. Because the recommended students had limited small group experience, prerequisite group skills were assessed during three 15-minute small group screening sessions. The primary purpose of the screening sessions was to confirm each student's readiness for small group instruction. Readiness for small group choral type instruction was determined based upon demonstration of mastery (80% criteria) during small group choral responding tasks. The five choral tasks required the subjects to follow a direction given chorally. The five directions were: (1) tap table, (2) pat head, (3) arms up, (4) touch nose, and (5) clap hands. These tasks were selected because all students performed them at a mastery level during one-to-one instruction. Therefore, it was hypothesized that if the students were able to generalize these skills to a small group choral responding instructional

arrangement, the students would be likely to benefit from small group instruction.

Students were considered ready for small group instruction if they obtained at least 80% accuracy on at least one of the three choral responding sessions.

Small group screening sessions lasted between 10 and 15 minutes and took place in a classroom adjacent to the children's regular instructional setting. The classroom contained a child-sized table with child-sized chairs. The group was presented with 25 choral responding instructional trials during each session. Please see Appendix D for Group Screening Procedure. By the third session, all students demonstrated at least 80% accuracy on choral responding tasks. Students were accepted as ready for small group instruction based on these criteria. Data for all three screening sessions can be found in Table 2. The table depicts the accuracy of responding to choral directions for each student during each screening session.

Table 2

Screening Results

Session	Katie	Lee	James
Session 1	47%	22%	68%
Session 2	56%	----	72%
Session 3	96%	96%	84%

Instructional Materials

Based on screening session data and agency and parent consent, all 3 students were accepted into the small group instruction study. Students participated in both one-to-one and small group instruction, and were taught to play with common toys and other objects encountered by preschool children. Some of the actions taught were as follows:

smash cars, hop frog, stamp play dough, put fire hat on, feed the baby, shake maraca, and fly plane.

Items were selected from approximately 60 small toy objects. Each student was assessed for accuracy of responding on items. Items were sorted into those at a mastery level (greater or equal to 75% accuracy) and those at an instructional level (less than or equal to 25% accuracy). Thirteen items were selected for each student for use during one-to-one and small group instruction. Instructional and mastery level items were selected for the study. Please see Appendixes E, F, and G for a list of stimulus items selected for each student participating in the study. Definitions for correct and incorrect responding to each stimulus item were developed and teachers were trained in presentation of each stimulus item. Please see Appendix H for a list of stimulus items and their corresponding definitions.

Instructional Strategies

Acquisition Strategies

To maximize learning potential, several instructional strategies were considered for one-to-one and group instruction. See Table 3 for a comparison of instructional strategies for one-to-one and small group instruction. Because research suggests that students at an acquisition stage need frequent opportunities for reinforcement, mastered items were included in instructional sessions. These items were included to increase the reinforcement ratio available at the start of the study. Use of mastered items within instruction increased the reinforcement ratio to about one reinforcer for every two responses during early instructional sessions. This instructional strategy also was utilized to keep the pace of instruction high. In both one-to-one and group instruction, 54% (7 of

13) of the action objects were instructional items. The remaining 46% (6 of 13) of the action objects were at a mastery level for each student.

Both one-to-one and small group instruction utilized a discrete-trial format for presenting action objects. Discrete-trial procedures allowed for error correction as well as frequent reinforcement of accurate responses. In addition, a slightly modified discrete-trial procedure for group instruction was hypothesized to provide an optimal transitional environment for the students to generalize previously learned task-related skills.

Table 3

Comparison of Small Group and One-to-One Instructional Procedures

<u>Group Instruction</u>	<u>One-to-One Instruction</u>
Three Students*	One Student*
Discrete Trial Format	Discrete Trial Format
Reinforcement for Attending	Reinforcement for Attending
Frequent Item Rotation	Frequent Item Rotation
46% of Items at Mastery Level	46% of Items at Mastery Level
57% of Items Observational*	All Items Taught Individually*
43% of Items Taught Chorally*	
Unpredictable Presentation*	
	* Denotes Experimental Variables

A third instructional variable utilized was choral response opportunities. To increase the pace of small group instruction, 43% (3 of 7 action objects) of the instructional items in group instruction were presented in choral fashion. During this procedure, each student was given the same stimulus item and then the group was given the corresponding verbal directive (i.e., "Everyone, fly plane"). Students were then either corrected or reinforced based upon their individual responses. Mastery items were also presented in a choral fashion during small group instruction.

The remaining 57% (4 of 7 action objects) of small group instructional items were presented to students in an observational learning fashion. During this instructional procedure, the teacher presented one student with the object and the appropriate directive. The targeted student acted as a model of appropriate responding while the remaining children in the group sat in attendance during the instructional trial. Stimulus items used for observational purposes were at a mastery level for the model student and at an instructional level for the remaining students in the group. It was hypothesized that students in the group could learn these actions even though they were not corrected or reinforced for responses associated with these items. The individual item procedure was used to present observational items to the model student. See Appendix I and J for Choral and Individual Instructional Procedures.

Behavior Strategies

The final instructional strategies utilized in both one-to-one and small group instruction were used to reinforce and maintain appropriate task-related behaviors during instructional sessions. First, in addition to keeping the pace of instruction high, during both one-to-one and small group instruction, items were rotated frequently to maintain the student's attention to the task. Each action object was presented four times during each instructional session, with two trials consecutively. Second, during small group instruction, random responding was used so that students (individuals or the group) were called on in an unpredictable fashion. Materials were also randomly presented each session.

Third, during both one-to-one and small group sessions, all students were reinforced for on-task behaviors. Each student was reinforced variably during the inter-

trial interval every two to four trials (between 14 and 20 times per instructional session). Reinforcers for on-task behaviors were presented by the teacher and consisted of a student-preferred edible paired with verbal praise (e.g., "Nice quiet hands James!" "Nice quiet voice Katie!" etc.). The reinforcement opportunity occurred within the inter-trial interval just before presentation of the next trial's stimulus item. During small group instruction, the students were reinforced individually and in random order for on-task behaviors. Students were considered on-task when their individually identified off-task behaviors were absent during the moment just before presenting the next stimulus item. Please see Table 4 for off-task behaviors.

Table 4
Off-Task Behaviors

<u>Student</u>	<u>Disruptive</u>	<u>Stereotypic</u>	<u>Other</u>
<u>Katie</u>	Throwing stimulus Crying Stealing item Screaming Touching neighbor Throwing item Head down Pushing away item Pulling/pushing item at teacher	Finger play Posturing Pulling cheeks/lips Hand flapping Tapping on table Flopping hands Flipping hands over on table	Playing with shirt Out-of-seat Nose picking Eating crumbs off table
<u>Lee</u>	Moving table Touching neighbors Stealing items Arms across table	Sweeping hands Arm twisting Hand flapping Noisy feet Picking lip Hitting fists together Hitting chin Laughing Rubbing eyes/head	Laying head on table/arm Eating crumbs off table Bottom off chair
<u>James</u>	Screams	Hand flapping Rubbing head Digging fingers into ribs	Turning around

		Exaggerated squinting Scissoring fingers Rubbing/scratching eyes/head Moving fingers on face/head Opening and closing hands	
--	--	--	--

Experimental Design and Procedures

An alternating-treatments design with baseline and probe measures was used to compare one-to-one and small group instructional arrangements. Although the baseline (no-treatment condition) was not a necessary component for comparison of the two instructional arrangements, it was needed to determine whether either treatment affected behavior if performance did not differ between them (Barlow & Hersen, 1994).

Baseline

The baseline condition consisted of three individual probe sessions. During probe sessions, each student was individually assessed for his/her accuracy on instructional items to be used in one-to-one and small group instruction. Correction procedures and reinforcement for correct responses were not provided during probe sessions.

Intervention

The alternating-treatments portion of the design was utilized to compare one-to-one and small group instructional arrangements. Variables manipulated in comparing the instructional arrangements included number of students participating in the session, and general type of instruction. All instructional items were presented directly and individually in the one-to-one arrangement. Instructional items were presented chorally (3 of 7 items) and as observational items (4 of 7 items) in the small group instructional

arrangement (see instructional strategies and procedures for description). In addition, small group arrangements also incorporated random responding. Before each small group sessions, items were randomized. During small group instruction, the items were presented so that the students could not predict whether an individual student or the group as a whole would be called on next. All other instructional variables were held constant across one-to-one and small group arrangements. See Table 3 for a comparison between one-to-one and small group instructional procedures.

Maintenance and Generalization

Maintenance of skills acquired during one-to-one and small group instruction was assessed at 1, 2 and 3 weeks following the last instructional sessions. The purpose of this follow-up was to identify whether skills taught in either type of instruction were more likely to be maintained after instruction had ended.

In addition to maintenance, generalization of mastered skills was assessed. Students were assessed for generalization of skills to new, but similar, materials presented in a new setting. Students were assessed using the probe procedure in a one-to-one setting.

Measures

Five types of measures were collected to measure differences between one-to-one and small group instructional arrangements. They are as follows: (a) direct observation and recording during one-to-one and small group sessions to measure acquisition of individual items, (b) probe measures to measure acquisition of group observational and choral responding items, (c) video-tape observation to measure task-related behavior, (d) direct observation and recording during generalization sessions to measure generalization

of acquisition to new stimulus items and setting, and (e) video-tape observation to measure differences in session length between one-to-one and small group instruction.

Direct Observation of Acquisition

Acquisition of action objects during one-to-one instruction was measured and recorded directly by the experimenters during one-to-one instructional sessions. The experimenter was positioned in the classroom to observe and record correct and incorrect responses on a pre-established data recording form (See Appendix K). During one-to-one instructional sessions, the teacher presented the student with 13 action objects, where 7 were instructional items and 6 were mastered items. The teacher presented each item 4 times for a total of 52 trials. Trials were presented so that each item was presented twice, then the teacher moved to a new random-selected stimulus item. After moving through all stimulus items, the teacher began the series once more. Overall, measures of acquisition were derived from 28 instructional trials during a session. Correct responding was defined as follows: The student independently completes the instructed response within 5 seconds of receiving the instruction. Acquisition was measured by calculating the percentage of instructional trials in which the student responded correctly during the instructional session.

Probe Measures of Group Acquisition

Because instructional items in the small group arrangement were of an observational and choral response type, accurate direct scoring of acquisition could not be completed during instructional sessions. During these sessions, students would have the opportunity to copy their peers. Therefore, acquisition of choral and observational items was assessed through individual probe sessions. Each student's acquisition of small

group items was assessed prior to the day's instructional session. Probe sessions took place in the instructional classroom and consisted of presenting each instructional item two times in random order. Students were not corrected or reinforced for accuracy and known mastery items were included in-between instructional trials to help maintain responding. Procedures to determine accuracy or inaccuracy in scoring were the same as those used in the direct measures of individual instructional items. Acquisition of small group items was scored by calculating the percentage of instructional probe trials in which the student responded correctly.

Video-Taped Observation of Task Related Behavior

Videotaped observation was used to score each individual student's task-related behavior during one-to-one and small group sessions. Two experimenters viewed the videotaped instructional sessions and scored off-task behaviors using a 15-second partial-interval recording system. Because each student had unique disruptive behaviors, off-task behaviors were defined individually for each student participating in the study. Off-task behaviors included the following general categories: (a) disruptive behaviors such as touching neighbors and moving the table, (b) stereotypic or repetitive behaviors, and (c) other inappropriate behaviors such as stealing items from other students, out-of-seat behavior, and turning around. Off-task behavior lists were developed by initially querying the one-to-one and small group teachers and then refined during inter-observer reliability training. (See Table 4 for off-task behaviors for each student). All instructional sessions were scored for task-related behavior. Thirty percent of instructional sessions were scored for inter-rater reliability. Please see Appendix L for the Behavior Recording Form.

Direct Observation of Generalization

Stimulus generalization of one-to-one and small group instructional items was measured directly during generalization probe sessions. First, items which students had mastered in one-to-one and small group instruction were gathered and similar but new stimulus objects were collected to match original stimulus objects (e.g., original ball was red plastic and generalization item was a baseball). Mastery was defined as greater than or equal to 75% accuracy for three or more sessions consecutively. While 80% accuracy is generally acceptable for mastery, objects were presented four times per session. Therefore, 100% accuracy would be required to meet the 80% criterion. In view of this, 75% or greater accuracy was accepted as a mastery level. Stimulus generalization probe sessions took place in the same instructional setting as one-to-one and small group instruction. Measurement of stimulus generalization used the probe procedure previously described.

Generalization of acquisition to a new setting was also assessed for each student individually. The generalization setting included a large unoccupied preschool classroom in which the student's were unfamiliar. A small rectangular table was set up near the wall of the classroom. Each student was individually assessed for his/her accuracy of one-to-one and small group instructional items in the alternate setting. Assessment in the alternate setting followed the probe procedure previously outlined. Again, objects that were mastered in one-to-one and small group instruction were used to obtain setting generalization measures.

Instructional Time

To compare one-to-one and small group instruction for efficiency, instructional time in one-to-one and small group instruction was measured for all sessions. Observers directly measured instructional time through videotape observation. Instructional time was defined as the amount of time that elapsed from the presentation of the first stimulus item to the delivery of the last reinforcer of the instructional session. Instructional time did not account for the time it took to settle students into their seats and return them to their classroom. Instructional time was calculated for all one-to-one and small group instructional sessions.

Reliability and Integrity

A total of two teachers and three observers were trained in instructional and measurement tasks. Teachers were trained for each of the types of instruction, including screening procedures, one-to-one procedures, choral responding procedures, group individual procedures, measurement and generalization probes, and reinforcement procedures. Instructional integrity was measured via integrity assessment during 40% of instructional sessions. Please see Appendix M for the Treatment Integrity Form and Procedures. Accurate presentation included obtaining student attention, presenting stimulus objects accurately, and reinforcing or correcting responses accurately. Instructional integrity ranged from 75% to 100% for instructional sessions with an average of 98% and 89% for one-to-one and group instruction, respectively.

Acquisition was measured throughout the study and reliability was scored for 47% of acquisition measures. Observers were also trained in the measurement of task-related behaviors and reliability was measured for 30% of all behavior measures.

Independent observers scored student responses directly and through videotape observation. The interval-by-interval method of scoring interobserver reliability was utilized. Reliability was computed by dividing the number of agreement intervals by the total number of agreement intervals plus disagreement intervals and multiplying by 100. In each case, reliability was scored for the entire session. Overall, reliability for acquisition ranged from 86% to 100%, and reliability for measurement of task-related behavior ranged from 83% to 95%. See Figures 1, 2, and 3.

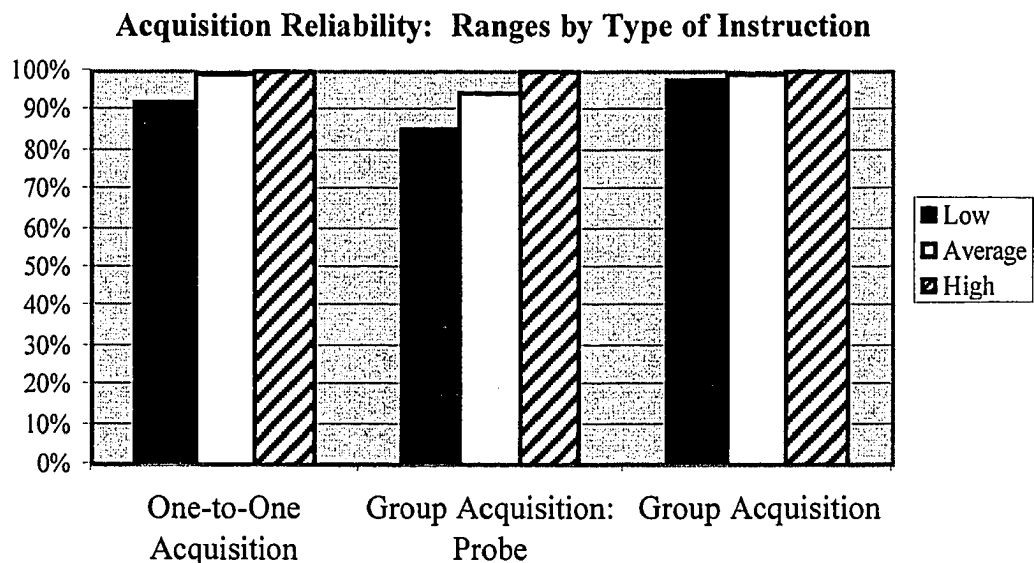


Figure 1. Acquisition Reliability: Ranges by Type of Instruction

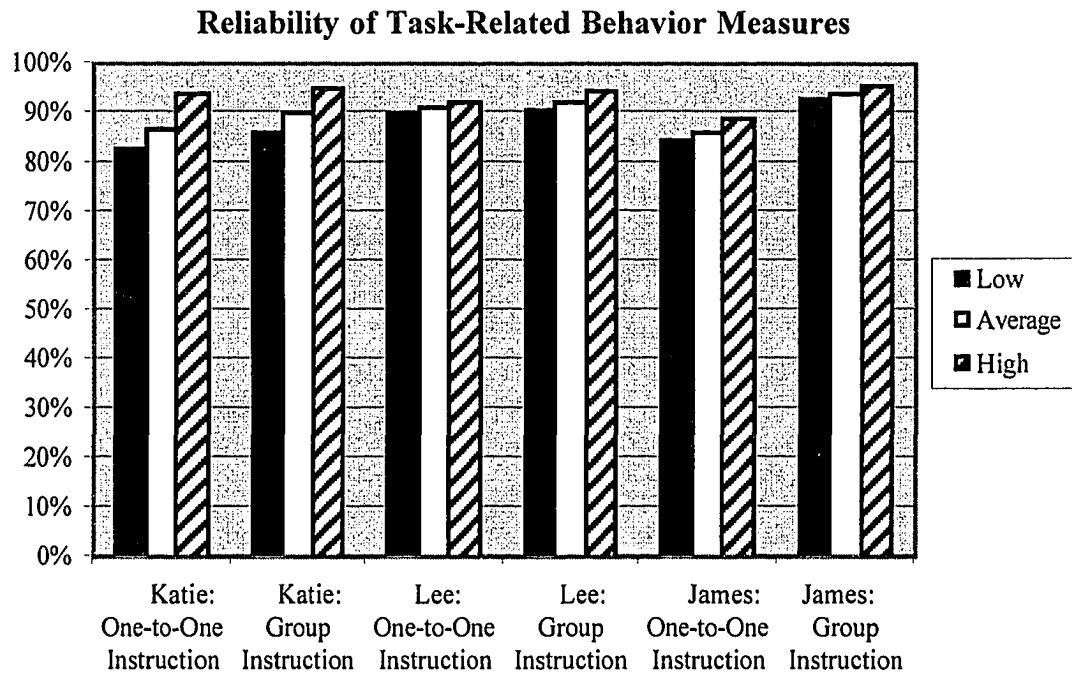


Figure 2. Reliability of Task-Related Behavior Measures

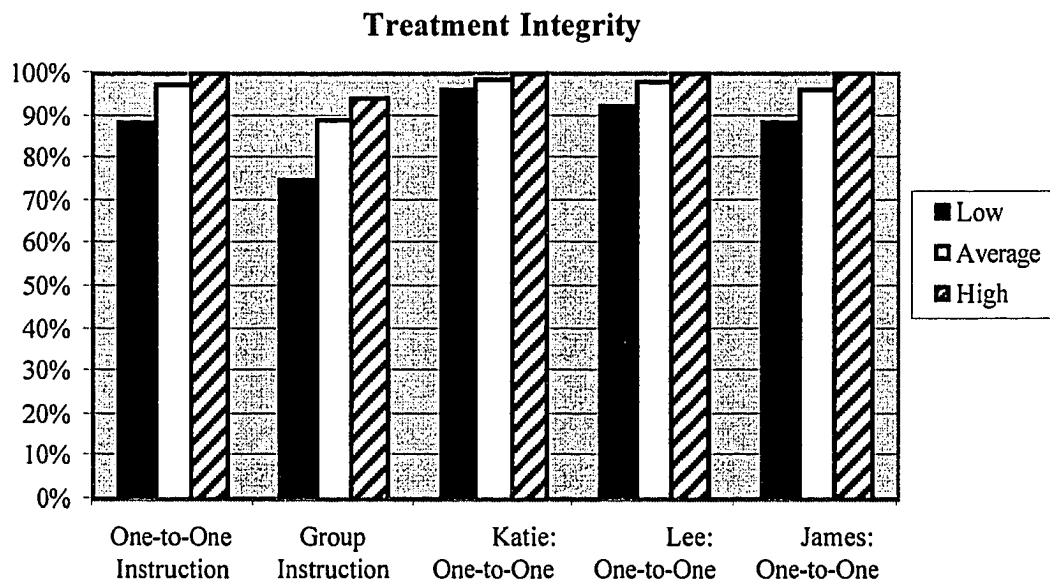


Figure 3. Treatment Integrity

CHAPTER III

RESULTS

In summary, results from this study show faster acquisition of skills, increased opportunities for observational learning and reduced amounts of instructional time for skills taught in small groups as compared to skills taught in one-to-one instruction. Its findings also indicate that small group instruction and one-to-one instruction resulted in similar levels of maintenance and generalization of skills. Finally, levels of inappropriate student behavior were generally similar during small group instruction and one-to-one instruction. The following sections detail these findings.

Acquisition Rates

Figures 4, 5, and 6 summarize acquisition rates for one-to-one and small group instruction for each student participating in this study. Each student had 28 direct learning opportunities during one-to-one instruction, and 12 direct learning opportunities and 16 indirect (observational) learning opportunities in small group instruction. Findings indicate that, although students had 57% fewer direct learning opportunities in small group instruction, students acquired skills at a faster rate in small group than during one-to-one sessions. All students demonstrated steeper acquisition trends with the small group instruction. All students reached maximum acquisition for small group items between the third and fourth sessions, while they reached maximum acquisition for the one-to-one instruction between the seventh and tenth sessions. Analysis of final acquisition levels indicated Katie had higher overall accuracy for items learned during

one-to-one instruction, while Lee's levels were similar across instruction types, and James had slightly higher levels of acquisition with items taught in group instruction.

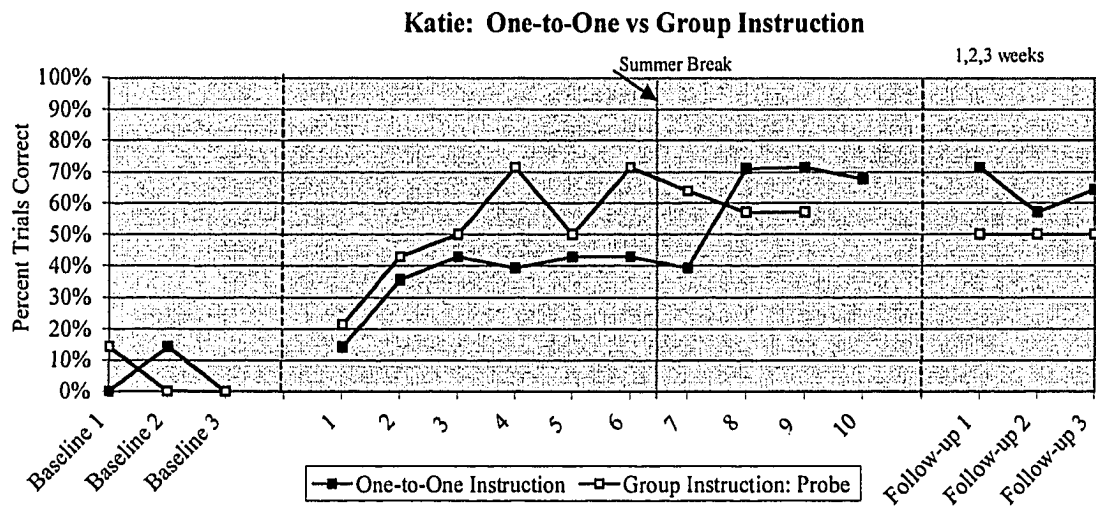


Figure 4. Katie: Comparison of Acquisition for One-to-One and Group Instruction

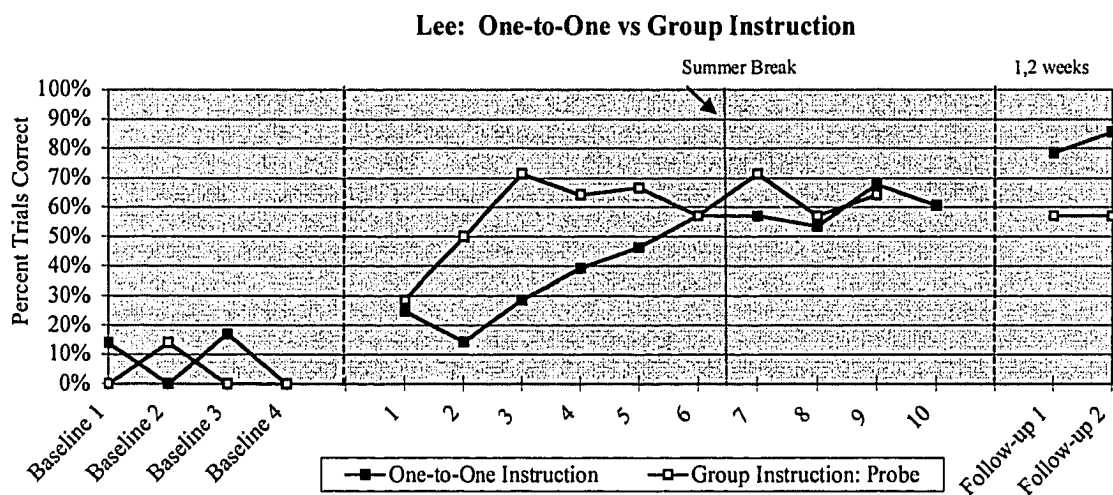


Figure 5. Lee: Comparison of Acquisition for One-to-One and Group Instruction

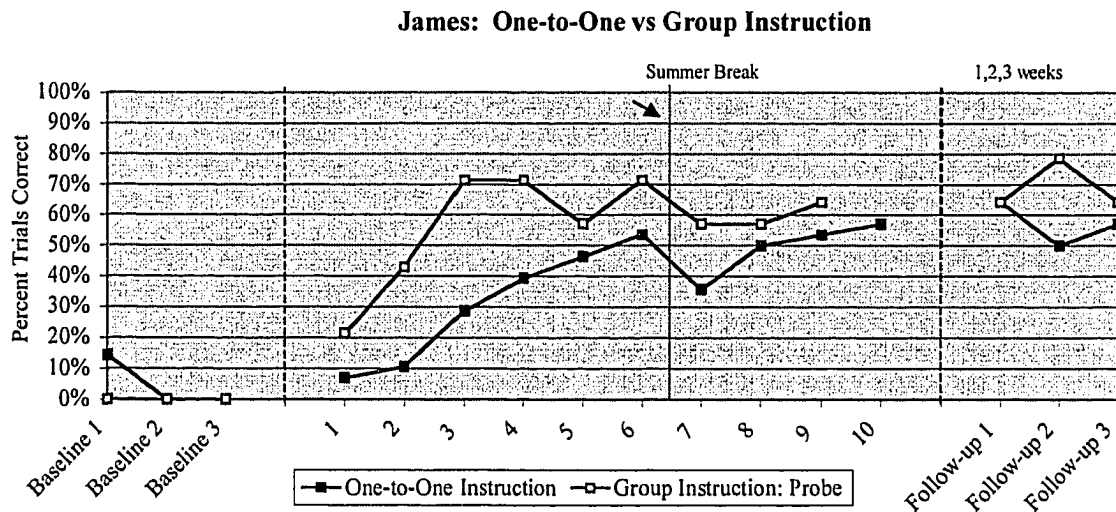


Figure 6. James: Comparison of Acquisition for One-to-One and Group Instruction

Observational Learning

Acquisition data for group instruction includes both items taught directly in small group choral fashion and items taught indirectly through observation. When these data are divided and analyzed separately, results indicate all students acquired some skills introduced observationally. Katie and Lee acquired these skills at a similar rate as skills taught individually, while James' rate of acquisition was slightly faster for items taught in the small group.

When comparing rates of acquisition for group items taught chorally and those taught only through observation, 2 of the 3 students demonstrated faster rates of acquisition on items taught through observation. Katie and Lee had similar rates of progress on these items until about the seventh session, when their accuracy of responding decreased suddenly for items taught through choral instruction. See Figures 7, 8, and 9 for a breakdown of acquisition rates during group instruction for each student.

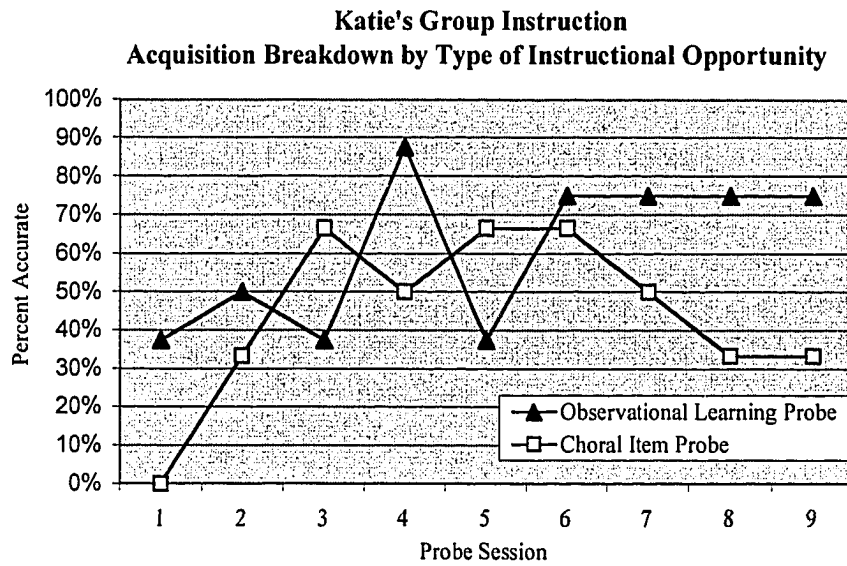


Figure 7. Katie: Acquisition During Group Observational Learning and Choral Instruction

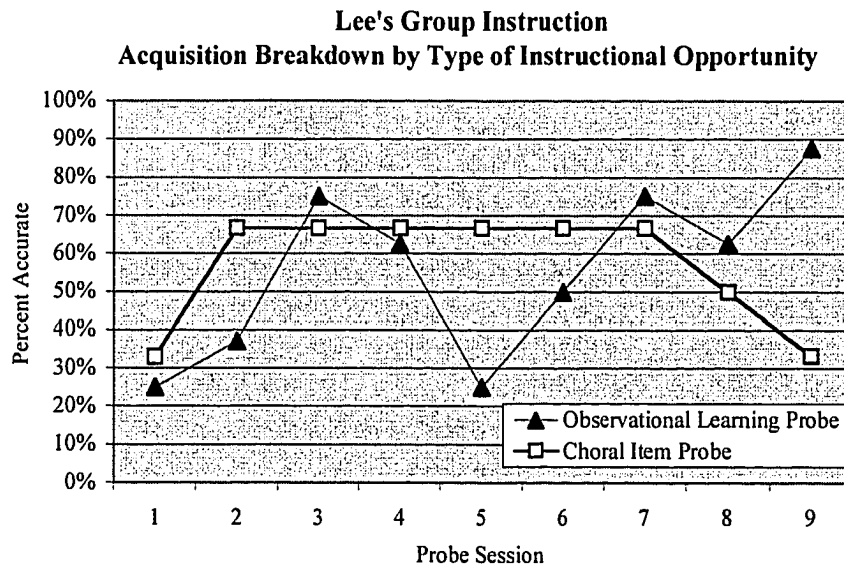


Figure 8. Lee: Acquisition During Group Observational Learning and Choral Instruction

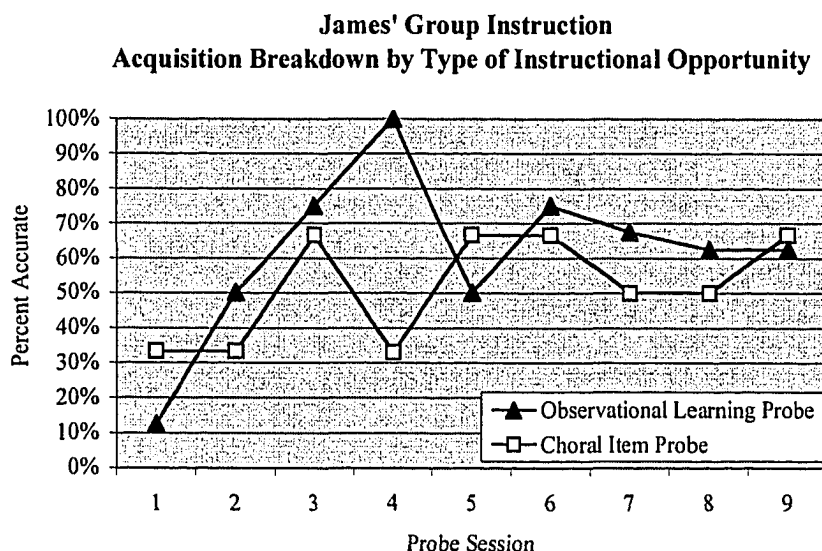


Figure 9. James: Acquisition During Group Observational Learning and Choral Instruction

Task Related Behavior

The students' task-related behavior during one-to-one and small group instruction was analyzed. Behaviors were defined and individualized based on each student's problematic behavior repertoire. Figures 10, 11, and 12 depict the percentage of off-task behavior for the 3 students during each small group and one-to-one instructional session.

For all students, the rate of off-task behavior was similar during one-to-one and small group instructional sessions. Two students evidenced some change in their rates of off-task behavior across the course of the study. James had a slight increase in off-task behavior toward the end of the study, while Lee had decreasing levels of off-task behavior during both one-to-one and group instruction. Lee had significantly more off-task behaviors in group sessions than in one-to-one sessions toward the end of the study. Overall, there was no apparent correlation between levels of off-task behavior and levels of acquisition during instructional sessions.

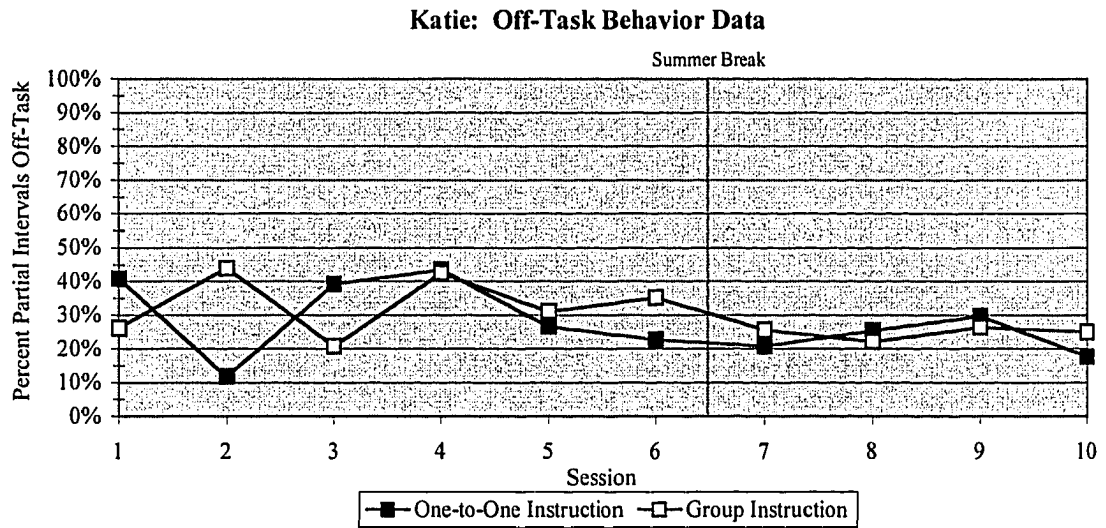


Figure 10. Katie: Comparison of Off-Task Behavior for One-to-One and Group Instruction

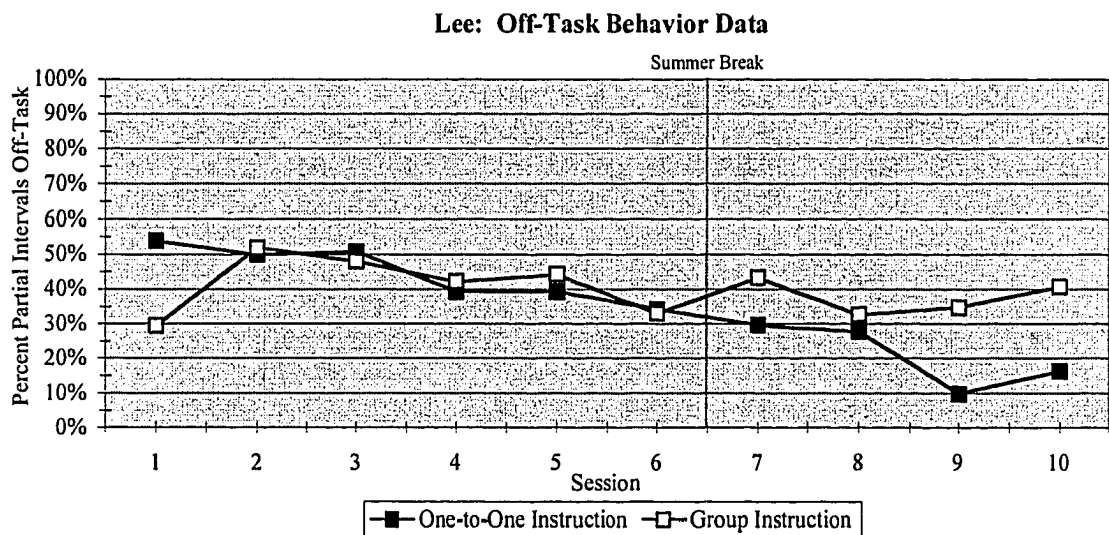


Figure 11. Lee: Comparison of Off-Task Behavior for One-to-One and Group Instruction

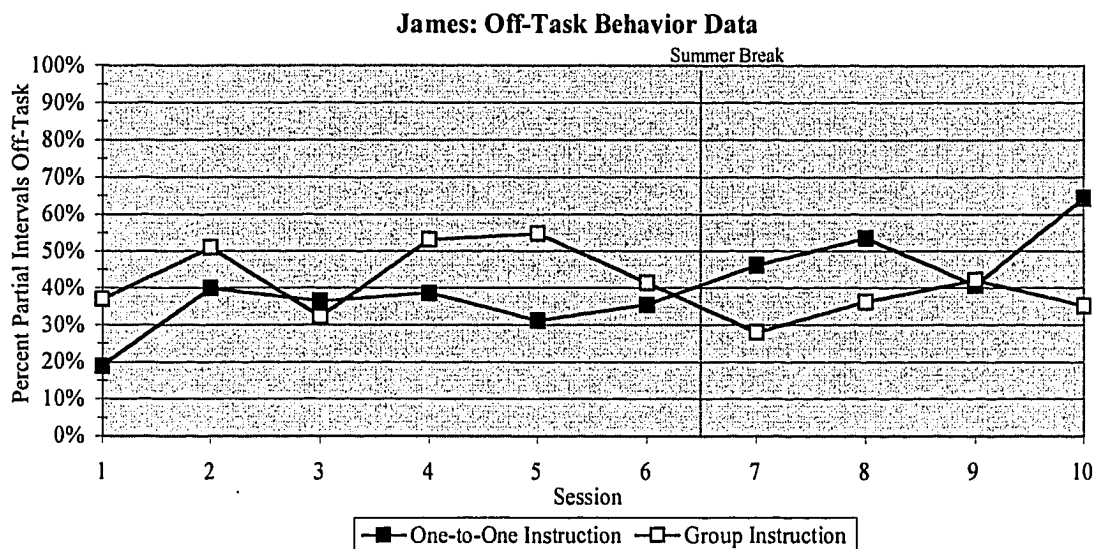


Figure 12. James: Comparison of Off-Task Behavior for One-to-One and Group Instruction

Teacher Management Behaviors

Instructional sessions were designed to provide the same number of learning opportunities and opportunities for reinforcement in small group and one-to-one instruction. Small group sessions contained choral instruction, individual instruction, reinforcement for on-task behaviors, and reinforcement for correct responding. One-to-one instructional sessions contained all of the previously mentioned types of teacher/student interactions except choral responses. Teacher management behaviors in the two types of sessions were analyzed. The number of trials presented per session and trials presented per minute were compared between one-to-one and small group instructional arrangements. Teachers presented 52 trials during one-to-one sessions and 52 trials during small group sessions. During small group sessions, students were

directly presented with 36 trials and observed during 16 observational learning trials. The pace of instruction in small group sessions was substantially lower than that of one-to-one instructional sessions. Teachers presented trials at a rate of 2 trials per minute during small group instruction and 3.3 trials per minute during one-to-one instruction. Please see Table 5 for more detail.

Table 5
Session Length and Rate of Instruction

	Group	One-to-One: Katie	One-to-One: Lee	One-to-One: James
Avg. Session Length	25.7 min.	14.2 min.	14.8 min.	18.8 min.
Total Trials	52	52	52	52
Trials Per Minute	2	3.7	3.5	2.8

During one-to-one and small group sessions, each student had the opportunity for reinforcement for on-task behavior during the inter-trial interval every two to four trials. Therefore, students had the opportunity to be reinforced for on-task behaviors approximately 16 to 20 times per session. In addition, each student was reinforced immediately for accurate responding. Reinforcement rates for one-to-one and small group instruction were compared. Figure 13 shows actual rates of reinforcement for accuracy during small group and one-to-one instruction as well as rates for reinforcement opportunities for behavior in small group and one-to-one instruction. Please note that rates for accuracy are actual rates while reinforcement opportunities are instances where the teacher was required to make a judgment as to whether or not to reinforce for on-task behavior. Analysis of these data indicate that, while reinforcement rates for accuracy are not noticeably different between small group and one-to-one instruction, teachers spent more time in small group making decisions about reinforcing on-task behaviors. This

was a consistent occurrence for all students, at the beginning of the study as well as at the end of the study. James had significantly lower rates of reinforcement for accuracy during one-to-one instruction as compared to the other students during one-to-one instructional sessions. This phenomenon was more pronounced during the last few sessions of the study.

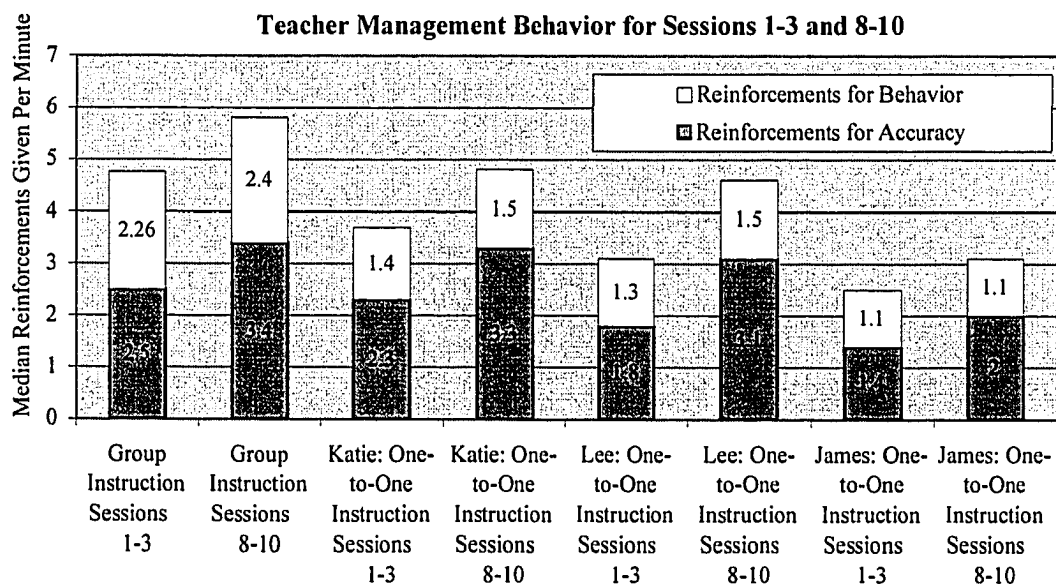


Figure 13. Teacher Management Behavior for One-to-One and Group Instruction

Instructional Time and Efficiency

Efficiency in terms of time and resources was reviewed. Small group and one-to-one instructional sessions were compared for the average length of instructional session, the total amount of instructional time required to complete the 52 sessions, and the resources required to carry out instruction (see Table 6). Although group instructional sessions were longer, results show that the total time spent in instruction was significantly lower for the small group sessions than for one-to-one sessions. While, these

instructional arrangements taught the same number of skills in the same number of trials, 36 of the trials presented during each group session were presented directly (individually and chorally) while 16 trials were presented indirectly (observationally). Analyses of session length across sessions indicate that for all students except James, slight but steady decreases in session length occurred from the beginning to the end of the study in both small group and one-to-one instruction. James had relatively stable session lengths for one-to-one instruction.

Table 6

Total Instructional Time

	Avg. Session	Trials Presented	Total
Small Group	25.7 min.	52	257 min.
One-to-One	16 min.	52	478 min.
One-to-One: Katie	14.2 min.	52	141.75 min.
One-to-One: Lee	14.8 min.	52	148.25 min.
One-to-One: James	18.8 min.	52	188 min.

Generalization and Maintenance

Measures of generalization were taken during follow-up sessions 1, 2, and 3 weeks after the end of instruction. Generalization probes were taken on items that were at a mastery level at the end of instruction. Mastery was defined as the student having attained at least 75% accuracy on the item for three consecutive sessions/probes.

Generalization of responding to new but similar stimulus items as well as to a new setting was assessed. Items, which had been mastered, were presented two times during each probe session. Figures 14, 15, and 16 present levels of accuracy for probes taken during stimulus and setting generalization sessions for each student. Data are divided into

accuracy on items taught individually and items taught in small group instruction. Data for a combined accuracy are also available. These data demonstrate generalization to stimulus and setting for Katie and Lee, while James had more difficulty consistently generalizing responses to new stimulus items. There are no distinct differences between stimulus items taught in a small group or those taught individually.

Student acquisition rates were assessed at 1, 2, and 3 weeks after instructional sessions were completed. Lee and James demonstrated levels of acquisition similar to that at the end of instructional sessions, while Katie demonstrated a slight decrease in all skills over time. Please see Figures 1, 2, and 3 for follow-up results for each student.

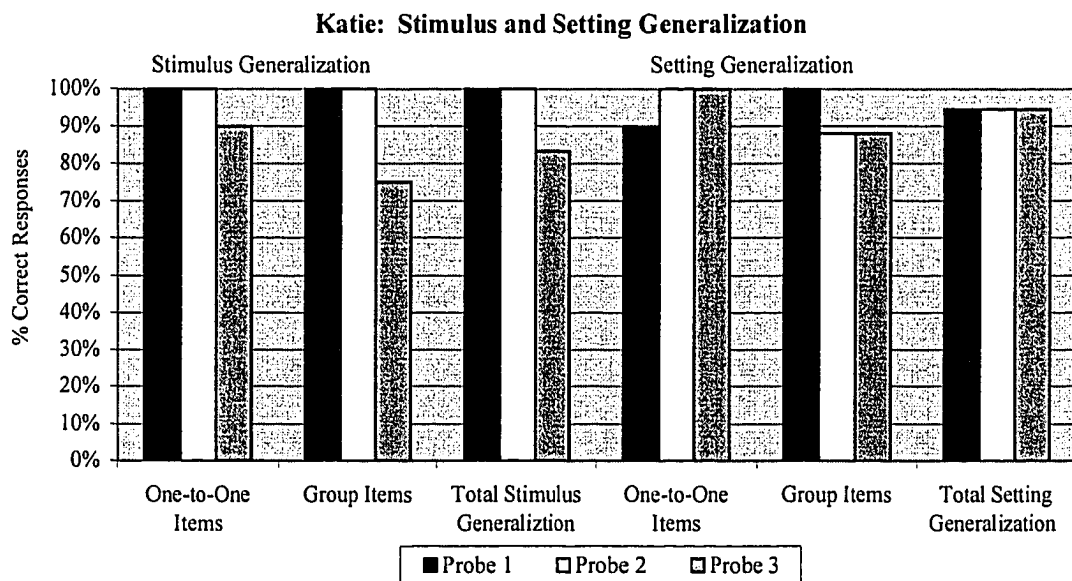


Figure 14. Katie: Stimulus and Setting Generalization

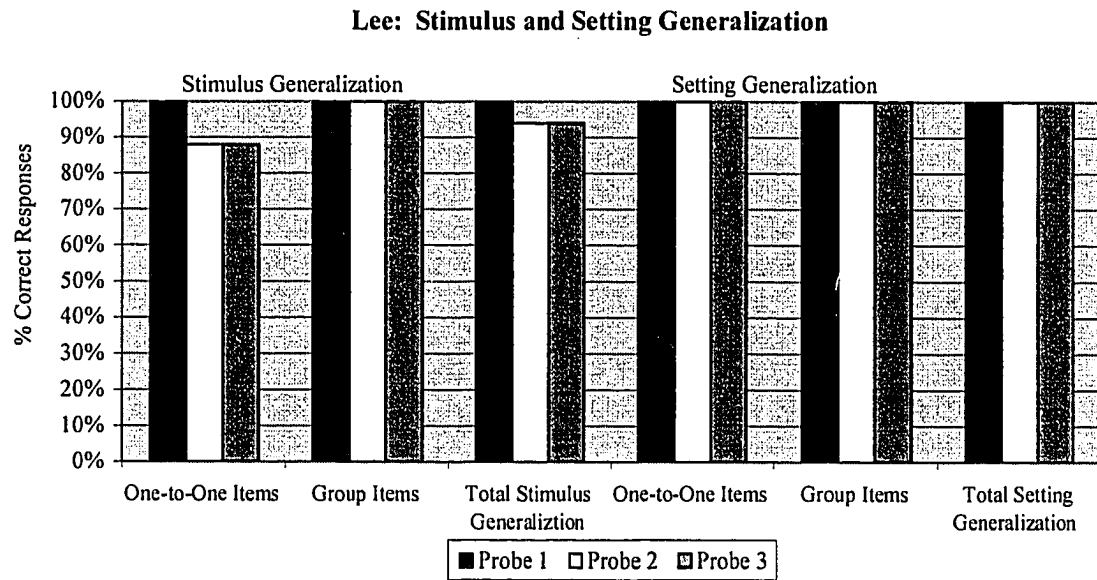


Figure 15. Lee: Stimulus and Setting Generalization

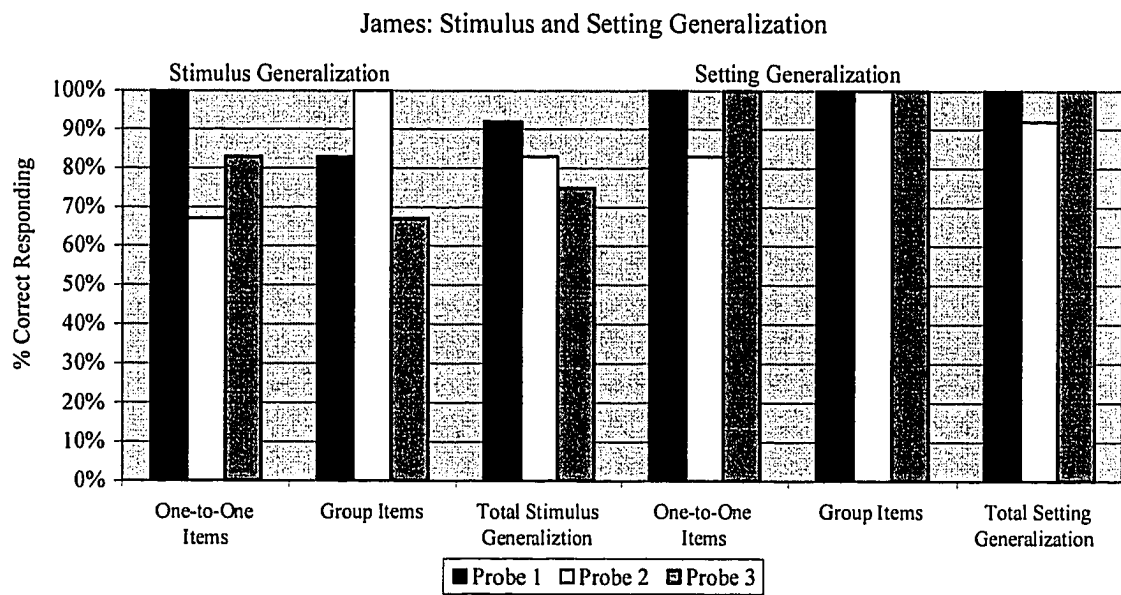


Figure 16. James: Stimulus and Setting Generalization

CHAPTER IV

DISCUSSION

The purpose of this study was to identify effective instructional strategies and instructional arrangements for young children with autism. Effectiveness of strategies used during small group instruction was compared to that obtained through individual instruction in a one-to-one setting. Variables assessed during one-to-one and small group instruction included effectiveness, efficiency, observational learning, generalization, student behavior, and teacher behavior. While some methodological considerations are evident, several conclusions can be drawn through analysis of the data collected during this study.

Methodological Limitations

Experimentation in school-based settings is often accompanied by implementation constraints. In this study, methodological issues involved counterbalancing, a preferred feature of alternating treatment designs. Counterbalancing controls for factors extraneous to the treatments that may influence treatment outcome (Barlow & Hersen, 1984). The teachers, instructional formats, and time of day the treatments were presented are variables that could have been counterbalanced in the present study. Instructional formats were counterbalanced in a “semi-random” order where each treatment could be administered no more than two times consecutively. An upper limit of two sessions was set to reduce effects time may have on acquisition. In addition, treatment sessions were separated by at least one day and treatment time of day for treatment sessions was held

constant between one-to-one and small group instruction. These procedures would assist in limiting order and carryover effects associated with alternating treatment designs.

While methodology was carefully considered, researchers were unable to counterbalance teachers. After the study began, changes in class and building schedules significantly reduced the opportunities for the two instructors to counterbalance instruction. While addition of a third teacher was considered, concerns regarding fidelity issues with increased number of instructors limited the viability of this option. Although counterbalancing was not available, analysis of the session by session data indicates no significant differences in treatment results based on the teacher that presented the instructional session.

An additional potential limitation was the selection of stimulus materials. While stimulus items were selected for the two treatment conditions randomly, there is no way of determining if there was disparity between the objects selected for each treatment condition.

Effectiveness

Several conclusions can be drawn from the current study. First, the results of this research indicate when effective instructional strategies are maximized, small group instruction is more efficient and as/more effective than one-to-one instruction. In this study, although small group instruction offered significantly (57%) fewer direct learning opportunities, all students had faster rates of acquisition during small group than during one-to-one instruction. All students reached maximum acquisition for small group by the third to fourth session where it took the students four to six more sessions to reach the same level of acquisition during one-to-one instruction. These findings extend the

literature on effective strategies for group instruction by suggesting young students with autism learn through observation and modeling when the instructional arrangements provide high paced random presentation of materials in a highly reinforcing environment. To date, in studies comparing acquisition rates between one-to-one instruction and small group instruction, there have been mixed results. While some studies have found similar rates of acquisition, (Favell et al., 1978; Kamps et al., 1992) others have found variability in acquisition (Handleman & Harris, 1983). In addition, while Kamps et al., (1990) determined small group to be as effective as one-to-one instruction, they also indicated more learning and reinforcement opportunities were presented during small group instruction. This study extends this research and demonstrates that even when learning and reinforcement opportunities are held constant, small group instruction is as effective or more effective than one-to-one instruction.

Learning Through Observation and Choral Instruction

Second, our study extends the research supporting specific instructional strategies during small group instruction. Kamps et al., (1994) found enhanced group instruction to be more effective than small group round robin instruction. Key instructional strategies used during enhanced group instruction included random response opportunities, choral responding, student-to-student presentation, and frequent rotation of materials. The current study extends this research and compares the effectiveness of small group instructional strategies. We compared acquisition rates for material taught directly during small group through choral response opportunity to that taught indirectly through observation. Results indicated, during group instruction, 2 of the 3 students learned items taught indirectly through observation more quickly than items taught directly through

choral responding. Several factors may account for these results. These include: (a) possible decreased instructional control during choral responding trials; (b) the effect of random responding on choral instruction and/or observational learning trials; (c) the impact of reinforcement for attending during observational learning trials; and (d) the impact of student variability in responding to choral requests. The current findings indicate further research will be needed to assess the variables that may significantly impact choral responding. Additional research is necessary to identify methods of optimizing choral instructional strategies for young children with autism.

Efficiency

Third, the efficiency and cost effectiveness of small group instruction in comparison to one-to-one instruction has been well documented (Favell et al., 1978; Fickel et al., 1998; Kamps et al., 1990, 1992; Polloway et al., 1986;). The results of the current study support findings from earlier research demonstrating that while the rate of trials is slower during group instruction, group instruction is more efficient in terms of teacher time. In the current study, group trials were presented at 2 trials per minute while one-to-one trials were presented at 3.3 trials per minute. One-to-one instruction took almost twice as much time than teaching the same amount of material to a small group.

While efficiency in terms of teacher time is an important variable for schools implementing small group instruction, the efficiency in terms of teacher effort to maintain a small group must also be considered. Kamps et al., 1990 suggested research document teacher skills necessary to manage group behavior. Similarly, Rotholz (1990) and Kamps et al. (1992, 1994) indicated the need to investigate teacher effort in maintaining attention and programming collective trials during group instruction. The

current study extends the literature to address the management of student behavior within group instruction as compared to one-to-one instruction. As seen in Figures, 10, 11, and 12 with the exception of Lee, rates of on-task behavior remained quite similar for each student between one-to-one and small group instruction.

Although, student behavior was not significantly effected by instructional arrangement, teacher management behavior was quite different between the two arrangements. Figure 13 demonstrates teacher rates of responding to students for both requests and reinforcement during one-to-one and small group instruction. These data suggest the teachers made significantly more responses to students within group as compared to one-to-one instruction even though the same number of trials were presented in group as one-to-one. It is important to note that this data does not include teacher to student redirections, which would increase teacher responses for both one-to-one and group instruction. Additionally, while teachers taught the same number of trials during group sessions as one-to-one sessions, group sessions were significantly longer than any of the one-to-one sessions. Kamps et al., (1992) indicated teachers scored group instruction unsatisfactorily due to issues with preparation time and student behavior in a small group. Similarly, teachers in the current study indicated groups required more time to transition and required more teacher effort to manage than one-to-one instruction. These anecdotal reports are consistent with the study findings that indicate while individual student behavior in the small group was not significantly different from that of student behavior during one-to-one instruction, it is the combined effects of the students' behavior and management requirements that increase teacher effort.

Summary and Further Investigation

The results of this study demonstrate that with a combination of effective instructional strategies, young children with autism can learn during a variety of instructional arrangements. This study supports the use of instructional arrangements which use the following instructional strategies: (a) rapid random response opportunities, (b) interspersed acquisition trials, (c) observational learning opportunities, (d) choral response opportunities, (e) individual response opportunities, and (f) explicit reinforcement for accuracy and behavior. While results of this study support the use of small group instructional arrangements for young children with autism, variability was evidenced as to the effectiveness of the instructional components. Therefore, we can not support any specific combination of group instructional strategies for all children with autism. Rather, this study provides teachers with a variety of instructional options to consider when planning instruction for young children with autism. Overall, it is recommended teachers utilize teaching strategies that maximize learning opportunities and allow for instructional arrangements that more closely approximate natural learning environments. It is also recommended that teachers and practitioners use data-based decision making to determine the ongoing effectiveness of instructional strategies for young children with autism, as opposed to relying on prescriptive programs for young children with autism.

While the findings of this study are encouraging, further study is warranted in several areas. First, further investigation is needed to assess variables that may effect learning through choral responding. While choral responding increases direct learning opportunities, in this study, observational learning was more effective for 2 of the 3

subjects in this study. Second, research should focus on assessing the quantity and quality of peer interactions during small group instruction for young children with autism. Further investigation is necessary to study the feasibility of teaching social skills to young children with autism through peer-to-peer trials and enhanced group strategies. Lastly, the components of small group instruction need continued analysis. It is uncertain if the behavior results obtained in this study would be similar with less intensive procedures, such as reduced rates of reinforcement for on-task behavior and predictable trial sequences. While using a combination of effective teaching strategies may be beneficial for students, this type of enhanced instruction may be difficult for teachers to implement with integrity. Further investigation is necessary to assess teacher training, instructional integrity and manageability of small groups.

Appendix A
Agency Consent Form



Kalamazoo Regional Educational Service Agency

Croyden Avenue School

4606 Croyden Avenue • Kalamazoo, MI 49006 • Phone 616.373.3260 • Fax 616.373.5725

October 30, 1998

Chairperson
Human Subjects Institutional Review Board
Western Michigan University
Kalamazoo, MI 49008

Dear Chairperson,

Kathy Bertsch has submitted a research proposal entitled "A Comparison of Small Group Instructional Arrangements with Young Children Identified as Autistically Impaired" to be implemented within the educational classrooms at Lake Center, Angling, and Croyden Avenue Schools. The project, as proposed, is relevant to the population of students served and poses no risks. We support the implementation of this research project and may benefit from the results obtained.

Sincerely,

Karol Peterson
Program Director
Kalamazoo Regional Education Service Agency

Appendix B
Parent Consent for Participation

Western Michigan University
Department of Psychology

Principal Investigator: Kristal Ehrhardt, Ph.D.
Co-principal/Student Investigator: Kathy Bertsch
Collaborative Researchers: Steve Ragotzy, Ph.D., Carmen Jonaitis, & Alan Poling, Ph.D.

My child has been invited to participate in a research project entitled "A Comparison of Small Group Instructional Arrangements with Young Children Identified as Autistically Impaired." The purpose of the project will be to compare the usefulness of small group instruction that consists of 2 and 3 members and one instructor. An additional purpose of this project is to fulfill Kathy Bertsch's Dissertation requirements and the findings of the project could potentially be written up for publication.

Participation in this project means that my child will be participating in two and/or three member group instruction for approximately 20 to 40 minutes daily over the course of 8 to 12 weeks throughout the months of January to May of 1999. Participation in this project also means the researchers may have access to my child's educational records (e.g., Individualized Education Plan) and consult with my child's teacher to determine if my child's educational needs match the goals of the project. My child is being asked to participate because her/his educational goals and behavior are compatible with the skills needed to complete this study. Information will be collected on my child's performance in order to determine the effectiveness of the different teaching procedures. Data collection procedures will include paper and pencil recording as well as video-taped clips of my child's participation in the small group instruction. My child may generally benefit from the study by gaining knowledge that is useful in his/her environment. The results from the study will be shared with the classroom teacher, and by allowing my child to participate, the teachers within the classroom may be able to develop a more effective method of teaching my child and his/her classmates.

All data and information obtained during the study will remain confidential. That means that my child's name will be omitted from all data collection sheets, written material for publications, or any presentations of the results. My child's name will be omitted from all data sheets and a code number will be attached. A separate list of all the children's names and corresponding codes will be kept in a locked file. Video-taped clips will only be viewed by the researchers associated with this study.

The only risk anticipated is my child's possible dissatisfaction with having to engage in a small amount of extra tutoring time within the course of the school-day. As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to the subject except as otherwise stated in this consent form.

Lastly, participation is voluntary and I may withdraw my child from the project at any time without any negative effect on his/her educational services. If my child does not participate in the project, my child will participate in the regularly scheduled school activities. If I have any questions or concern about the study, I may contact Kathy Bertsch at (616)329-6004, Kristal Ehrhardt at (616)387-4478, or Steve Ragotzy at (616)373-4707. I may also contact the Chair of the Human Subjects Institutional Review Board at 387-8293 or the Vice President for Research at 387-8298 with any concerns I have.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Subjects should not sign this document if the corner does not show a stamped date and signature.

I can and do give my permission for _____ (child's name) to participate in this research project to determine the effectiveness of small group teaching and that the investigators have permission to review my child's educational records.

Parent/Guardian Signature _____ Date _____

Signature of Person Obtaining Consent _____ Date _____

Appendix C
Parent Consent to Video-Tape

Western Michigan University
Department of Psychology

Principal Investigator: Kristal Ehrhardt, Ph.D.
Co-principal/Student Investigator: Kathy Bertsch
Collaborative Researchers: Steve Ragotzy, Ph.D., & Carmen Jonaitis

My child has been invited to participate in a research project entitled "A Comparison of Small Group Instructional Arrangements with Young Children Identified as Autistically Impaired."

Participation in this project means that my child will be video taped during the project's instructional sessions. These video tape clips obtained during the study will remain confidential. That means that they will only be viewed by researchers associated with this study. They will not be used for any formal presentations, but only to aid the researchers in monitoring the progress of the study. These video-tapes will be kept in a locked file.

Lastly, participation is voluntary and I may withdraw my child from the project at any time without any negative effect on his/her educational services. If I have any questions or concern about the study, I may contact Kathy Bertsch at (616)329-6004, Kristal Ehrhardt at (616)387-4478 or Steve Ragotzy at (616)373-4707. I may also contact the Chair of the Human Subjects Institutional Review Board at 387-8293 or the Vice President for Research at 387-8298 with any concerns I have.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Subjects should not sign this document if the corner does not show a stamped date and signature.

I can and do give my permission for _____ (child's name) to be video-taped for this project entitled "A Comparison of Small Group Instructional Arrangements with Young Children Identified as Autistically Impaired."

Parent/Guardian Signature _____ Date _____

Signature of Person Obtaining Consent _____ Date _____

Appendix D
Group Screening Procedure

Group Screening Procedure

Students:	All			Teacher:	
Materials:					
Reinforcers:	Reinforce Contingently				
# of Trials:	5 trials/item	Data Collector:		Reliability:	Yes No
Teacher Presentation	Correct Response		Incorrect Response		Criteria
	Pupil Behavior	Tutor Behavior	Pupil Behavior	Tutor Behavior	
<p>The teacher sits facing students. Teacher obtains quiet hands and eye-contact from students.</p> <p>The teacher says "Everyone, DO THIS." Paired with a model of _____.</p> <p>TAP TABLE PAT HEAD ARMS UP TOUCH NOSE CLAP HANDS</p>	<p>Student independently completes instruction within 5 seconds of directive.</p> <p>Student response must be first response within 5 seconds of directive.</p>	<p>Provide descriptive praise and edible reinforcer upon accurate response.</p> <p>Group Accurate: "Good <u>ARMS UP</u> everyone!" + small edible to each student.</p> <p>OR</p> <p>Individual Accurate: "Good <u>ARMS UP</u> Katie!" + small edible to Katie.</p>	<p>Student does not follow directive within 5 seconds of directive or student's first response is not the correct action.</p> <p>(i.e. The direction is ARMS UP and the student first TAPS TABLE then puts ARMS UP.)</p>	<p>No reinforcement for the individual student.</p> <p>Use physical prompt with each student to form response and say "<u>Katie</u> this is <u>ARMS UP</u>."</p> <p>Use an affirming tone.</p>	<p>Student obtains 80% correct on stimulus item for at least 1 of 3 sessions.</p>

Appendix E

Katie's One-to-One and Small Group Stimulus Items

Katie's One-to-One and Small Group Stimulus Items

Item	Object Action	Instruction Type	Level
1	smash cars	One-to-One	Instructional
2	pat baby	One-to-One	Instructional
3	push buttons	One-to-One	Instructional
4	block behind box	One-to-One	Instructional
5	kiss baby	One-to-One	Instructional
6	rock baby	One-to-One	Instructional
7	feed puppy	One-to-One	Instructional
8	hop frog	One-to-One	Mastery
9	stamp playdough	One-to-One	Mastery
10	put firehat on	One-to-One	Mastery
11	feed baby	One-to-One	Mastery
12	shake maraca	One-to-One	Mastery
13	stamp paper	One-to-One	Mastery
1	wipe mouth	Group Choral	Instructional
2	fly plane	Group Choral	Instructional
3	block under	Group Choral	Instructional
4	roll playdough	Group Observational	Instructional
5	roll ball	Group Observational	Instructional
6	hug puppy	Group Observational	Instructional
7	saw table	Group Observational	Instructional
8	put firehat on	Group Choral	Mastery
9	stamp paper	Group Choral	Mastery
10	feed baby	Group Choral	Mastery
11	shake maraca	Group Choral	Mastery
12	hop frog	Group Observational	Mastery
13	stamp playdough	Group Observational	Mastery

Appendix F

Lee's One-to-One and Small Group Stimulus Items

Lee's One-to-One and Small Group Stimulus Items

Item	Object Action	Instruction Type	Level
1	shake tambourine	One-to-One	Instructional
2	pat baby	One-to-One	Instructional
3	zip purse	One-to-One	Instructional
4	sweep	One-to-One	Instructional
5	rock baby	One-to-One	Instructional
6	feed puppy	One-to-One	Instructional
7	block behind	One-to-One	Instructional
8	put firehat on	One-to-One	Mastery
9	take picture	One-to-One	Mastery
10	shake maraca	One-to-One	Mastery
11	stamp paper	One-to-One	Mastery
12	pour a drink	One-to-One	Mastery
13	feed baby	One-to-One	Mastery
1	wipe mouth	Group Choral	Instructional
2	fly plane	Group Choral	Instructional
3	block under	Group Choral	Instructional
4	roll ball	Group Observational	Instructional
5	hop frog	Group Observational	Instructional
6	saw table	Group Observational	Instructional
7	stamp playdough	Group Observational	Instructional
8	put firehat on	Group Choral	Mastery
9	stamp paper	Group Choral	Mastery
10	feed baby	Group Choral	Mastery
11	shake maraca	Group Choral	Mastery
12	roll playdough	Group Observational	Mastery
13	hug puppy	Group Observational	Mastery

Appendix G

James' One-to-One and Small Group Stimulus Items

James' One-to-One and Small Group Stimulus Items

Item	Object Action	Instruction Type	Level
1	bounce ball	One-to-One	Instructional
2	gallop horse	One-to-One	Instructional
3	shake tambourine	One-to-One	Instructional
4	kiss baby	One-to-One	Instructional
5	cut playdough	One-to-One	Instructional
6	rock baby	One-to-One	Instructional
7	feed puppy	One-to-One	Instructional
8	feed baby	One-to-One	Mastery
9	stir	One-to-One	Mastery
10	saw table	One-to-One	Mastery
11	stamp paper	One-to-One	Mastery
12	shake maraca	One-to-One	Mastery
13	put firehat on	One-to-One	Mastery
1	wipe mouth	Group Choral	Instructional
2	fly plane	Group Choral	Instructional
3	block under	Group Choral	Instructional
4	roll playdough	Group Observational	Instructional
5	hug puppy	Group Observational	Instructional
6	hop frog	Group Observational	Instructional
7	stamp playdough	Group Observational	Instructional
8	put firehat on	Group Choral	Mastery
9	stamp paper	Group Choral	Mastery
10	feed baby	Group Choral	Mastery
11	shake maraca	Group Choral	Mastery
12	roll ball	Group Observational	Mastery
13	saw table	Group Observational	Mastery

Appendix H

Stimulus Definitions

Stimulus Definitions

Directions: Use the following stimulus definitions to score student response as correct, incorrect, or no response.

Accuracy Definitions:

Correct (+): Any response which begins within 5 seconds of the prompt and meets the definition for a correct response for that item. In addition, this needs to be the first response after the prompt.

Incorrect (-): Any response which begins within 5 seconds of the stimulus and does not meet the definition for a correct response for that item.

No Response (0): No response to stimulus prompt. The student simply sits and does not move to make a response within 5 seconds of the prompt.

Stimulus Definitions:

1. Bounce Ball: Drops ball on table so it bounces at least once.
2. Cut Playdough: When given flattened piece of playdough and cutter, cuts across dough so as to leave indentation in dough at least 2 inches long.
3. Feed the Baby: When given baby and bottle puts bottle up to baby mouth.
4. Feed the Puppy: When given puppy facing bowl tips puppy over and puts puppy face in bowl.
5. Gallop Horse: Takes horse and gallops it across desk so that its hoofs stay within 5 inches of table, needs to move at least 5 inches across table.
6. Hop Frog - bounces frog from table to air at least once.
7. Hug the Puppy: Takes puppy in hands and pushes it against chest.
8. Kiss the Baby: Takes baby in hands and puts lips against baby's head.
9. Pat the Baby: Takes baby doll in hand puts up to chest and pats at least once on baby back.
10. Pet the Puppy: Strokes puppy from head to tail at least once.
11. Fly the Plane: Takes plane in hand and makes it fly at least 1 foot in the air.
12. Pour: Takes pitcher in hand and tips it over cup.
13. Put Block Behind Box: When given upside-down box and handed block puts block behind box nearest to teacher.
14. Put Block Under Box: When given upside-down box and handed block puts block under the upside-down box.
15. Put Firehat On: Puts firehat on head (it may be backward or sideways).
16. Push Buttons (on phone): Pushes buttons on play phone with any finger.
17. Rock the Baby: Takes baby in hands and sways it from one side of body to the other at least once (baby can not touch table).
18. Roll Ball: When given ball, student rolls ball back across the table to teacher.
19. Roll Playdough: When given piece of playdough slightly rolled out, puts hand on dough and pushes it forward and pulls it back so it moves at least one inch in each direction.
20. Saw Table: Takes saw and rubs its rough edge against the edge of table at least once so that moves at least 2 inches across the table.

21. Shake Maraca: Takes maraca and shakes it with one hand so as to make rattling sound.
22. Shake Tambourine: Takes tambourine and shakes it with one or two hands so as to make jingling sound.
23. Smash Cars: When given two matchbox cars approximately 1.5 ft apart takes one in each hand and smashes them into each other head first.
24. Stamp Paper: Takes stamp in hand and presses it to paper so that it makes some mark on paper.
25. Stamp Playdough: When given flat playdough and cutter, pushes cutter into dough.
26. Stir (make sure spoon is in bowl): When given bowl with spoon in it, takes spoon in hand and stirs at least once.
27. Sweep (hand broom): Takes broom in hand and sweeps it across table at least once so brush moves at least one inch across table.
28. Take a Picture: Takes camera and puts up to eye (it may be backward).
29. Wipe Face: Takes washcloth and wipes it across mouth (not nose).
30. Zip Purse: When given purse which is zipped unzips it (may zip it back up).

Appendix I

Group Procedure for Choral Responding

Group Procedure for Choral Responding

Students:	All			Teacher:	
Materials:	3 firemen's hats	3 washcloths			
	3 toy maracas	3 blocks with boxes			
	3 stampers with paper	3 toy planes			
	3 baby dolls with bottle				
Reinforcers:	Reinforce Contingently				
# of Trials:	4 trials/item with 2 trials in a row	Data Collector:		Reliability:	Yes No
Teacher Presentation	Correct Response		Incorrect Response		Criteria
	Pupil Behavior	Tutor Behavior	Pupil Behavior	Tutor Behavior	
<p>The teacher sits facing students. Teacher obtains quiet hands and eye-contact from students.</p> <p>The teacher places a stimulus item in front of each student randomly and immediately says, "Everyone, _____."</p> <p>(See Stimulus Item Directions for directives for each stimulus item.)</p>	<p>Student independently completes instruction within 5 seconds of directive.</p> <p>Student response must be first response within 5 seconds of directive.</p> <p>(See Stimulus Item Directions for definitions of correct responses for each item.)</p>	<p>Provide descriptive praise and edible reinforcer upon accurate response.</p> <p>Group Accurate: "Good <u>feeding the baby</u> everyone!" + small edible to each student.</p> <p>OR</p> <p>Individual Accurate: "Good <u>feeding the baby</u> Katie!" + small edible to Katie.</p>	<p>Student does not follow directive within 5 seconds of directive or student's first response is not the correct action.</p> <p>(ie. The direction is to put a block beside the box and the student first puts it on the box then beside the box.)</p>	<p>No reinforcement for the individual student.</p> <p>Use physical prompt with each student to form response and say "<u>Katie</u> this is <u>putting the block beside the box.</u>"</p> <p>Use an affirming tone.</p>	<p>Student obtains 80% correct on stimulus item for at least 2 consecutive sessions.</p>

Appendix J

Individual Procedure for One-to-One and Group Instruction

Individual Procedure for One-to-One and Group Instruction

Students:	All			Teacher:	
Materials:					
Katie		Lee		James	
1. Playdough with stamper	6. Block with boxy	1. Playdough	7. Toy camera	1. Plastic Ball	7. Stuffed puppy
2. Toy frog	7. Toy fireman's hat	2. Stuffed puppy	8. Wisk broom	2. Toy saw	8. Stamper with paper
3. Baby doll with bottle	8. 2 toy cars	3. Toy tambourine	9. Toy maraca	3. Toy horse	9. Toy puppy with bowl
4. Stuffed puppy	9. Toy maraca	4. Baby doll	10. Stamper with paper	4. Baby doll	10. Toy maraca
5. Play phone	10. Stamper with paper	5. Toy fireman's hat	11. Pitcher and cup	5. Toy tambourine	11. Fireman's hat
		6. Purse with zipper	12. Block and box	6. Bowl and spoon	12. Baby doll with bottle
Reinforcers:	Reinforce Contingently				
# of Trials:	4 trials/item with 2 trials in a row	Data Collector:		Reliability:	Yes No
Teacher Presentation	Correct Response		Incorrect Response		Criteria
	Pupil Behavior	Tutor Behavior	Pupil Behavior	Tutor Behavior	
<p>The teacher sits facing student/students. Teacher obtains quiet hands and eye-contact from target student.</p> <p>The teacher places a stimulus item in front of the student and immediately says, "<u>Katie</u>, _____."</p> <p>(See Stimulus Item Directions for directives for each stimulus item.)</p>	<p>Student independently completes instruction within 5 seconds of directive.</p> <p>Student response must be first response within 5 seconds of directive.</p> <p>(See Stimulus Item Directions for definitions of correct responses for each item.)</p>	<p>Provide descriptive praise and edible reinforcer upon accurate response.</p> <p>"Good <u>feeding the baby Katie!</u>" + small edible to Katie.</p>	<p>Student does not follow directive within 5 seconds of directive or student's first response is not the correct action.</p> <p>(ie. The direction is to put a block beside the box and the student first puts it on the box then beside the box.)</p>	<p>No reinforcement for the student.</p> <p>Use physical prompt with student to form response and say "<u>Katie this is putting the block beside the box.</u>"</p> <p>Use an affirming tone.</p>	<p>Student obtains 80% correct on stimulus item for at least 2 consecutive sessions.</p>

Appendix K
Data Recording Form

AI Group Project: Data Recording Form

Date: _____

Session #: _____

Observer: _____

Trainer: Kathy Sara

Reliability Observer: _____

Session Type: 1 3 Probe

Student: K L J

Video Taped? Yes NO

Object																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Subject J																										
Subject L																										
Subject K																										

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Subject J																										
Subject L																										
Subject K																										
% Correct																										

+ Correct - Incorrect 0 No Response

Session Summary

	% (Unknown) Correct	%(Known) Correct	Total % Correct
Subject J			
Subject L			
Subject K			

Appendix L
Behavior Recording Form

AI Group Project: Behavior Recording Form

Date: _____

Session #: _____

Observer: _____

Trainer: Kathy Sara

Reliability Observer: _____

Session Type: 1 3 Probe

Student: K L J

Video Taped? Yes NO

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90

91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120

121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150

Session Summary

		% Intervals Off
Intervals Off		
Total Intervals		

Appendix M
Treatment Integrity Form and Procedures

Date: _____
Session #: _____
Trainer: _____
Observer : _____

Video-taped:	Yes	No	
Student:	K	L	J
Treatment:	Group	Individual	

[illegible][illegible]

Directions for Scoring Treatment Integrity

Directions: Score each numbered step as + if the teacher completes the step as described. Score the step as – if the teacher does not complete the step as described.

STEPS

1. Obtain student on-task behavior (quiet hands, in seat, oriented forward, quiet feet).
2. Place stimulus items in front of student/s as designated for item.
3. Give Direction

GROUP ITEM: SAY, “EVERYONE, _____.” (As designated for stimulus item).

INDIVIDUAL ITEM: SAY, “KATIE, _____.” (As designated for stimulus item).

4. Reinforce Correct Responses

If student/s independently completes the instruction within 5 seconds of discriminative stimulus and student/s response is first response within 5 seconds of discriminative stimulus, immediately reinforce the correct student/s with descriptive praise and edible.

Correct Response of INDIVIDUAL ITEM: (ie. Good hopping frog, Katie.)

Correct Response of ALL THE GROUP: (ie. Good hopping frog, everyone!)

5. DO NOT REINFORCE INCORRECT RESPONSES:

Student does not follow instruction within 5 seconds of discriminative stimulus or student's first response is not the designated directive action. (ie. combing his own hair with brush then the baby's hair). No reinforcement for that individual student.

6. Correction: Use physical prompt as needed with each student to form response.
7. Say for example, “This is hopping frog.” in an affirming tone while correcting.

Appendix N

Human Subjects Review Board Approval



WESTERN MICHIGAN UNIVERSITY

Date: 11 January 1999

To: Kristal Ehrhardt, Principal Investigator
Kathy Bertsch, Student Investigator for dissertation

From: Sylvia Culp, Chair *Sylvia Culp*

Re: HSIRB Project Number 98-11-04

This letter will serve as confirmation that your research project entitled "A Comparison of Small Group Instructional Arrangements with Young Children Identified as Autistically Impaired" has been **approved** under the **full** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 11 January 2000

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