VIDEO MODELING AND OBSERVATIONAL LEARNING TO TEACH RECREATION AND LEISURE SKILLS TO STUDENTS WITH AUTISM

by

AMY DAY SPRIGGS

(Under the Direction of David L. Gast)

ABSTRACT

The purpose of this study was to evaluate both video modeling and observational learning to teach age-appropriate recreation and leisure skills to students with Autism Spectrum Disorder. Results were evaluated via a multiple probe design across participants for video modeling and across participants and behaviors for observational learning. Participants included 4 children with autism, ages 8 to 11, who were served in self-contained special education classrooms. Results indicated video modeling was effective for teaching chained tasks, across students; observational learning occurred for at least some steps across students. Results and future implications are discussed.

INDEX WORDS: Autism, Video modeling, Observational learning, Recreation and leisure skills

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DEDICATION

I would like to dedicate this to my family. The support and understanding of Jarrett and Kennedy have been amazing. The encouragement from my mom, dad, sister and brother has kept me going to see this to the end. Without them, completing this final product would not have been possible.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER ONE

Introduction

Autism spectrum disorders (ASD) are characterized by deficits in social skills, communication, and stereotypic or restricted behaviors (Heflin & Alaimo, 2007). Within each of these core deficits, a wide range of ability exists; thus, effective educational programming often requires various formats. One common characteristic associated with individuals with ASD is the ability to process visual stimuli. Quill (1997) suggested using visually cued instruction to enhance strengths often associated with ASD in the areas of attention, perception, information processing, memory, language, and general intelligence. An evidence-based practice that contains these principles is video modeling. Video models have been used to teach numerous skills to students with ASD. As a form of observational learning, videos have been demonstrated effective in literature as an acceptable practice for teaching students with ASD (Stansberry-Brusnahan & Collet-Lingenberg, 2010). Interestingly, literature on effectiveness on using in vivo (e.g., live person) observational learning for students with ASD is limited, especially where modeling chained tasks is targeted. While studies exist for facilitating observational learning opportunities for individuals with various disabilities (Broweder, Schoen, & Lentz, 2001; Robertson & Biederman, 1989), very little exists for facilitating those opportunities for individuals with ASD; most of the existent studies, target discrete tasks (Delgado & Greer, 2009; Egel, Richman, & Koegel, 1981; Ihrig & Wokchick, 1984; leford, Gast, Luscre, & Ayres, 2008; Kamps & Walker, 1990).This study focused efforts of teaching chained recreation and leisure skills via video models to students with ASD in small group instructional arrangements, facilitating observational learning opportunities.

Definitions

Observational learning. Observational learning can be defined as “cognitive and behavioral change(s) that result from the observation of others engaged in similar actions” (Dorwick & Jesdale, 1991, p. 65). Bandura (1977) outlines attention to and retention of modeled behaviors and ability and motivation to learn and imitate those behaviors as key factors in observational learning. Observational learning involves a process of observing and doing. It can occur via in vivo modeling from a teacher, watching other students perform a task, or through video modeling (Darden-Brunson, 2008). For the purpose of this study, observational learning included in vivo skills performed by peers in real time and excluded video or computer-based models (those models were the focus of the video modeling portion of this study).

Video modeling. A specific form of observational learning, video modeling involves the use of video to demonstrate skills to be imitated. Those watching the video must discriminate the model’s behavior and then exhibit those specific skills in the natural environment (Nikopoulos & Keenan, 2006). Video models can take first person point of view, also referred to as subjective point of view (Mechling, 2005) and point-of-view (Hine & Wolery, 2006), or third person point of view. In first person point of view videos, hands are often shown manipulating task materials simulating the task being done from the observer’s point of view; in third person point of view videos, the entire person and task materials are shown simulating a “demonstration.” For the purpose of this study, video models were filmed in third person point of view, showing a full third person demonstration of each activity.

Recreation and leisure. Recreation and leisure education became a priority for educators in 1975 in anticipation of students with disabilities being included in public schools for the first time (Hitzhusen, 1975). “Recreation is typically defined as an activity that people engage in for the primary reasons of enjoyment and satisfaction… leisure describes a person’s perception that he or she is free to choose to participate in meaningful, enjoyable, and satisfying experiences” (Dattilo & Schleien, 1994, p. 53). For the purpose of this study, recreation and leisure were used in conjunction with each other; the participants chosen did not have a repertoire of skills to choose meaningful, age appropriate activities prior to the study.

Rationale

Observational learning. Observational learning can be used for skill acquisition or skill refinement. Nikopoulos and Keenan (2006) suggest observational learning can occur rapidly, with as few as one instructional session, decreasing the chance for errors. Teaching students in a small group setting, a requirement for observational learning to occur, provides several benefits to classrooms serving students with ASD. It can require fewer staff members to execute the activity. Small group instructional arrangements can also enhance instructional time (e.g., if one skill is simultaneously being taught in a group of three students, and all three students acquire the skill, additional, direct instructional time will not be required). Small group instructional arrangements also provide access to multiple forms of the target skill. If three students in a group are taught three different skills and learning occurs both directly and observationally, all three students could learn three times the amount of information simply by group participation. Small groups also facilitate natural teaching environments. If students are going to be included with typical peers, group participation skills (e.g., waiting, watching, turn-taking, tolerance) need to be learned. Learning to attend to a peer as a model can become natural while reinforcing appropriate behaviors. Research is needed to address effectiveness and efficiency of in vivo observational learning for children with ASD.

Video modeling. Krantz, MacDuff, Wadstrom, and McClannahan (1991) list advantages of using video with students with disabilities. Some include student attention to video, when attention to other stimuli is variable, opportunities for repeated viewing, and portability for viewing in multiple settings, including those where skills need to be performed. Nikopoulos and Keenan (2006) provide the following advantages for using video for learners with ASD: (a) video can present behaviors in natural settings, (b) video can serve as non-verbal symbols for those who have difficulty with verbal language or written text, (c) video can utilize various exemplars, (d) internal reliability increases because behaviors videoed are modeled the same way every time, (e) generalization can be easily programmed into video models, and (f) they can be cost effective. Video modeling has been well documented as an evidence-based practice for individuals with ASD (Ayres & Langone, 2005; Mechling, 2005; Bellini & Akullian, 2007). "While [video modeling] has been used successfully for typically developing individuals as well as people with a range of diagnoses, the preference for visual processing and learning approaches has been noted as a factor contributing to the success of such interventions for individuals with autism" (Rayner, Denholm, & Sigafoos, 2009, p. 292). Many students with ASD have positive histories with DVD media, preferring to watch movies for reinforcement, during free time, or while engaged in structured social interactions. Video models are also useful for providing alternatives to direct teacher instruction; not only does this promote student engagement, it is reliable, offering instruction the same way every time even if the teacher is absent.

Although video modeling can be a form of observational learning, for the purposes of this study, the two will be separated. This decision was made for several reasons. First, video modeling has proven effective in teaching individuals with ASD several skills. The technology aspects promote likely observational learning occurring from person in video to person watching. What is lacking in research is the observational learning that occurs from person to person, in vivo. For most individuals, rates of learning via video would likely mirror rates of learning in vivo. Corbett and Abdullah (2005) suggest differences may occur and could be attributed to "over-selective attention.., restricted field of focus.., preference for visual stimuli.., and avoidance of face-to-face attention [that] may actually be capitalized on while using video modeling" (p. 205). Further research is needed to address these issues.

Recreation and leisure. Dattilo (1991) describes excess of free time and difficulty filling that time with constructive, age appropriate activities as an issue for individuals with disabilities. The lack of educational programming for persons with disabilities led to suggestions for improvement. Of importance to this study, targeting age appropriate leisure skills that are readily available in the person's environment (e.g., home, school, community) are imperative. He also notes the importance of selecting activities that are either in students' repertoire or those that can be taught. Beyer and Gammeltoft (2000) describe the dual demands of recreation and leisure activities for learners with ASD; they suggest "most play activities demand both social skills and practical playing skills. Non-autistic people rarely perceive the social requirements as a strain, while children with autism experience them as the most difficult part of the task" (p. 98). The authors go on to suggest choosing leisure activities of high interest that are both easy and familiar. In a classroom full of high-tech recreation/leisure possibilities, the first logical step would be to teach these skills. Scheuermann and Webber (2002) state that

> [while] most of us do not require formal instruction to participate in recreational

> activities, pursue leisure time interests, and develop specific skills and talents, … this is not the case for children with autism. Without systematic instruction in leisure and recreation skills, it is unlikely that individuals with autism will learn them on their own, due to their overriding cognitive, language, and social skills deficits. Given undirected free time, most students with autism would either sit doing nothing or engage in inappropriate behavior, unless they are taught desirable leisure and play skills and are provided with structured opportunities to practice these skills (p. 237).

Dattilo and Schleien (1994) found that individuals with disabilities are often not included in recreation and leisure activities due to false notions that they cannot learn the skills. When skills are taught, they are often restricted, stereotypic, and done in groups of people with disabilities (e.g., bowling, crafts).

"Individuals with [disabilities] need to develop a repertoire of leisure skills that (a) is appropriate to their chronological age, (b) is based in their community, and (c) will facilitate successful integration into the community" (Dattilo & Schleien, 1994, p. 56). Isolating these activities and teaching necessary skills for involvement may bridge the gap for inclusion. As students with disabilities get older, academic inclusion becomes more difficult; finding recreation and leisure skills enjoyed by same age peers can promote social inclusion where friendships can be formed. With a minimal research base to support or negate its implications, research involving recreation and leisure education for children with ASD is essential.

Research questions

1. Will students with autism learn to access critical steps in chained recreation/leisure activities via video models (access being defined as completing the critical steps necessary to get to the game; it does not include accuracy or skill of playing the game)?

2. Will students with autism who are observers of students engaged in chained recreation/leisure activities learn to access critical steps in recreation/leisure activities?
3. Will there be a difference in percent critical steps completed correctly for students learning via video models vs. students learning observationally?
4. If students who are observers learn to access critical steps chained recreation/leisure tasks, will their accuracy of critical steps completed be different when learning subsequent recreation/leisure activities where they are observing?
5. If students have prior success accessing recreation/leisure activities via video models, will their accuracy of critical steps performed be different when learning observationally verses those students who have yet to experience the video models?

The underlying hypothesis is that students with autism will learn to access critical steps in recreation/leisure activities via video models based on previous research. Students observing others engaging in recreation/leisure activities are also likely to learn to access at least some critical steps for each activity; however, it is possible that subsequent activities will result in higher percent steps completed correctly for observers at the point the target student reaches criterion.

Definitions and Principle Measure

1. Student performance measures
    a. Learner
        i. Accuracy of response: correctly initiating and completing a step within 10 seconds of the task direction or completion of previous step
        ii. Trials to criterion: total number of video model trials required to reach criterion

iii. Errors to criterion: total number and type of errors made prior to mastery of each activity

iv. Error types: latency, duration, sequential, and topographical errors

b. Observer

i. Accuracy of response: correctly initiating and completing a step within 10 seconds of the task direction or completion of previous step

ii. Total errors: total number and type of errors made prior to mastery of each activity

iii. Error types: latency, duration, sequential, and topographical errors

CHAPTER TWO

A review of the literature

A literature review on video modeling, observational learning, and topics for recreation/leisure skills for those with disabilities was conducted to establish a foundation for this study. Literature on video modeling for students with disabilities indicates effectiveness for teaching a multitude of skills. Ayres and Langone (2005) reviewed 15 articles using video interventions with students with autism spectrum disorders (ASD). Dividing their literature review into interventions focusing on teaching social skills and those focusing on functional skills, they described mostly positive results. They concluded that one benefit was "video can isolate steps of a process and show perfect, repeated demonstrations of critical steps. Singularly, one of the most important behavioral principles for teaching students who have significant disabilities is the need to provide repetition of the targeted skills while manipulating important exemplars (e.g., materials)" (p. 128). Mechling (2005) also conducted a review of video interventions. Her search encompassed all disabilities but was limited to teacher created video. In the 24 studies reviewed, the majority described positive results, suggesting video models as effective instructional tools. Bellini and Akullian (2007) conducted a meta-analysis to analyze current video modeling literature as it relates to evidence-based practices. In the 23 studies reviewed, the authors concluded that video modeling "effectively promote(s) skill acquisition, and that skills acquired via video modeling … are maintained over time and transferred across persons and settings" (p. 281).

Literature on in vivo observational learning for students with ASD is minimal. The existent literature suggests observational learning can occur for students with a variety of disabilities; the studies that do exist for students with ASD propose they might observationally learn from their peers when taught in small group instructional arrangements. Visual strengths of students with ASD would make learning observationally, where the focus can be non-verbal cues, ideal (Quill, 1997); deficits in joint attention, where attention is coordinated on critical features, suggests observational learning may be hindered (Carpenter & Tomasello, 2000).

Literature for providing recreation/leisure education for individuals with ASD is almost non-existent. A limited literature base exists describing how to teach those skills to individuals with disabilities with a focus on adults learning skills via transition goals and objectives; results are empirical with positive results, but sparse.

Evaluated together, the current literature base on video modeling, observational learning, and recreation/leisure education reveals that while video models have been effective for teaching individuals with autism, using them in conjunction with recreation/leisure tasks and incorporating observational learning as a component is lacking. The combination of these reviews reveals an area of instructional promise that needs systematic investigation.

Method

Literature was identified for this review in several ways. First, an electronic search in ERIC, PsychINFO, Academic Search Complete, and Educational Research Complete databases was conducted using combinations of the following terms: autism, video modeling, observational learning, recreation, leisure, and disabilities. Second, an ancestral search of their reference lists was conducted. Last, a hand search of tables of contents of journals which report developmental disabilities applied research was completed (See Table 1).

Studies identified as appropriate for this review met the following criteria: (1) the study was empirical; (2) the study was published in a peer reviewed journal, (3) the study included participants with disabilities; and (4) the study was written in English. Specifically for video modeling literature, studies were limited to those that (1) included school age (e.g., 3-21) students with ASD or pervasive development disorder (PDD), (2) utilized video modeling (as opposed to video prompting) as a component of the independent variable, and (3) targeted functional chained tasks. Studies focusing on play behaviors were included if manipulation of toys was a component and results isolated from social play behaviors. Observational learning literature was limited to studies that included school age students (e.g., 3-21) with disabilities and utilized observational learning to teach discrete or chained tasks. Studies that used video models as the observational medium were omitted; those meeting the aforementioned video model criteria were included within that section. Literature on teaching recreation and leisure skills included studies that targeted individuals with disabilities where recreation and leisure skills were the topic of the study.

Results

Video modeling. Twenty two articles were identified as meeting the video model literature criteria. Table 2 summarizes characteristics found within the articles. Of the studies identified, all but one used a single subject research design (Gast, 2010) to evaluate functional relations between video modeling and skill acquisition; studies included used variations of multiple baseline and multiple probe designs when single independent variables were the focus and variations of alternating treatment designs when multiple independent variables were of interest. Although not indicated, Kinney, Vedora, and Stromer (2003) used methods similar to multiple probe designs. Twenty studies reported inter-observer agreement (IOA) ranging from 78 to 100%. Nine studies reported procedural reliability ranging from 84 to 100%. Social validity measures were reported with positive results for five studies.

A total of 63 participants participated in the studies identified for video modeling. Sixty participants were identified as having ASD or PDD. Twenty one articles included multiple participants; six studies included two participants (Bourdreau & D'entremont, 2010; Lassater & Brady, 1995; MacDonald, Clark, Garrigan, & Vangala, 2005; Murzynski & Bourret, 2007; Paterson & Arco, 2007; Sancho, Sidener, Reeve, & Sidener, 2010), nine included three participants (Alcantara, 1994; Ayres, Maguire, & McClimon, 2009; Blum-Dimaya, Reeve, Reeve, & Hoch, 2010; Geiger, LeBlanc, Dillon, & Bates, 2010; Hagiwara & Myles, 1999; Haring, Kennedy, Adams, & Pitts-Conway, 1987; Norman, Collins, & Schuster, 2001; Palechka & MacDonald, 2010; Rosenburg, Schwartz, & Davis, 2010; Shipley-Benamou, Lutzker, & Taubman, 2002), four studies included four participants (Allen, Wallace, Renes, Bowen, & Burke, 2010; Ayres & Langone, 2007;Cihak & Schrader, 2008; Tereshko, MacDonald, & Ahearn, 2010), and one study included five participants (Keen, Brannigan, & Cuskelly, 2007).

Studies focused on various chained tasks. Three studies evaluated teaching community functioning skills (Alcantara, 1994; Ayres & Langone, 2007; Haring et al., 1987) and two studies focused on vocational skills (Allen et al., 2010; Cihak & Schrader, 2008). Geiger et al. (2010) compared in vivo modeling to video modeling for teaching three students to draw, tell jokes, and answer questions; they found both modeling procedures effective, with no differential selection between the two. Kinney, Vedora, and Stromer (2003) effectively taught a first grader with ASD generative spelling using video models and video rewards. Literature focused mainly on self-help and daily living skills (Ayers et al., 2009; Hagiwara & Myles, 1999; Keen et al., 2007; Lassater & Brady, 1995; Murzynski & Bourret, 2007; Norman et al., 2001' Rosenburg et al., 2010; Shipley-Benamou, 2002) and play (Bourdreau & D'Entremont, 2010; MacDonald et al., 2005; Palechka & MacDonald, 2010; Paterson & Arco, 2007; Sancho et al., 2010; Tershko et al., 2010). For the purposes of this review, play was defined as toy manipulation and was not included within recreation/leisure studies. This decision was made primarily due to age appropriateness of procedures described; activities appropriate for students ages 8 to 11 were included in recreation and leisure. The only article included meeting those criteria focused on teaching three students ages 9 to 12 to play Guitar Hero (Blum-Dimaya et al., 2010). The authors describe an instructional package including graduated time delay, visual activity schedules, manual prompting, and embedded video models as effective for teaching students with ASD to play three games on Guitar Hero; generalization and maintenance were also reported as effective via multiple probe design across participants.

Observational learning. Thirty two articles were identified as meeting the observational learning literature criteria. Table 3 and Table 4 summarize characteristics found within each article. In all 32 studies, participants were reported to learn at least some information observationally. Each study utilized single subject designs to investigate functional relations between independent and dependent variables; multiple probe designs were used in 28 studies, multiple baseline in two, a BCBC design used by one (Ihrig & Wokchick, 1984), and a modified alternating treatments design used by one (Kamps & Walker, 1990). All studies reported IOA ranging from 82.8 to 100%. Twenty seven studies reported procedural reliability ranging from 83 to 100%.

Table 3 summarizes observational learning of discrete tasks. While not the focus of this study, 4 of the 24 studies included children with ASD (Delgado & Greer, 2009; Egel, Richman, & Koegel, 1981; Ihrig & Wokchick, 1984; Ledford, Gast, Luscre, & Ayres, 2008) demonstrating observational acquisition of discrete skills for this population. Skills taught discretely for observational learning included reading (Alig-Cybriwsky, Wolery, & Gast, 1990; Delgado & Greer; Farmer, Gast, Wolery, & Winterling, 1991; Gast, Wolery, Morris, Doyle, & Meyer, 1990; Ledford et al.; Kamps & Walker, 1990; Keel & Gast, 1992; Mechling, Gast, & Krupa, 2007; Parker & Schuster, 2002; Schoen & Ogden, 1995; Schuster, Morse, Griffen, & Wolery, 1996; Shelton, Gast, Wolery, & Winterling, 1991; Stinson, Gast, Wolery, & Collins, 1991; Winterling, 1990; Wolery, Ault, Gast, & Doyle, 1990) , math (Gursel, Tekin-Iftar, & Bozkurt, 2006; Whalen, Schuster, & Hemmeter, 1996), and naming, discrimination, or discrete identification (Campbell & Mechling, 2009; Doyle, Gast, Wolery, & Ault, 1990; Egel et al.,; Falkenstine, Collins, Schuster,, & Kleinert, 2009; Gursel et al.; Ihrig & Wokchick; Parker & Schuster; Ross & Stevens, 2003;Rothstein & Gautreaux, 2007). All studies reported at least some observational learning evidence.

Table 4 summarizes observational learning of chained tasks. Eight studies were included in the review. Chained tasks taught included: food preparation (Griffen, Wolery, & Schuster, 1992; Schoen & Sivil, 1989; Tekin-Iftar & Birkan, 2010; Wolery, Ault, Gast, Doyle, &Griffen, 1991), vocational tasks (Smith, Collins, Schuster, & Kleinert, 1999; Wall & Gast, 1999; Wolery et al.), self-help (Christensen, Lignugaris-Kraft, & Fiechtel, 1996; Wolery et al.), or a variety of tasks. Werts, Caldwell, and Wolery (1996) evaluated observational learning of various tasks (e.g., sharpening pencils, adding with a calculator, accessing computer programs, sequencing numbers) via non-disabled peer models correctly performing each task. Findings indicate students with disabilities were able to perform steps in the behavior chains after observing peers. One study included participants with ASD (Tekin-Iftar & Birkan). Three students were taught food and drink preparation chained tasks; students learned to complete their target tasks and they were able to perform peer's tasks learned observationally. All studies reported high levels of observational learning evidence.

Recreation and leisure. Twenty articles were identified as meeting the recreation and leisure literature criteria. Characteristics found within each article are summarized in Table 5. Seventeen studies used empirical research designs to evaluate effectiveness of recreation/leisure programs on dependent variables. Single subject research designs were used in 13 studies, 10 being multiple baseline (Adkins & Matson, 1980; Cory, Dattilo, & Williams, 2006; Dattilo & Hoge, 1999; Dattilo, Williams, & Cory, 2003; Mahon, 1994; Williams & Dattilo, 1997) or multiple probe (Blum-Dimaya et al., 2010; Collins, Hall, & Branson, 1997; Dattilo, Guerin, Cory, & Williams, 2001; Keogh, Faw, Whitman, & Reid, 1985) designs. Devine, Malley, Sheldon, Dattilo, and Gast (1997) used an alternating treatments design to compare two interventions. Schleien, Kiernan, and Wehman (1981) and Whatley, Gast, and Hammond (2009) used reversal designs to evaluate effectiveness of intervention. Schniter and Devine (2001) evaluated intervention effectiveness via a single case study. Experimental group designs were used in four studies (Bedini, Bullock, & Driscoll, 1993; Garcia-Villamisar, & Dattilo, 2010; Hoge, Datillo, & Williams, 1999; Jeffree & Cheseldine, 1984). Hoge and Dattilo (1995) used interviews to investigate recreation participation patterns.

A total of 477participants were included in the studies; 377 participants had disabilities. Nineteen studies included a minimum of three participants. Ages of participants spanned 6 to 52, with the majority being over 15 years. Three studies included students with ASD. Garcia-Villamisar and Dattilo (2010) evaluated a one year leisure program where 37 participants were exposed to a variety of leisure activities (e.g., exercising, playing games, attending events) and then encouraged to choose activities to participate in. Findings indicate that participants in the experimental group displayed lower stress levels and higher indicators for quality of life markers (e.g., satisfaction, independence, interaction) than the 34 participants not receiving intervention. Schniter and Devine (2001) taught a young adult with ASD to express leisure preferences using a Leisure Communication Book. Self-injurious behaviors decreased from over 20 to fewer than 5 occurrences per day. Blum-Dimaya et al. (2010) taught 3 students with ASD to play Guitar Hero using graduated time delay, visual activity schedules, and embedded video modeling.

Studies included in the review focused on four categories: (a) worth or value in recreation/leisure activities (Bedini, Bullock, & Driscoll, 1993; Garcia-Villamisar and Dattilo, 2010; Hoge & Dattilo, 1995; Hoge, Dattilo, & Williams, 1999;), (b) self-determination of individuals engaged in recreation/leisure activities (Dattilo et al. 2001; Mahon, 1994; Schniter & Devine, 2001; Williams & Dattilo, 1997), (c) social skills (Cory et al. 2006; Dattilo & Hoge, 1999; Dattilo et al. 2003; Schleien, et al., 1981; Williams & Dattilo, 1997), and (d) making something or learning a specific skill. Adkins and Matson (1980) used prompting, attention, and direct instruction to teach six adults with moderate to severe mental retardation pot holder making. Blum-Dimaya et al. (2010) effectively taught three students with ASD to play Guitar Hero via multiple independent variables. Keogh et al. (1985) taught adolescents with severe mental retardation to play commercially available board games. Collins et al. (1997) taught students with moderate and severe disabilities to watch TV, play video games, and play card games via system of least prompts. McAvoy et al. (2006) taught various outdoor activities (e.g., camping, canoeing) to 23 adults with mental retardation. Initiation (Devine et al. 1997) and increased level of engagement (Jeffree & Cheseldine, 1984; Whatley et al., 2009)) were the focus of two studies.

Critique of Research

The field of special education uses scientific evidence to determine evidence-based practices; top tier research and professional wisdom provide the framework for evaluation (Odom et al., 2005). Methodologies that are rigorously researched, systematically replicated, and evidenced via strong research designs in the past 10 years are crucial to evidence-based practice determination. Considering these factors when evaluating the current literature, leads to mixed results.

The growing body of research on video modeling indicates its use as a possible evidence-based practice; eighteen of the studies included were published after 2000, making this intervention applicable to today's technological advances. Single subject research designs (Gast, 2010) were used to evaluate functional relations. While designs chosen were appropriate, 8 of 17 studies used multiple baseline or probe designs across participants; a stronger causal relationship could have been demonstrated via intra-subject replication if compared across behaviors and replicated across participants. Reliability and social validity were reported for several studies, confirming results and validating importance.

Although not as current (only 1/3 studies investigated were conducted in the last 10 years), observational learning is well researched across multiple disabilities. All studies included in the review were evaluated via single subject research designs. Of the 26 multiple baseline or probe designs included, 20 were evaluated across behaviors and replicated across participants, demonstrating inter- and intra-subject replication. Every study included inter-observer agreement results, endorsing findings. Social validity was reported for several studies, supporting its use. Limitations of this methodology include current relevancy with chained tasks and use with individuals with ASD.

Recreation and leisure education for individuals with ASD is not well established; two studies included students with ASD. The literature base is not current; of the 20 studies included in this review, eight were published within this decade. Several evaluated effectiveness via single subject research designs or group designs. Ten used multiple baseline or probe designs to evaluate functional relations between independent and dependent variables with two of those assessing across behaviors, replicating across participants; the remaining eight, failed to demonstrate intra-subject replication. Three studies included reported variable data or only slight changes in the dependent variable.

Conclusions

Literature has established video modeling as an effective practice for teaching various skills to individuals with ASD. The visual nature can make video highly motivating and naturally reinforcing for students with ASD. Ayers and Langone (2005) point out that while researchers have answered many questions about using video models for instruction, we do not know everything we need or want to. For this current study, it is assumed students will learn via video models. Questions of interest are: (a) will others learn from watching what the learners demonstrate and (b) will there be significant differences in percent critical steps performed accurately for those learning via video models versus those learning via in vivo models?

The research base of learning observationally, that is watching and imitating peer's actions, for individuals with ASD is minimal. The existent literature is not current, making its relevancy in today's classroom questionable. For students with ASD, the question of interest will be: can they learn chained tasks from observing peers? Their visual strengths would suggest positive results; their stimulus over-selectivity tendencies would suggest possible difficulties. Validating the ability of students with ASD to learn in small groups could prove beneficial for future educational programming. Collins, Gast, Ault, and Wolery (1991) list several advantages to small group (as opposed to 1:1) instruction: “(a) teachers can instruct more than one student at a time, (b) less classroom personnel and instructional time… required, (c) students may be prepared to function in less restrictive environments, (d) students may learn to interact appropriately with peers, and (e) students may learn additional information from observing other members of the group” (p. 18).

Currently, leisure skills literature encompasses a narrow range of restricted activities (e.g., bowling, crafts) (Dattilo & Schleien, 1994). The majority of existent literature targets adults, or teens, transitioning to post school environments. Although imperative at this age due to increases in free time, younger individuals may also require systematic instruction to learn these skills. Earlier intervention is important for two reasons: (a) students with disabilities often require more time to learn and maintain skills, and (b) teaching students with ASD highly motivating age appropriate recreation and leisure skills can open the door for naturalistic, meaningful social interactions. Educators must select recreation and leisure activities that are age appropriate and readily available in the students school, home, and community environments. Skills must also be in students’ repertoire or directly taught (Dattilo, 1991). Current, relevant research on effective ways to teach recreation and leisure skills is needed.

Presently there is a plethora of literature evaluating video models for teaching various skills to individuals with ASD. Research has also demonstrated acquisition of skills via observational learning. Although this literature provides strong evidence for teaching discrete tasks to individuals with various disabilities, teaching chained tasks is not well documented; including participants with ASD is minimal. Research on educating individuals with disabilities specific recreation and leisure skills is promising but limited. Including participants with ASD is almost non-existent. Collectively, video modeling, observational learning, and recreation and leisure skills provide promising research possibilities. Singularly, all three areas have demonstrated areas of potential; combining the concepts could provide further insight into how students with ASD process models and how they apply them to highly motivating, age appropriate activities.

Table 1

Table of Contents of Journals Reviewed

Exceptional Children
Education and Training in Developmental Disabilities
Focus on Autism and Other Developmental Disabilities
Journal of Applied Behavior Analysis
Journal of Autism and Developmental Disorders
Journal of Leisure Research
Journal of Special Education Technology
Mental Retardation
Teaching Exceptional Children
Therapeutic Recreation Journal

Table 2

Video Models to Teach Chained Functional Skills

Reference	Participants	Targeted Skills	Dependent Variables/ Measures	Independent Variable(s)	Research Design	Conclusions/ Results
Alcantara (1994)	• N: 3 • Age: 8-9 years • ASD	• Buying groceries	• Correct steps performed at each store	• Video instruction in the classroom • Video plus in vivo training (SLP)	• Multiple baseline design across settings, replicated across students	• All students learned to purchase groceries in all three stores; after two stores were learned, the third store was learned rapidly (data indicates carry over effect) • IOA 86-100% • Procedural Reliability 100%
Allen, Wallace, Renes, Bowen, & Burke (2010)	• N: 4 • Age: 16-25 years • ASD	• Wearing a costume and performing the following: waving; shaking hands; giving high-fives; moving tongue, tail, ears, or eyes; jumping or shaking body	• Occurrence of multiple target skills within a 15 s interval	• Students watched commercially produced scripted and naturalistic video models twice before returning to store; if criterion not met after 10 minutes, students watched videos again two times during break	• Multiple baseline design across participants	• All students met criteria for mascot to appear lifelike • Participants occasionally perseverated on one skill • Participants found the costume comfortable; job acceptable • IOA 78-100% • Social Validity 4.8-5.9/6.0 (students rated)
Ayres & Langone (2007)	• N = 4 • Age: 6-8 years • ASD	• Putting groceries away	• Number groceries put away correctly	• Compared first-person to third-person perspective video models	• Adapted alternating treatments design with	• Students learned to put groceries away using the computer; all students generalized the

				• Pre/posttest in-vivo where students were given items and told to put them away • PC probes - students shown an item and instructed to put away (drag to appropriate picture on computer)	concurrent baseline condition	skill to in-vivo settings; one point of view did not appear to have more positive effects • IOA 100% • Procedural Reliability 88-100% • Social Validity: all students were able to ID what the videos were depicting; students were not able to describe differences in videos
Ayres, Maguire, & McClimon (2009)	• N = 3 • Age: 7-9 years • ASD	• Making soup • Making a sandwich • Setting the table	• Percent steps completed correctly in each task analysis	• Students watched two video model exemplars of the skills to be performed and then completed a computer simulation via SLP • Students completed tasks in vivo for generalization	• Multiple probe design across behaviors, replicated across students	• All students increased percent steps completed correctly for each task assessed (one student was not taught making soup) • IOA 96.2-100% • Procedural Reliability 96.6%
Blum-Dimaya, Reeve, Reeve, & Hoch (2010)	• N: 3 • Age: 9-12 years • ASD	• Playing Guitar Hero II video game via Sony Play Station	• Percent correctly completed schedule components • Percent intervals on-task	• Used graduated time delay with visual activity schedules to teach TA for playing game • Used manual prompting for correct guitar playing • Students watched	• Multiple probe design across participants	• All students learned to play 4 songs (3 taught; 1 generalized) • Ability to play songs maintained after picture activity schedule removed • IOA 98-100% • Procedural Reliability 100% • Social Validity yielded

				embedded video model to know which color to touch on guitar		high scores post intervention
Boudreau & D'Entremont (2010)	• N: 2 • Age: 4 years • ASD	• Play skills: actions and verbalizations with a puppy and a truck	• Number of modeled actions, unmodeled actions, scripted verbalizations, and unscripted verbalizations	• Video modeling using adult modeling 12-15 actions and 9-13 verbalizations	• Multiple baseline design across subjects	• Rapid acquisition of modeled actions and scripted verbalizations for both participants • IOA 84-100% • Procedural Reliability - 1 report of technical difficulty • Social Validity indicated families being satisfied with the intervention
Cihak & Schrader (2008)	• N: 4 • Age: 16-20 • ASD	• Vocational and prevocational chained tasks (making copies, sending a fax, packaging first aid kits and family packs)	• Percentage of steps completed independently	• Comparison of self-modeling vs. adult-modeling via video models	• Alternating treatments design	• All students acquired the skills to complete the tasks via both self and adult-models; three participants acquired tasks slightly more efficiently with self-models; one showed no difference • IOA 95-100% • Procedural Reliability 95-100% • Social Validity all participants reported liking watching themselves; the teacher reported ease of use and desire to include video models in future instruction

Geiger, LeBlanc, Dillon, & Bates (2010)	• N: 3 • Age: 7-9 years • ASD	• Drawing a sun, house, smile • Make a bug • Answering questions • Telling jokes	• Cumulative card selections • Percent of target skill components completed accurately • Duration of attention to model	• Compared preference for in vivo modeling to video modeling	• Alternating treatments design with baseline for 2 skills and a free play control/baseline condition	• Both modeling conditions produced similar acquisition rates • There was no differential selection between the two • IOA 94-100%
Hagiwara & Myles (1999)	• N: 3 • Age: 7-9 years • ASD	• Washing hands	• Percent steps completed • Average duration time on task	• Multimedia social story on computer	• Multiple baseline design across settings, replicated across participants	• Minimal change in student behavior • IOA 89-100% (no description of calculation)
Harring, Kennedy, Adams, & Pitts-Conway (1987)	• N: 3 • Age: 20 years • ASD	• Purchasing items	• Percent total steps, operational steps, and social steps	• Videotaped models together with shopping training (using SLP/ minimal prompting)	• Multiple baseline across participants	• Video modeling, together with shopping training, effective for promoting generalization, increased independent functioning, and social repsonding • IOA 95.8%
Keen, Brannigan, & Cuskelly (2007)	• N: 5 • Age: 4-6 years • ASD	• Toilet training	• Frequency of in-toilet urinations	• Animated toilet training video to teach daytime urinary control	• Multiple baseline design between groups (one group exposed to video; one group was not)	• Frequency of in-toilet urinations was found to be greater for children who watched the video than for those who did not

Kinney, Vedora, & Stromer (2003)	• N: 1 • Age: 1st grade • ASD	• Spelling	• Number words spelled correctly	• Video models and video rewards used to teach generative spelling in 4 phases	• Not indicated	• Student learned to spell all words taught and all words remaining in each matrix (words following similar spelling rules) • IOA 97-99%
Lassater & Brady (1995)	• N: 2 • Age: 14-15 years • 1: William's Syndrome • 1: ASD	• Task fluency of self-help skills: shaving, sandwich making	• Number of self-help steps completed independently • Time to complete task • Percent intervals where task-interfering behavior occurred	• Instructional package that included self-assessment, behavior rehearsal, and self-modeling via videotaped feedback	• Multiple baseline design across tasks, replicated across participants	• Increased task fluency for both students; generalization to novel skills occurred for both students; task interfering behaviors decreased for both students • IOA 94-100%
MacDonald, Clark, Garrigan, & Vangala (2005)	• N: 2 • Age: 4-7 years • ASD/PDD	• Thematic pretend play (verbalizations and play actions) using a town, ship, and house	• Number scripted verbalizations and play actions • Number unscripted play actions	• Adult model video models shown two times consecutively	• Multiple probe design across play sets replicated across participants	• Both children acquired verbalizations and play actions • Maintenance demonstrated via follow-up probes • Unscripted play did not emerge • IOA 96-99%
Murzynski & Bourret (2007)	• N: 2 • Age: 8-9 years • ASD	• Daily living skills (folding shirts and pants, making sandwiches and juice)	• Number steps completed independently for chained daily living skills	• Comparison of video modeling with least-to-most prompting to least-to-most prompting alone	• Parallel-treatments design	• Both participants acquired the skills in fewer trials and with fewer prompts with video models and most-to-least prompting
Norman, Collins, &	• N: 3 • Age: 8-12 years	• Cleaning sunglasses, putting on	• Percent correct responses for each task	• Treatment package – video modeling and video	• Multiple probe design across behaviors,	• Students with Down Syndrome learned the skills with video

Schuster (2001)	• 2 Down Syndrome; 1 ASD	watch, zipping jacket		prompting	replicated across students	modeling alone • Student with ASD learned 2/3 skills with massed trials presented thru video models • IOA 88-100% • Procedural Reliability 89-100&
Palechka & MacDonald (2010)	• N: 3 • Age: 4-5 years • ASD	• Play skills (actions with toys and statements emitted)	• Percent script completion (actions and statements emitted during play) • Percentage duration attending to videos and toys	• Comparison of commercially-available children's video to instructor-created video model	• Multi-element design within participant and across model types • Multiple probe design across participants	• Two children learned more rapidly using the instructor-created video; the third participant had similar acquisition rates for both videos • Participants attended to video and toys equally across both video formats • IOA 78-100%
Paterson & Arco (2007)	• N:2 • Age: 6-7 years • ASD	• Independent toy play (one participant had three physically unrelated toys; one participant had three related toys)	• Percent intervals with appropriate play-behaviors • Percent intervals of repetitive play-behaviors	• Video models with an adult model	• Multiple baseline design with withdrawals across toy play	• Both participants increased appropriate play and decreased repetitive play when exposed to video models • Generalization only occurred for related toys • IOA 97-100%
Rosenburg, Schwartz, & Davis (2010)	• N: 3 • Age: 3-5 years • ASD	• Washing hands	• Number correctly completed steps from TA	• Commercial video model for hand washing • Customized video with familiar child models	• Concurrent multiple baseline across participants	• One participant learned 80% of the hand washing steps; two participants did not learn from commercial video, they did learn at

						least some steps from customized video (one learned all of the steps; one had variable data) • IOA 96-100% • Procedural Reliability 95-100%
Sancho, Sidener, Reeve, & Sidener (2010)	• N: 2 • Age: 5 years • ASD	• Acquisition of play skills (actions and scripts)	• Number play actions imitated • Number vocal scripts imitated • Mean number unscripted play actions, scripted verbalizations, unscripted verbalizations	• Comparison of traditional video priming to simultaneous video modeling	• Adapted alternating treatments design with reversal and multiple probe across participants	• Participants acquired play skills via both video modeling procedures; procedures for one participant appeared to have equal effectiveness; for the other, scripted play actions were acquired more quickly in the simultaneous condition • IOA 97-100% • Procedural Reliability 97-100%
Shipley-Benamou, Lutzker, & Taubman (2002)	• N: 3 • Age: 5 years • ASD	• Functional daily living skills	• Percent steps in TA completed correctly	• Point of view video modeling	• Multiple probe design across tasks, replicated across participants	• All three participants acquired functional daily living skills • IOA 96-100%
Tereshko, MacDonald, & Ahearn (2010)	• N: 4 • Age: 4-6 years • ASD	• Constructing toy structures • Attending	• Length of video segment • Total steps completed	• Segmented video model procedure, showing an increasing number of steps in the response chain across trials	• Multiple probe design across toy structures, replicated across participants • Changing criterion design	• Participants were able to imitate the 8-step response chains via segmented video modeling • IOA 97-99%

Table 3

Observational Learning Discrete Skills

Reference	Participants	Targeted Skills	Dependent Variables/ Measures	Independent Variable(s)	Research Design	Conclusions/ Results
Alig-Cybriwsky, Wolery, & Gast (1990)	• N: 4 • Age 4-5 years • Mild to moderate ID	• Sight word reading	• Mean percent anticipations • Mean percent correct waits	• Constant time delay – 3 seconds	• Multiple probe design across word pairs, replicated across participants	• All students learned their target words • Students learned incidental information provided • Students learned other students' target words and incidental information • IOA 98.1- 99.9% • Procedural Reliability 99.2-100%
Campbell & Mechling (2009)	• N: 3 • Age: 5-6 years • LD	• Letter sounds • Incidental information – letter names	• Percent unprompted correct target sounds	• Computer assisted instruction with SMART Board technology and 3s time delay • Small group arrangement	• Multiple probe design across letter sound sets, replicated across students	• Participants learned letter sounds directly taught • Participants learned some of the letter sounds taught to other students • Participants learned some of the incidental information included • IOA 98.1-100% • Procedural Reliability 97.8-100%
Delgado & Greer	Experiment 1 • N: 4 (two	• Dolch sight	• Responses to	• Monitoring	• Delayed	• Both participants

(2009)	peer confederates and two target participants) • Age: 5 years • ASD	words	observational learning probes	experiences involving target student • Monitoring correctness or incorrectness of the responses of the peer (peer monitoring)	multiple probe design across participants	learned observational targets across the taught stimuli and untaught stimuli • IOA 97-100%
	Experiment 2 • N: 4 (one peer confederate and three target participants) • Age: 6 years • OHI	• Vocal spelling	• Response to pre- and post-experimental probes for spelling words	• Peer monitoring (see above) vocal spelling responses of peers	• Delayed multiple probe design across participants	• All participants learned the observational spelling words • IOA 99-100%
Doyle, Gast, Wolery, & Ault (1990)	• N: 4 • Age: • MID; MoID	• Local /federal service, government agencies and over-the-counter medication identification	• Mean percent correct responding • Mean percent correct observational and incidental targets	• Constant time delay in small group instruction	• Multiple probe design with reinforced probe conditions across behaviors	• CTD was effective across all facts, students, and conditions • Students acquired 88.5-95.8% observational targets; 50-83.3% incidental information for observational facts; 50-100% incidental information for target facts • IOA 95.8-100%
Egel, Richman, & Koegel (1981)	• N: 4 • Age: 5-7 years • ASD	• Discriminatio n tasks (color, shapes, prepositions, yes/no)	• Percent correct (unprompted) responses	• Constant Time Delay – 5 seconds and peer models of correct responses	• Multiple baseline design across participants	• Peer modeling produced rapid achievement of acquisition criteria across students and tasks

						• Levels maintained when peers were removed • IOA 100%
Falkenstine, Collins, Schuster, & Kleinert (2009)	• N: 3 • Age: 16 years • Moderate to Severe Disabilities	• Acquisition of academic skills • Chained and discrete tasks (provided as non-target information)	• Percent correct responses	• Constant time delay – 4 seconds	• Multiple probe design across behaviors, replicated across students	• Students learned their target information • Students learned much of the other's information • IOA 100% • Procedural reliability 99.9 -100%
Farmer, Gast, Wolery, & Winterling (1991)	• N: 3 • Age: 15-18 years • Severe ID	• Community word identification	• Percent correct responses	• Progressive time delay used in a small group instructional arrangement	• Multiple probe design across word sets, replicated across participants	• All students learned their target community words • 2/3 students learned their peer's words • IOA 99.7-100% • Procedural Reliability 96.8-100%
Gast, Wolery, Morris, Doyle, & Meyer (1990)	• N: 5 • Age: 8-12 years • Moderate ID	• Environmental word identification	• Mean percent anticipations and waits	• Constant time delay – 4 seconds in a small group instructional arrangement	• Multiple probe design across word pairs, replicated across students	• Students learned target sight words • Students learned some incidental information and some target words of other students (observationally) • IOA 95-100% • Procedural Reliability 85-100%
Gursel, Tekin-Iftar, & Bozkurt (2006)	• N: 5 • Age: 11-14 years • Mild to moderate ID	• Social studies and math skills	• Percent correct responses	• Simultaneous prompting in small group instructional arrangements	• Multiple probe design across behaviors, replicated across	• Students learned their target information • Students learned at least some of the other participant's target

					students	information • IOA 99.3-100% • Procedural Reliability 83-100%
Ihrig & Wokchick (1984)	• N: 4 • Age: 9-11 years • ASD	• Responding to questions about common objects and actions	• Percent questions answered correctly	• Comparison of peer to adult models for observational learning	• BCBC design counterbalanced across modeling conditions and replicated across participants	• Participants acquired the information with both peer and adult models • Generalization and maintenance occurred after both types of models • IOA 86.8-99%
Ledford, Gast, Luscre, & Ayres (2008)	• N: 6 • Age: 5-8 years • ASD	• Expressive sight word, phrase, and related picture identification	• Percent correct for target, observational, and incidental information	• Constant Time Delay in dyad groupings	• Multiple probe design across behaviors	• Students learned target, observational, and incidental information • IOA 99.4% • Procedural Reliability 99.7% • Social Validity yielded positive opinions from parents for objectives, procedures, and outcomes
Kamps & Walker (1990)	• N: 3 • Age: 8-11 years • ASD	• Word recognition using Dolch sight words	• Percent words read correctly • Percent intervals on-task • Percent intervals of self stimulatory behaviors • Percent words learned observationally	• Compared one-to-one vs. small group instructional arrangements	• Modified alternating treatments design	• One-to-one and small group formats were effective for learning words • All but one student learned at least some of the observational targets (one student's seating arrangement may have effected results) • Student behaviors (on-

						task and self stimulatory) were better during one-to-one instructional formats • IOA 87-99.5% • Procedural Reliability 94%
Keel & Gast (1992)	• N: 3 • Age: 11-12 years • LD or LD/BD	• Multisyllabic vocabulary words	• Percent correct	• Constant time delay in a small group instructional procedure	• Multiple probe design across behaviors, replicated across students	• Constant time delay was effective in teaching target vocabulary words • Students learned 83-100 observational words • Students learned to spell some of their words and some of the observational words (the specific attentional cue) • IOA 95-100% • Procedural Reliability 89-100%
Mechling, Gast, & Krupa (2007)	• N: 3 • Age: 19-20 years • MoID	• Sight word reading in small group arrangements • Matching photos to words	• Percent words read correctly • Percent pictures matched to words correctly	• SMART Board technology and 3s constant time delay	• Multiple probe design across word sets replicated across three participants	• Students learned the target words and picture/word pairs • Students learned some to all observational targets • IOA 99.8-99.9% • Procedural Reliability 99.8-99.9%
Parker & Schuster (2002)	• N: 4 • Age: 15-19 years	• Discrete stimuli (grocery aisle headers,	• Percent correct responses	• Simultaneous prompting in small group	• Multiple probe design	• All students mastered targets directly taught • ¾ students learned at

	• Typically developing to moderate ID	occupational words, pre-fixes, elements on periodic table				least some instructive feedback information • ¾ students learned at least some peers' target stimuli • All students learned at least some peers' instructive feedback information • IOA 99.3% • Procedural Reliability 100%
Ross & Stevens (2003)	• N: 3 • Age: 9 – 10 years • Multiple disabilities, LD, OHI	• Spelling social studies vocabulary words	• Percent correct unprompted written responses	• Constant time delay – 5 seconds	• Multiple probe design across word sets, replicated across participants	• Students learned to spell all of their target words with 100% accuracy • Students learned 21-92% observational words • IOA 100% • Procedural Reliability 97-100%
Rothstein & Gautreaux (2007)	• N: 3 • Age: 12-13 years • EBD	• Naming (famous people or types of comedy)	• Number correct responses	• Peer-yoked contingencies derived from Greer and Ross's Observational System of Instruction	• Delayed multiple baseline design across participants	• Participants learned to name the pictures presented under the peer-yoked contingencies • All but one student learned the observational targets • IOA 90-100%
Schoen & Ogden (1995)	• N: 3 • Age: 6 years • MoID; at risk	• Sight words taught in small group setting	• Percent correct responses	• Constant time delay, observational learning opportunities,	• Multiple probe design across participants combined with a	• CTD was effective in teaching sight words to all participants • Students learned an

				differential attentional cuing	multitreatment design across conditions	average of 83% -88% observational words • IOA 92-100% • Procedural Reliability 95.8%
Schuster, Morse, Griffen, & Wolery (1996)	• N: 3 • Age: 10 -11 years • Moderate ID	• Grocery words found on aisle signs • Related phrases included as instructive feedback	• Percent unprompted correct responses	• Constant time delay	• Multiple probe design across behaviors, replicated across participants	• Participants learned to reinforce peers • Participants learned their grocery words • Participants learned some of the observational information and much of the incidental information provided • IOA 97-99% • Procedural Reliability 95-100%
Shelton, Gast, Wolery, & Winterling (1991)	• N: 8 • Age: 9-12 years • Mild MR	• Sight word reading	• Percent correct responses	• Progressive time delay in small group instructional arrangement	• Multiple probe design across word sets, replicated across students	• Students learned their target words • Students learned words observationally • Students learned some incidental information • IOA 99.8% • Procedural Reliability 99.2%
Stinson, Gast, Wolery, & Collins (1991)	• N: 4 • Age: 9-10 years • Moderate MR	• Sight word reading • Definitions provided via instructive feedback	• Percent correct responses	• Progressive time delay	• Multiple probe design across word pairs, replicated across students	• Students acquired all target words • Students acquired at least 50% incidental and observational targets • IOA 99.8%

						• Procedural Reliability 99.9-100%
Whalen, Schuster, & Hemmeter (1996)	• N: 3 • Age: 6-9 years • Mild MR	• Math facts (directly taught) • Sight words (incidental information)	• Percent correct anticipations for target math facts, non-target information, observation of other's target math facts, observation of others non-target information	• Constant time delay – 3 seconds	• Multiple probe design across math fact sets, replicated across participants	• All students learned and maintained their target math facts • All students learned over ½ of their non-target information • All students learned at least some of the other's target math facts • All students learned at least some of the other's non-target information • IOA 100% • Procedural Reliability 99%
Winterling (1990)	• N: 3 • Age: 7 years • Moderate ID; LD	• Dolch sight word recognition	• Percent correct Dolch words	• Treatment package: constant time delay, practice writing or spelling target words, token reinforcement	• Multiple probe design across word sets, replicated across students	• Students acquired all target information • Students acquired at least some of the other student's information (observational learning) • IOA 99% • Procedural Reliability 99%
Wolery, Ault, Gast, & Doyle (1990)	• N: 4 • Age: 7-8 years • Mild ID	• Dolch sight word reading	• Mean percent correct	• Constant time delay – 4 seconds • Choral and individual spelling attentional responses	• Multiple probe design across word pairs, replicated across students	• Students learned all target words • Observational and incidental learning occurred for all students

				• IOA 98-99% • Procedural Reliability 90-100%

Table 4

Observational Learning Chained Tasks

Reference	Participants	Targeted Skills	Dependent Variables/ Measures	Independent Variable(s)	Research Design	Conclusions/ Results
Christensen, Lignugaris-Kraft, & Fiechtel (1996)	• N: 6 (3 target learners; 3 observational learners) • Age: 3-5 years • Development Delay or OHI	• Seeking adult assistance for "first aide" (simulated injuries)	• Number steps completed correctly for seeking adult assistance when injured	• Instructor model and corrective feedback as mistakes were made	• Multiple probe design across pairs of participants	• Trials to criterion were similar for all 6 students (observers and learners) • Skills generalized to the playground • IOA 83-100% • Procedural Reliability 83.3-100%
Griffen, Wolery, & Schuster (1992)	• N: 3 • Age: 10-13 years • Moderate MR	• Chained snack preparation tasks (milkshakes, scrambled eggs, pudding)	• Percent correct responses (for each task analysis)	• Constant time delay – 5 seconds	• Multiple probe design across students and tasks	• Participants learned all skills directly taught • Participants learned most of the skills taught to others • IOA 99.3-100% • Procedural Reliability 97.5-100%
Schoen & Sivil (1989)	• N: 8 • Age:2-5 years • Development delay	• Self-help skills (making snack; getting drink)	• Number steps completed	• System of least prompts and constant time delay	• Combined multiple probe and parallel treatments design	• Students learned skills directly taught with both SLP and CTD; CTD had a slight efficiency advantage • 3 of 4 students observing learned the entire task analysis • 1 of 4 learned most of the steps • IOA 96%

						• Procedural Reliability 96%
Smith, Collins, Schuster, & Kleinert (1999)	• N: 4 • Age: 16-18 years • Moderate to severe disabilities	• Table cleaning (targeted) • Preparing and putting away materials (observational)	• Number correct, independent steps	• SLP with multiple exemplars	• Multiple probe design across participants	• All students learned to clean tables via SLP procedures • Students acquired most observational information (13 to 14/15 steps in preparing materials and 11 to 13/14 steps in putting materials away) • IOA 100% • Procedural Reliability 95-100%
Tekin-Iftar & Birkan (2010)	• N: 3 • Age: 8 years • ASD	• Food and drink preparation chained tasks	• Percentage of correct responses	• Progressive time delay, general case training, and observational learning	• Multiple probe design across response chains and students	• Participants acquired and maintained targeted skills • Participants acquired other student's targeted skills • Participants were able to generalize acquired skills to similar response chains • IOA 97-100% • Procedural Reliability 100%
Wall & Gast (1999)	• N: 12 • Age: 14-21 years • Moderate ID	• Vocational chained tasks (grocery bagging)	• Percent correct unprompted responses	• Constant time delay in dyads	• Multiple probe design across dyads	• All students learned to bag groceries with fewer than 10% errors • Students learned 56.7% incidental information • Students learned 51.6% observational

						information (presented to partner) • IOA 99.5% • Procedural Reliability 98.8%
Werts, Caldwell, & Wolery (1996)	• N: 15 (3 with disabilities) • Age: 7-8 years • Developmental Delay	• Three chained tasks for each participant (sharpening pencil, adding using calculator, accessing computer programs, playing audio tape, spelling name, sequencing numbers)	• Percent correct steps (in each task analysis)	• Peers without disabilities performed response chains while describing what they were doing in a total-task, one-trial-per-day format	• Multiple probe design across response chains, replicated across participants	• Students with disabilities were able to perform response chains modeled by their non-disabled peers • IOA 82.8-100% • Procedural Reliability 100%
Wolery, Ault, Gast, Doyle, & Griffen (1991)	• N: 4 • Age: 10-12 years • Moderate MR	• Domestic and vocational chained tasks (cleaning transparencies, folding clothes, making eggnog, making milkshakes, cleaning a sink, preparing envelopes for mailing)	• Percent correct responding (on each task analysis)	• Constant time delay in small groups (dyads)	• Multiple probe design across tasks, replicated across 4 students	• CTD was effective in teaching chained tasks • All students learned some of the tasks observed • IOA 91.6-100% • Procedural Reliability 96.1-98.7%

Table 5

Topics in Recreation and Leisure and Disabilities

Reference	Participants	Targeted Skills	Dependent Variables/ Measures	Independent Variable(s)	Research Design	Conclusions/ Results
Adkins & Matson (1980)	• N: 6 • Age: adults • Moderate to Severe MR	• Potholder making	• Frequency of constructive leisure time	• Prompting • Attention • Making potholder training	• ABACADE multiple baseline design	• Specific instructions increased performance during leisure times • Generalization occurred for related leisure skills • Performance maintained for at least 6 weeks
Bedini, Bullock, & Driscoll (1993)	• N: 38 • Age: 17-22 years • Trainably or educably mentally handicapped	• Worth of recreation leisure education	• Number of activities • Mean survey scores (pre and posttest)	• Leisure education (direct and written instruction)	• Experimental randomized pre/posttest • Interviews	• Positive results for leisure awareness, initiation, participation, and appreciation were seen for experimental group (leisure education had positive effects)
Blum-Dimaya, Reeve, Reeve, & Hoch (2010)	• N: 3 • Age: 9-12 years • ASD	• Playing Guitar Hero II video game via Sony Play Station	• Percent correctly completed schedule components • Percent intervals on-task	• Used graduated time delay with visual activity schedules to teach TA for playing game • Used manual prompting for correct guitar playing • Students watched embedded video	• Multiple probe design across participants	• All students learned to play 4 songs (3 taught; 1 generalized) • Ability to play songs maintained after picture activity schedule removed • IOA 98-100% • Procedural Reliability 100% • Social Validity yielded

				model to know which color to touch on guitar		high scores post intervention
Collins, Hall & Branson (1997)	• N: 25 (4 w/ disabilities) • Age: 15-19 years • Moderate to severe disabilities	• Watching TV • Watching sports video • Playing computer • Playing cards	• Percent steps completed independently for each task analysis	• SLP • Descriptive praise • CRF until 100% mastery; VR3 until 100% for two more days	• Multiple probe design across activities, replicated across participants	• Participants with disabilities engaged in all leisure activities with independence • IOA 94-98% • Procedural Reliability 99%
Cory, Dattilo, & Williams (2006)	• N: 4 • Age: 11-13 years • Mild MR, Down Syndrome, ADHD, visual impairment	• Social skill knowledge and leisure skills • Social skill demonstration during leisure skills	• Percent correct social skill knowledge responses • Percent prosocial interactions during leisure activities	• Computerized leisure program • Role play • Modeling	• Multiple baseline design across participants	• Participants showed increased social skill knowledge • Participants did not generalize social skills during leisure activities • IOA 96-99% • Social validity reported social significance
Datillo, Guerin, Cory, & Williams (2001)	• N: 4 • Age: 10-14 years • ADHD, Down Syndrome, Cerebral Palsy	• Knowledge of self-determination as it relates to leisure skills	• Percent correct	• Computerized leisure game	• Multiple probe design across participants	• 2 of 4 students reached 80% criterion using paper and pencil assessments after playing game • 2 of 4 students reached 80% criterion using computerized test after playing game • Procedural reliability 100% • Social validity results indicated agreement or strong agreement in all positive statements

Dattilo & Hoge (1999)	• N: 19 • Age: 15-20 years • Mild to moderate MR	• Affective behavior during leisure activities • TRAIL objectives (included leisure appreciation, self-determination, social interaction)	• Frequency positive facial expressions • Frequency positive vocalization	• TRAIL Leisure Education Curriculum	• Multiple baseline design across classes	• Mixed results: higher immediate levels for class 1 and 3 on facial expression; data similar to baseline conditions; no change or decreases in vocalizations for all 3 groups • Follow-up procedures produced higher levels of positive facial expression for all 3 groups • All students made gains in learning TRAIL objectives • IOA 84-97% • Procedural Reliability evaluated a priori until 90% or better achieved • Social Validity yielded majority positive results
Datillo, Williams, & Cory (2003)	• N: 3 • Age: 6-15 years • ID	• Social skills relevant to leisure activities	• Percent correct social interaction responses	• Leisure education software targeting social skills needed during leisure activities	• Multiple baseline design across participants	• All students showed slight gains in percent correct social interaction responses • Procedural reliability 100% • Social validity revealed positive results

Devine, Malley, Sheldon, Dattilo, & Gast (1997)	• N: 6 • Age: 25-54 years • Mild to moderate ID	• Community leisure activities	• Number community activity initiations	• Calendar prompts • Telephone prompts	• Alternating treatments design	• Both interventions resulted in initiation of community leisure activities • IOA 99-100%
Garcia-Villamisar & Dattilo (2010)	• N: (exp) 37 • N: (cont) 34 • Age: 17-39 years • ASD	• Interaction with media • Exercise • Playing games • Crafts • Attending events • Participation in other leisure activities	• Means and standard deviations of stress surveys and Quality of Life Questionnaire	• 1-year leisure program where participants were exposed to a variety of leisure activities and then encouraged to choose activities to participate in	• Pre-test, post-test control group experimental design	• Participants in experimental group showed lower stress levels and higher indicators for quality of life markers (satisfaction, independence, competence, interaction) • Participants did not show improvement in social integration or empowerment/independence measures
Hoge & Dattlio (1995)	• N: 200 • Age: 18-70 years • 100 with MR • 100 without MR	• Recreation participation patterns	• Percentage of participation rates	• Interview using TRAIL activity circles, response cards, and TRAIL Leisure Behavior Checklists	• Not specified	• Adults with MR participated in far fewer leisure activities than those without MR • Reliability coefficient .97
Hoge, Dattilo, & Williams (1999)	• N: (exp) 19 • N: (cont) 21 • Age: 15-20 years • Mild to moderate MR	• Perceived freedom in leisure skills	• Mean gain scores (from pre- to post-test)	• 18 week course on leisure skills with a leisure coach	• Nonequivalent control group design	• Students participating in experimental group had higher scores of perceived freedom in leisure

Jeffree & Cheseldine (1984)	• N: 10 • Age: 15 -17 years • Severe MR	• Increasing level of leisure activity	• Percentage of observations engaged in leisure activities	• One-to-one teaching of various leisure games	• Group pre/post-test analyzed via two-way ANOVA	• Students engaged in more active leisure activities after being taught how to play/perform them • IOA 74-92%
Keogh, Faw, Whitman, & Reid (1985)	• N: 4 • Age: 11-19 years • Severe MR	• Commercially available board games	• Percent correct responses	• Trainer modeling in individual sessions • Dyad training with verbal and physical prompting and corrective feedback • Free play intervention with prompts	• Multiple probe design across games, replicated across participants	• Participants learned how to play the games and learned to use some appropriate social language associated with the game • Occasional reviews increased maintenance performance • Reliability coefficients ranged .75-.98
Mahon (1994)	• N: 4 • Age: 16 to 20 years • Mild to moderate MR	• Using self-control strategies to facilitate self-determination skills within leisure skills	• Percent appropriate responses	• Leisure awareness and decision making training • Leisure action planning and self-monitoring	• Two multiple baseline designs across participants	• Student's mean scores increased under intervention, with variable data (only one student demonstrated consistency in high percentages of appropriate responses) • IOA 90-94% • Procedural Reliability 78-100%
McAvoy, Smith, & Rynders (2006)	• N: 23 • Age: 21-62 years • Mental retardation	• Outdoor recreation and leisure skills (camping, canoeing)	• Number rated on Likert Scale	• "Gateway to Adventure" outdoor adventure program • Structured training in	• Likert Scale pre/post-assessment • Interviews	• Participants rated themselves as having increased levels in 9 of 10 outdoor skills • Support staff reported greater skills observed in 9 of 10 skills

				outdoor activities • Support staff (1:1) • Shorter, less demanding trip than typical program		• Participants reported highly positive satisfaction with the trip • Social skills were reported to improve from beginning to end of trip
Schleien, Kiernan, & Wehman (1981)	• N: 6 • Age: 27-52 years • Moderate MR	• Leisure behaviors • Social behaviors	• Mean percent of behaviors	• Weekly leisure counseling, reinforcement training, introduced to new recreational materials	• ABAB reversal design	• Participants engaged in more high quality leisure behaviors when involved in weekly counseling sessions; decreases in inappropriate social behaviors and stereotypic behaviors were also noted • IOA 87%
Schniter & Devine (2001)	• N: 1 • Age 21 • ASD	• Expressing leisure preferences • Reduction of SIB	• Number self-injurious behaviors	• Leisure Communication Book	• Case Study	• SIB decreased from over 20 occurrences per day to less than 5
Whatley, Gast, & Hammond (2009)	• N: 4 • Age: 13-15 years • Moderate ID	• On-task behaviors • Transition behaviors • Incidental vocabulary words and pictures	• Percentage time on-task • Percentage transition steps completed independently	• Constant time delay	• A-B-BC-B-A-B withdrawal design	• Time on-task and transitioning behaviors increased when using the visual activity schedule • Students learned incidental information • IOA 98-100% • Procedural Reliability 100%

Williams & Dattilo (1997)	• N: 4 • Age: 20-27 years • Mild to moderate MR	• Self-determination, social interaction, and positive affect during leisure activities	• Frequency of choices • Frequency of social interactions • Frequency of affective behaviors	• Modified version of TRAIL Leisure Education Curriculum (included leisure appreciation, self-determination, social interaction)	• Multiple baseline across participants	• Results were mixed (some increased positive affect; some learned the skills; participation, choice making, and social interactions did not increase) • IOA 98%

CHAPTER THREE

Methods

Participants

The participants in this study included 4 elementary school age students who had a primary special education eligibility of autism. The students were randomly assigned the order from student 1 to student 4 prior to beginning the study; the predetermined order was consistent for the duration of the study. Table 6 summarizes participant characteristics. To participate in the study, students had to meet the following selection criteria: (a) ability to follow multi-step directions; (b) ability to attend to a movie for a minimum of 10 min; (c) ability to attend to a preferred task for up to 15 min (e.g., manipulating materials without requiring redirection to learning area or materials); (d) ability to imitate simple gross and fine motor movements demonstrated by the teacher (e.g., jumping, stomping feet, clapping hands, blowing kiss, picking items up, putting items into containers, etc.); (e) regular school attendance, with no more than 3 absences in the previous nine weeks of school; and (f) parental agreement for their student to participate.

Fred. Fred was 11 years, 7 months at the beginning of the study. Fred could read on a Developmental Reading Assessment (DRA) (Celebration Press/Pearson Group, n.d.) level D and could spell highly preferred words (e.g., Barney, Elmo, computer). He could add using TouchMath when both numbers contained TouchPoints and were below six. He could add and subtract single digit numbers using a calculator. Fred engaged in high levels of aberrant behaviors that included self-injurious behaviors (e.g., hand biting, head banging) and aggression toward others (e.g., scratching, biting, hitting). Although the function of his behaviors was most often escape, he did engage in the same topography for self-stimulation. Fred did not take any medication during the course of the study.

Fred was evaluated in 2004, when he was 5 years old. The Wechsler Preschool and Primary Scale of Intelligence- Third Edition was attempted but he was “un-testable.” He scored a 39.5 on the Childhood Autism Rating Scale (CARS) (Schopler, Reichler, & Renner, 1986), putting his behaviors in the low end of the “Severely Autistic” range. In 2011, the Gilliam Autism Rating Scale – Second Edition (GARS-2) (Gilliam, 2006) was administered. His Autism Index was 126, indicating a “very likely” probability of autism. His Individualized Education Plan (IEP) goals and objectives were derived from present levels of performance and the Syracuse Community-Referenced Curriculum Guide for Students with Moderate and Severe Disabilities (Ford, et al., 1989). Fred had a special education eligibility of Autism Spectrum Disorder and Speech and Language Impairment. He received services in a self-contained applied behavior analysis (ABA) classroom with reverse inclusion for 15 min each day. He did eat lunch and go to recess with typical peers. He received four, 45 min segments of speech each week. Fred was staffed with two adults at all times due to high levels of aggression toward others and magnitude of self-injurious behaviors. Examples of his IEP objectives included: matching sentences/phrases to pictures, counting by 5’s and 10’s to 100, adding and subtracting money amounts using a calculator, describing common pictures/objects using adjectives, spelling known words, identifying survival signs, and multiple functional communication objectives.

Randy. Randy was 11 years, 0 months at the beginning of the study. Randy was learning to identify functional words (e.g., stop, boys, exit) and rote counting to 30. He could add without renaming using TouchMath where at least one number had TouchPoints. He could identify coins by name and value using his augmentative communication device. Randy was non-verbal but functionally used a communication device. Randy engaged in refusal behaviors (e.g., laughing at inappropriate times, sitting not looking at task materials). He did not take medication during the course of the study.

Randy was formally assessed by the school psychologist in December 2009. He received a parent rating of 85 and a teacher rating of 89 on the GARS-2, placing him in the “very likely” range of probability for characteristics of ASD. He scored a 33 on the Social Communication Questionnaire, with a score higher than 15 indicating ASD. A 2011 administration of the GARS-2 indicated a “very likely” probability of autism with a similar Autism Index of 92. Randy had a special education eligibility of Autism Spectrum Disorder and Speech and Language Impairment. He received his education in a self-contained classroom for students with mild and moderate disabilities. He received two, 30 min segments of speech each week. He went to CAMP (e.g., computer, art, music, and PE), lunch, and recess with typical peers. His IEP was developed based on current strengths and weaknesses. His IEP goals and objectives included verbal approximations, identifying functional words and signs, and addition and subtraction.

Kevin. Kevin was 10 years, 1 month at the beginning of the study. Kevin could read on a DRA level B and was beginning to read high frequency sight words. He could add using TouchMath when at least one number had TouchPoints. He was artistic and could draw elaborate scenes from movies or television shows (e.g., Dora the Explorer, Up). Kevin engaged in refusal behaviors (e.g., screaming, laying on desk, elopement). Kevin’s behaviors typically began as avoidance and led to attention. Kevin took Risperdone for aggression and Melatonin for sleeping during the course of this study.

Kevin was diagnosed with autism in 2006 by a school psychologist. Although there were several formal observations and adaptive rating scales in Kevin's educational file, they were all conducted at age 3 and the scores are no longer relevant to his present levels of performance. In 2011, the GARS-2 was administered. Kevin's Autism Index was 117 indicating a "very likely" probability of autism. Kevin had a special education eligibility of Autism Spectrum Disorder and Speech and Language Impairment. He was served via a self-contained ABA classroom and he received two, 30 min segments of speech each week. His IEP included 45 min a week of computer lab time with typical peers; his behaviors interfered with participation in that class during the study. He did go to recess and lunch with typical peers. His IEP goals and objectives were derived from present levels of performance and the Syracuse Community-Referenced Curriculum Guide for Students with Moderate and Severe Disabilities (Ford, et al., 1989). Examples of his IEP objectives included: reading basic sight words, matching sentences/phrases to pictures, skip counting to 100, counting objects to 50, adding single digits, sorting based on similarities and differences, and describing common pictures/objects using adjectives.

Rachel. Rachel was 8 years, 4 months at the beginning of the study. Rachel had just learned to identify letters and was beginning to receptively and expressively recognize high frequency sight words. Rachel prefered to play with her "babies" and often role played with them (e.g., lining them up, putting them to sleep, etc.). Rachel engaged in high levels of self-injurious behaviors (e.g., biting herself or bracelets) and aggression toward others (e.g., pinching, biting). Rachel took Clonidine for seizures and Abilify for anxiety and aggression during the course of the study.

Rachel had minimal formal testing. She scored -2.33 standard deviations below the mean for her age on the Bayley II given on 5/31/2005. The GARS-2 was administered in 2011.

Rachel's Autism Index was 122, indicating a "very likely" probability of autism. She had a special education eligibility of Autism Spectrum Disorder and Speech and Language Impairment. She received her education in a self-contained ABA classroom with three, 30 min segments of speech each week. She went to lunch and recess with typical peers. Her IEP goals and objectives were derived from present levels of performance and the Syracuse Community-Referenced Curriculum Guide for Students with Moderate and Severe Disabilities (Ford, et al., 1989). Examples of her IEP objectives included: reading basic sight words, rote counting to 100, counting objects to 20, matching pictures by association, and expressively identifying verbs.

Settings and Arrangements

All conditions occurred in a self-contained special education classroom. Figure 1 illustrates the lay-out of the classroom. The classroom was arranged in zones. The learning zone had individual cubicles with learning materials and reinforcers for one-to-one instruction; the independent work zone consisted of work boxes and visuals for tasks to be completed with minimal assistance; the "no" zone, located in the back of the classroom, was off limits to students. It included the teacher desk, teacher computer, and instructional materials not intended for independent student use. The classroom had cubbies for student book bags and belongings, a student bathroom, a staff bathroom, and a kitchen (including a full size refrigerator, full size oven, two sinks, a microwave, and a toaster oven). The classroom also had a padded timeout area where students went when aggression toward others was not redirectable. All conditions of this study took place in the small group or recreation/leisure zone. The small group zone included a kidney shaped table where the teacher could sit in the indention and students could be seated at the outer edges. It also included an interactive whiteboard, DVD player, laptop computer, and CD player. The recreation/leisure zone included a large television and all gaming equipment; this zone also included a shelf with a variety of leisure activities (e.g., puzzles, books, markers, DVD's, CD's, etc.). For this study, one student and teacher sat in a cubicle in the learning zone to view video models; other students were in the small group zone with paraprofessionals, where video models could not be observed. After video models were observed by the target student, all students were seated around the target student, in view of the leisure task being performed. Students performing leisure tasks were situated naturally around the specific leisure activity (e.g., standing in front of the TV and Wii gaming system, sitting at the kidney shaped table playing the Nintendo DS, etc.).

Students did not have access to the DVD's or the target items outside of instructional times. The DVD's and target items were stored out of the students' reach or in the "no" zone within the classroom.

Materials and Equipment

Videos were created using a Flip camera (a hand held digital video recorder). Task analysis of each task was created by the primary investigator (see Tables 7 – 10 for task analyses and response definitions for each activity) and recorded with a third person point of view, showing an adult demonstration of each activity. Narration of each step was included by the teacher as each was completed. The decision to use an adult model was based on three reasons. First, time constraints associated with peer recruiting, training the skill and script, and modeling with fidelity could prove burdensome in a public school setting where maximized instructional time is the focus. Second, narration by the teacher replicates general classroom procedures. Last, Ihrig and Wolchick (1984) found no qualitative differences in using peers versus adults as models when comparing effectiveness of each (e.g., both adult and peer models were effective). Task analyses included steps for accessing (e.g., setting up, starting, getting to game/activity, stopping) each activity. Accuracy of play was not evaluated in this study; playing the game was included as one step in each task analysis, but not as a critical step. The videos were saved onto a classroom laptop, using Flipshare software (downloaded free from the internet) where it could be viewed anywhere in the classroom.

All recreation/leisure materials were selected based on classroom availability and/or donations to the classroom to ensure cost-effectiveness and accessibility. Four total recreation/leisure activities were included in the study:

Nintendo Wii Video Game. The Nintendo Wii is an interactive video game console played by one or more players with wireless remote controls. There are a variety of DVD-type games compatible with the Wii gaming system that include various difficulty levels, interactive features (e.g., some games require more hand-eye coordination than others), and high interest aspects (e.g., Disney characters). The specific game selected was available within the classroom and had a low difficulty level, low interactive requirements, and high interest level aspects. Table 2 includes a task analysis and response definitions for the Wii.

Nintendo DS. The Nintendo DS is a portable, handheld video game system played by one player at a time. It features dual screens; the lower one being a touchscreen offered more immediate interaction with the game played. There are a variety of cartridge-type games compatible with the Nintendo DS system that include various difficulty and interest levels. The specific game selected was donated to the classroom and had a low difficulty level and high interest aspects. Table 3 includes a task analysis and response definitions for the Nintendo DS.

Power-Joy Plug and Play Video Game. The Power-Joy joystick is a video gaming system that plugs directly into the TV. Pre-loaded with 60 arcade games, the Power-Joy can easily be used in multiple settings. The game selected was available within the game itself, had a low difficulty level, and high interest level aspects. Table 4 includes a task analysis and response definitions for the Power-Joy video game.

V.Flash Home Entertainment System. The V.Flash learning system is a video game console played by one or two players. V.Disc games compatible with the V.Flash are educational with embedded real videos customized to enhance each game. The game selected was donated to the classroom, had a low difficulty level, and high interest level aspects. Table 5 includes a task analysis and response definitions for the V.Flash.

Response Definition and Data Collection

Dependent measure. Dependent measures for all conditions were percent critical steps correctly completed independently for each task analysis. Data were collected using a trial-by-trail format where each step in the task analysis was evaluated.

Student responses were scored correct if he/she initiated and correctly completed a step in the task analysis within 10s of the task direction or completion of the previous step. An incorrect response was scored if the student did not initiate and/or complete a step within 10s or if the student completed a step incorrectly or out of sequence. The only adult prompts provided during any condition of the study were verbal reminders to “Play the game” or “Watch [student].” Percent correct was calculated by tallying the number critical steps correctly completed within 10s, divided by the total number of critical steps, multiplied by 100. Critical steps (denoted by asterisks) were those steps necessary to access each activity. All steps included in the task analyses were videoed; not all were critical in accessing the game (e.g., when playing the Wii, the Wii console could be turned on via completion of step 2, *Press the power button on the Wii*, or via completion of step 3, *Pick-up game and insert game disk into Wii*).

Other Measures

Efficiency. To evaluate efficiency of intervention, several measures were collected. First, total minutes to film and upload each video were recorded and reported. Number trials and errors to criterion were also recorded for each type of participant across conditions: learners and observers. Errors were coded by type (e.g., latency, duration, sequential, and topographical errors) and reported with efficiency data. Anecdotal data were collected on technological glitches that occurred during the study.

Experimental Design

A multiple probe design across behaviors (e.g., recreation/leisure activities) was used to evaluate functional relations between video modeling and skill acquisition (Gast & Ledford, 2010). Multiple probe designs include a series of stacked A-B designs where pre-intervention data are collected on all behaviors or conditions (tiers). Intervention is introduced to one behavior or condition (tier 1); when mastery criteria are reached, probe data are collected on all tiers. If pre-intervention levels are maintained for the tiers not receiving intervention, intervention is applied to the second tier. This continues until all tiers have received the intervention. Multiple probe designs differ from multiple baseline designs in that baseline data are probed rather than collected continuously. While multiple baseline designs offer more rigor, multiple probe designs offer more practical applications within the classroom (e.g., conditions not receiving intervention do not need continuous pre-treatment data collected). Multiple probe designs also reduce the likelihood of testing threats via repeated exposure to each step assessed. This study counterbalanced order of behaviors via multiple probe design assessing video models across recreation/leisure skills (one activity assigned to one tier) with different students receiving the video model in each tier (e.g., the Wii was taught in tier 1; student 1 learned to use the Wii via video models and observational learning was assessed for students 2, 3, and 4; the Nintendo DS was taught in tier 2; student 2 learned to use the Nintendo DS via video models and observational learning was assessed for students 1, 3, and 4, etc.). Table 11 includes an outline of student participation in each tier.

Visual analysis of data (Gast & Spriggs, 2010) was used to answer the questions regarding accessing recreation/leisure activities via video modeling. A within-condition analysis of data included descriptions of condition length, level, and trend. Trend within-conditions was calculated using the split-middle method. A between-conditions analysis of data included descriptions of level and trend direction change and percentage of non-overlapping data (PND) from one condition to another. PND should be high; the higher the PND, the more impact intervention is likely to have had on target behaviors. Using a multiple probe design across behaviors, increases in levels and trend after video models while maintaining levels and trends prior to video models would indicate a functional relation.

Students not receiving video models, were assessed for observational learning via multiple probe designs (e.g., student 1 learned to access the Wii via video models, students 2, 3, and 4 had the opportunity to observe student 1 with the Wii. Their ability to perform the skill observationally was assessed and analyzed via multiple probe procedures).

Procedures

General procedures. Individual trials were conducted daily, when all students were present. Daily instruction was used for two reasons. First, students with ASD historically perform better given set routines and schedules. Second, Venn, Wolery, and Greco (1996) found that while students could learn skills taught every day or every other day, observational learning was not likely to occur during every other day instruction. Trials lasted no more than 30 minutes, including watching the video model and spending time engaged with the activity. Natural consequence of playing with the leisure activity was used across all conditions; other tangible reinforcement was not used. A specific task direction was provided for each task (e.g., “It’s time to play the Wii!” or “It’s time to play the DS.”). Inappropriate behaviors were managed per each student’s Behavior Intervention Plan (BIP). All students had a hierarchy of behavioral strategies outlined per their BIP. All students’ BIPs indicated mandatory completion of all teacher-directed activities, regardless of behaviors. Students trying to leave the recreation/ leisure area were physically guided back. Order of conditions is depicted in Figure 2.

Probe condition. Multiple opportunity probes (Cooper, Heron, & Heward, 2007) were conducted one-on-one for all tasks with all participants to determine percent steps they could complete independently. Materials for each task were prearranged; a specific task direction was provided (e.g., “It’s time to play the Wii!”). Data were collected for each participant for individual steps on each task analysis. When a task analytic step was not initiated or completed correctly within 10s of the task direction or completion of the previous step, the primary investigator completed the step while shielding the student’s view by turning around or covering, depending on the specific step. The student had the opportunity to complete each step in the task analysis. Video Modeling instruction began for one student after data stabilized for three trials across a minimum of two days across participants.

Video modeling/observing condition. After the last probe trial for all students, video model trials began for one student with one behavior (e.g., Wii) during scheduled recreation/ leisure time the following school day. The student was given a specific task direction (e.g., “It’s time play the Wii!”). The student was instructed to sit at a table in the learning zone, one-on-one with the teacher, and given the direction “Watch this;” the video was shown. Other students were engaged in other activities in the small group zone, supervised by classroom paraprofessionals while the target student watched the video (e.g., partitions between the learning zone and the small group zone prevented the other students from watching the video). After viewing the video, all students were brought to the recreation/leisure activity to sit and watch. A specific task direction was provided (e.g., [student 1's name], "It's time to play the Wii!"). Post-Video Model data were taken to assess the target student's immediate ability to recall steps viewed in the video model. If the student failed to correctly complete or initiate a step within 10s of the task direction or completion of the previous step, the primary investigator completed the step while shielding all students' views (e.g., the learner and the observers) by turning around or covering, depending on the specific step. The student had the opportunity to complete each step in the task analysis. After the target student finished playing, students observing were also given an opportunity to demonstrate what they observed, following the same guidelines. To assess observation of the target student only, observing students' performance was evaluated one-on-one; all other students were engaged in other activities in the learning zone where they could not see the activity being performed. Data were collected on each step in the task analysis he/she was able to perform. The order of opportunity to demonstrate accessing the activity for the 3 observers was randomly counterbalanced with no more than 2 trials occurring immediately (the 1st demonstration after the peer model) or delayed (the 2nd or 3rd demonstration after the peer model). This allowed all three observers equal difficulty level demonstrations.

Pre-video model probe condition. Following the first Video Model trial and Post-Video Model probe, the following procedures were used. Pre-Video Model probe trials were conducted one-on-one in the morning, not during scheduled recreation/leisure across students for the behavior currently being taught (e.g., the Wii). Students not being assessed were engaged in other activities out of sight of the activity. These probes served as “cold” probes to assess student’s performance prior to daily instruction. A specific task direction was provided (e.g., “It’s time to play the Wii!”); data were collected across students for performance on each step of the task analysis. If the student failed to correctly complete or initiate a step within 10s of the task direction or completion of the previous step, the primary investigator completed the step while shielding the student’s view by turning around or covering, depending on the specific step. The student had the opportunity to complete each step in the task analysis. All four students participated in Pre-Video Model probes until mastery criteria, 100% accuracy on critical steps for 3 trials, for the target student (e.g., the student receiving the video model) were met.

Data were collected via Pre-Video Modeling probes and Post-Video Modeling probes; mastery criteria were based on Pre-Video Modeling performance of the target student (e.g., the student receiving the video model). Three Pre-Video trials of 100% accuracy on critical steps were required for mastery of each target behavior.

Observational learning followed by video model condition. After the 4th probe condition (e.g., probe condition following Kevin’s mastery of the Power joy via video model), students not mastering activities observationally (e.g., Randy: Wii and Power Joy, Rachel: Wii, Nintendo DS, and Power Joy) were shown video models. The video models were shown in isolation and performance on accessing critical steps for each activity was assessed. Trials were conducted per video model condition methods; performance was based on pre-video model condition guidelines. This condition continued until mastery criteria (e.g., 100% critical steps completed independently over 3 consecutive trials) were met or through the last day of the school year.

Maintenance. Maintenance probes were collected during probe trials. For example, when tier 3 behaviors reached criterion, tiers 1 and 2 (already mastered) were probed for maintenance.

Reliability

Inter-observer agreement (IOA) and procedural reliability were collected for 61.8% of all trials, with a minimum of one collection in each condition for all participants. The classroom teacher (principle investigator) and a paraprofessional trained in data collection procedures both took data on student performance using identical data sheets. IOA was calculated using the point-by-point method where each data point was compared; number of agreements was divided by number of agreements plus number of disagreements and multiplied by 100. 85% IOA was required to continue the study. Procedural reliability was assessed concurrently with IOA. A classroom paraprofessional, trained in data collection procedures evaluated teacher behaviors using a checklist of expected teacher behaviors during each trial. Number of teacher behaviors emitted was divided by total number teacher behaviors expected and multiplied by 100. 85% procedural reliability was required to continue study.

Social Validity

Social validity measures were collected using a variety of formats. First, prior to the study, parents had to give consent for their child to participate; this ensured they thought it was worthwhile for their child to learn more appropriate recreation/leisure skills. At study completion, a Likert scale survey was given to individuals directly involved with students in the study (e.g., parents, teachers, paraprofessionals). The questions were directly related to the skills learned and activities engaged in during the course of the study. Results are reported as to how socially valid others perceive video modeling to teach students with ASD as well as learning age appropriate recreation/leisure skills. Importance of providing observational opportunities was also discussed. After students mastered activities taught, all four were presented; students were instructed to “pick one and play.” Results are reported as to which games individual students chose.

Table 6

Participant Characteristics

	Fred	Randy	Kevin	Rachel
Age	11-7	11-0	10-1	8-4
Grade Level	5	4	4	2
Ethnicity	Caucasian	Latino	Caucasian	Caucasian
Special Education Eligibility	ASD SLI	ASD SLI	ASD SLI	ASD SLI
Autism Rating Scale Score	GARS-2 126	GARS-2 91	GARS-2 117	GARS-2 122
Previous Instruction with Video Models	*No	No	*No	*No
Previous Instruction with Observational Learning	No	No	No	No
Previous Instruction on Recreation/ Leisure Activities	Yes	No	Yes	Yes

Note. ASD: Autism Spectrum Disorder; SLI: Speech and Language Impairment
GARS-2: Gilliam Autism Rating Scale – Second Edition
*Students had limited exposure to video instruction where they imitated gross motor movements while video streams

Table 7

Task Analysis and Response Definition for Using the Wii (Bowling)

1. Press the square power button on TV to turn on.*
2. Press the power button on the Wii.
3. Pick up game and insert game disc into Wii.*
4. Pick up remote control.*
5. Press power button on the remote control.
6. Move hand to Wii Sports title and press A.*
7. Move hand to start and press A.*
8. Put on wrist strap and wait.
9. Press A and B together to start game.*
10. Move hand to bowling and press A.*
11. Move hand to 1 (# of players) and press A.*
12. Move hand to character (Mii) and press A.*
13. Move hand to yes (continue?) and press A.*
14. Move hand to OK and press A.*
15. Move hand to OK (play with this Mii?) and press A.*
16. Press A (again).*
17. Play game.
18. Press power on remote to turn remote and Wii console off.
19. Press power button on TV to turn off.

Note. *indicates a critical step for accessing the game.

Table 8

Task Analysis and Response Definition for Using the Nintendo DS (Backyardigans)

1. Insert game into DS.*
2. Open DS.*
3. Slide power button.*
4. Touch screen with stylus (to start).*
5. Touch game name on screen with stylus.*
6. Touch screen with stylus to begin.*
7. Touch # 1 (choose profile).*
8. Touch “any game” (chose mode you want to play).*
9. Touch “pirates” (choose the kind of game you want to play).*
10. Touch “pirate flag” (Choose the game you want to play).*
11. Play game.
12. Slide power off.
13. Close DS.
14. Eject game.
15. Put game and stylus in game box.
16. Hand DS to teacher

Note. *indicates a critical step for accessing the game.

Table 9

Task Analysis and Response Definition for Using the Power-Joy Joy Stick (Galaga)

1. Get joy stick out of basket.*
2. Plug yellow cord into front of TV.*
3. Plug white cord into front of TV.*
4. Press square power button on TV to turn on.*
5. Slide power button on joy stick to ONI.*
6. Move arrow (using thumbstick) to #36.*
7. Press start.*
8. Press start (1 player).*
9. Wait for game to load.
10. Play game.
11. Move power button to OFF.
12. Turn TV off.
13. Unplug white cord from TV.
14. Unplug yellow cord from TV.
15. Put game into basket.

Note. *indicates a critical step for accessing the game.

Table 10

Task Analysis and Response Definition for Using the V-Flash (Scooby Doo)

1. Press power button on TV to turn on.*
2. Push open button on V-Flash.*
3. Insert game into V-Flash system.*
4. Close machine.*
5. Press “on” button to turn V-Flash on.*
6. Wait for game to load.
7. Pick up controller.*
8. Press “enter” when you see game title.*
9. Press “enter” (to game zone).*
10. Move joy stick to “x”/no (continue last game?).
11. Press “enter.”*
12. Press “enter” (new game).
13. Press “enter” (Level one; One player).*
14. Wait for game to load.
15. Play game.
16. Move joy stick to “x” (play again?).
17. Press “enter.”
18. Press “off” on V-Flash.
19. Press power button on TV to turn off.

Note. *indicates a critical step for accessing the game.

Table 11

Participant Participation During Each Tier

		Student 1	Student 2	Student 3	Student 4
Video Model and Observational Learning Intervention	**Tier 1 Activity 1**	**Learner (Watches Video Model)**	**Observer (Watches Peer)**	**Observer (Watches Peer)**	**Observer (Watches Peer)**
	Tier 2 Activity 2	**Observer (Watches Peer)**	**Learner (Watches Video Model)**	**Observer (Watches Peer)**	**Observer (Watches Peer)**
	Tier 3 Activity 3	**Observer (Watches Peer)**	**Observer (Watches Peer)**	**Learner (Watches Video Model)**	**Observer (Watches Peer)**

Note. The shaded boxes indicate student receiving video model.

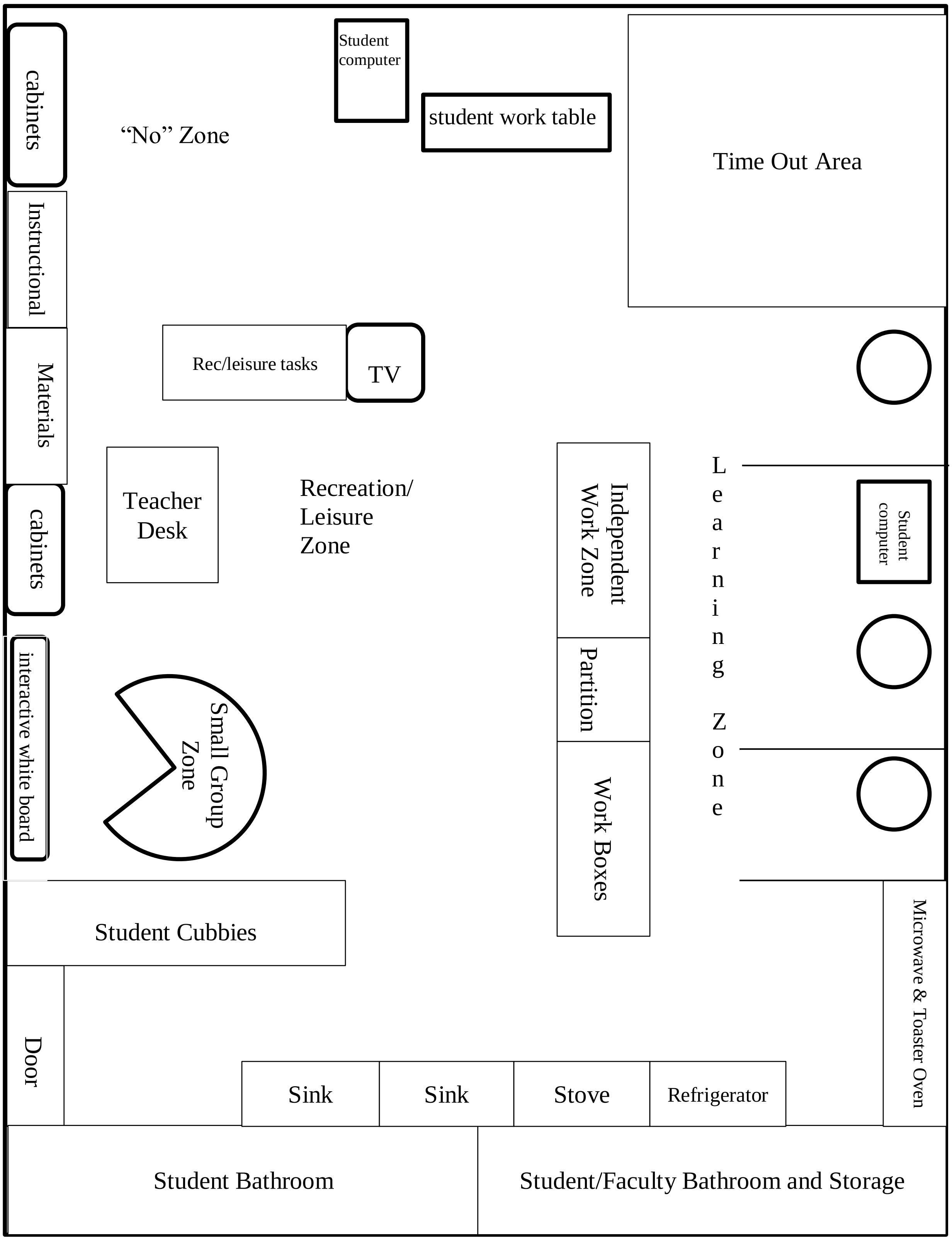

Figure 1. Classroom map.

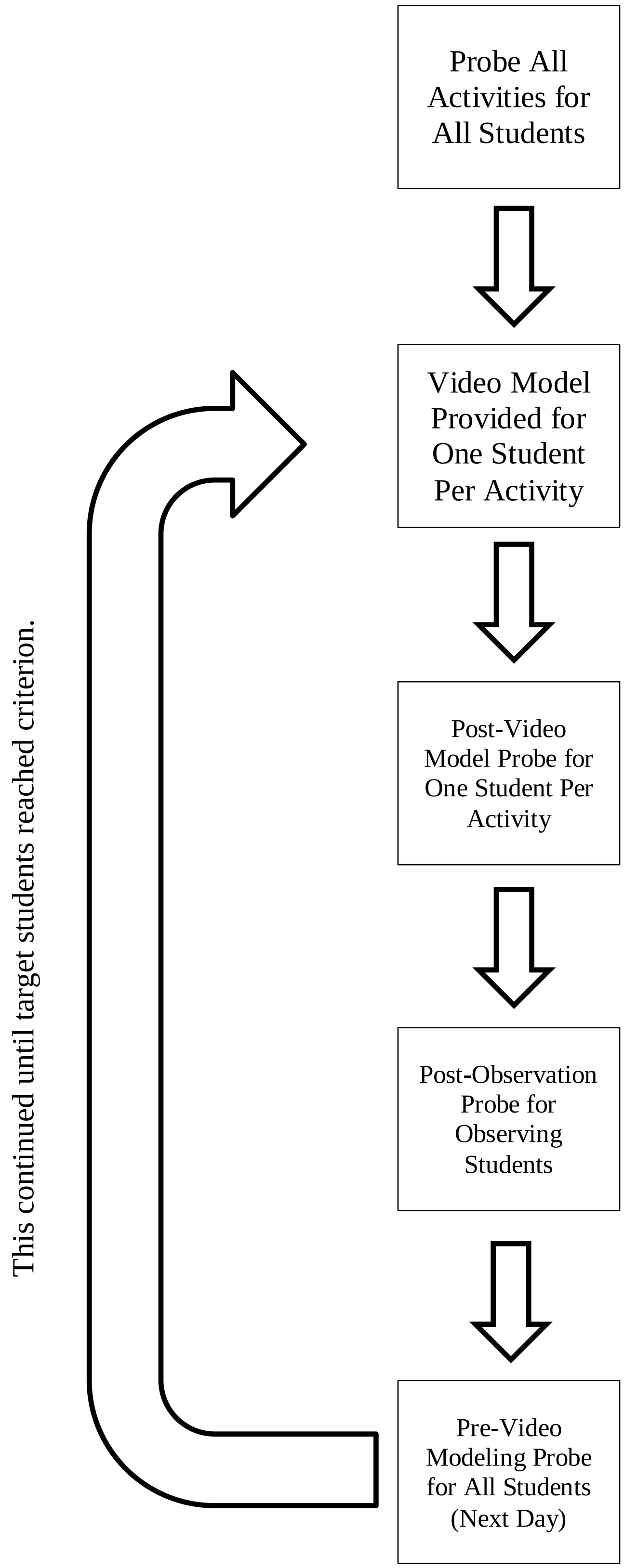

Figure 2. Flow chart of study conditions.

CHAPTER FOUR

Results

The purpose of this study was to evaluate the use of video models to teach students with Autism Spectrum Disorder (ASD) to access age appropriate chained recreation/leisure tasks. A secondary purpose was to quantify observational learning, if it occurred, as peers watched the target student access a recreation/leisure activity post video-model. The rationale behind this was to add to the existent literature on teaching chained tasks via video models, acquisition of skills via observational learning for students with ASD, and explicit teaching of age appropriate recreation/leisure skills to individuals with disabilities. The results of individual student performance for each activity are discussed in terms of percent critical steps completed correctly. Efficiency data are included and incorporate: trials to criterion for target students, errors to criterion for target students, total errors for observers, and total time to film. Social validity data are discussed in terms of parent and professional opinions and via student preference for activities learned.

Reliability

Inter-observer agreement (IOA) data were collected for 61.8% of all trials across students, activities, and conditions and was calculated at 97.1% agreement. Table 12 outlines the results for IOA; results are provided for general probe trials, pre-video model probes, and post-video model trials for each activity. Error-type coding resulted in all disagreements. In all instances, the primary investigator coded latency errors (e.g., more than 10s to initiate or complete a step) or sequential errors (e.g., step completed correctly, but out of sequence) while the paraprofessional collecting reliability counted the step independently completed (e.g., correctly completing the step in sequence and within 10s of the task direction or completion of previous step). Regardless, in each instance of disagreement, it was noted by both the teacher and paraprofessional that the step was completed by the student. Procedural reliability data were collected simultaneously with IOA data (e.g., for 61.8% of all trials across participants, activities, and conditions) and was calculated at 100% (e.g., no teacher errors were made).

Effectiveness of Video Modeling

Analysis of data for all students indicated acquisition of steps necessary to access recreation/leisure activities via video models. Inter-subject replication for the effects of video modeling on accessing recreation/leisure skills was obtained; replication for a single activity was not obtained, as students were taught to access different recreation/leisure activities. Shaded areas of Figure 3 depict percent critical steps completed correctly for students receiving video models. Performance on the Wii is denoted by open squares (□), open triangles (Δ) represent performance on the Nintendo DS, performance on the Power Joy is represented with open circles (○), and closed diamonds (♦) denote performance on the V-Flash; all symbols are consistent for the recreation/leisure skill being accessed, across students and conditions. Initial probe data were collected for four trials, until data reached a stable or decelerating trend across students and activities. Subsequent probe trials were collected for three to four trials, until initial probe data reached a stable or decelerating trend across students and activities (e.g., the 2nd probe had four trials and the 3rd probe had three trials). Introduction of video modeling was staggered across participants and activities and was based on target student performance with video models.

Nintendo Wii Video Game. Fred received the video model for the Wii; his percent critical steps completed correctly are depicted in Figure 3 (open squares). Mean initial probe performance was 2.25% (ranging from 0 – 8%), stabilizing at 8% critical steps completed correctly over three consecutive trials. Upon introduction of video modeling, Fred’s data showed an immediate change in level with an accelerating trend that maintained at or above 92% for eight consecutive trials. Fred reached mastery criteria (e.g., 100% critical steps completed correctly over three consecutive trials) in 14 trials. Maintenance trials, where video models were not shown, conducted during trials 19 – 22, 36 – 38, and 50 – 52, maintained high levels of accuracy, with a mean of 98.4% (ranging 92 – 100%) percent steps completed correctly. Fred’s data had 100% percent non-overlapping data (PND) between initial probe and video model intervention and all follow-up probes.

Nintendo DS. Randy received the video model for the Nintendo DS; his percent critical steps completed correctly are depicted in Figure 3 (open triangles). Mean initial probe data were 0% for both probe conditions prior to intervention. Upon introduction of video modeling, Randy’s data showed an immediate change in level with an accelerating trend that stabilized at 100% for three consecutive trials. Randy reached mastery criteria (e.g., 100% critical steps completed correctly over three consecutive trials) in 13 trials. Maintenance trials, where video models were not shown, conducted during trials 36 – 38 and 50 - 52, maintained high levels of accuracy with a mean of 98.3% (range 90 – 100%) steps completed correctly. Randy’s data had 100% PND between initial probe and video model intervention and all follow-up probes.

Power-Joy Plug and Play Video Game. Kevin received the video model for the Power-Joy; his percent critical steps completed correctly are depicted in Figure 3 (open circles). Mean initial probe data were 3.5% (ranging from 0 – 13%) for all three probe conditions prior to intervention. Upon introduction of video modeling, Kevin’s data showed an immediate change in level with an accelerating trend that stabilized at 100% for three consecutive trials. Kevin reached mastery criteria (e.g., 100% critical steps completed correctly over three consecutive trials) in 11 trials. Maintenance trials, where video models were not shown, conducted during trials 50 – 52, resulted in high levels of accuracy with a mean of 96% (range 88 – 100%). Kevin's data had 100% PND between probes and video model intervention.

Effectiveness of Observational Learning

Examination of data for all students indicated acquisition of at least some steps necessary to access recreation/leisure activities via in vivo observation of peers performing the steps. Direct intra-subject and inter-subject replications were obtained; these were evaluated via the multiple probe design where probe data levels remained consistently low; data increased only after observational learning opportunities occurred. Non-shaded areas of Figure 3 depict percent critical steps completed correctly for students observing (e.g., for the Wii, students 2, 3, and 4 were observers of student 1; students 1, 3, and 4 observed student 2 for the Nintendo DS). Probe data collected mirrored that of video modeling conditions (e.g., all pre-intervention probe data were collected for three to four trials, until data reached stable or decelerating trends across students and activities). In each tier, students not receiving the video model were included in observational learning opportunities.

Nintendo Wii Video Game. Observational learning of steps to access the Wii were assessed for Randy, Kevin, and Rachel. Results are displayed in non-shaded areas of Figure 3 (open squares). Students observing the target student demonstrated at least some of the steps performed. Students had immediate increases in level with accelerating trends during intervention. Students maintained similar levels of accuracy in follow-up probes conducted during trials 19 – 22, 36 – 38 and 50 - 52, where they were no longer observing the Wii being played. All students had 100% PND between initial probe and intervention and follow-up probe conditions.

Randy’s percent critical steps completed correctly in the task analysis for the Wii are shown in Figure 3 (open squares, tier 2). During the initial probe, Randy’s mean and range steps completed correctly were 0%. Observation of Fred resulted in a slight change in level (from 0% to 8%) for four trials; an abrupt change in level (from 8% to 69%) occurred in trial nine with an accelerating trend, stabilizing at or above 85% for seven trials. Randy maintained similar levels of accuracy (ranging 85% - 100%) during immediate follow-up probes (trial 19 – 22), where observing was not occurring. Delayed follow-up probe conditions (trial 36 – 38 and 50 - 52) resulted in mean accuracy of 93% (range 85 – 100%).

Figure 3 (open squares, tier 3) illustrates Kevin’s percent critical steps completed independently for the Wii. Initial probe condition resulted in low percent steps completed correctly with a mean of 6% (range 0% - 8%). Introduction of observational opportunities of the Wii resulted in an immediate and abrupt change in level, with an accelerating trend, stabilizing at or above 90% for six consecutive trials. Follow-up probes resulted in high levels of accuracy with a mean and range of 100% critical steps correctly completed.

Rachel’s percent steps completed correctly in the Wii task analysis are depicted in Figure 3 (open squares, tier 4). Initial probe data indicate low percent steps completed correctly with a mean and range of 0%. Upon introduction of observing a peer access the Wii, Rachel’s level slightly increased to 15% with an accelerating trend (range 15% - 62%). Follow-up probes ranged from 23% - 62% with a mean of 44.6% critical steps completed correctly in the task analysis.

Nintendo DS. Non-shaded areas of Figure 3 (open triangles) display the results of observational learning performance for Fred, Kevin, and Rachel when accessing the Nintendo DS. Students observing the target student acquired most to all critical steps required to correctly access the Nintendo DS. All students showed an immediate increase in level with accelerating trends during intervention, maintaining high levels of accuracy during follow-up probes, where observational opportunities were not present. All students had 100% PND between initial probe and intervention and follow-up probes.

Fred’s percent critical steps completed correctly in the task analysis for the Nintendo DS are shown in Figure 3 (open triangles, tier 1). Probe conditions occurring prior to intervention resulted in low levels of accuracy with a mean of 12.5% (range 0– 30%). Introduction of observation of a peer accessing the Nintendo DS resulted in an immediate and abrupt level change with an accelerating trend, stabilizing at or above 90% for four consecutive trials. Fred completed 100% critical steps correctly during the last three intervention trials. Follow-up probe data indicate maintained high percent steps completed correctly, with a mean of 96.6% (range 90% - 100%).

Kevin’s percent critical steps completed correctly in the Nintendo DS task analysis are illustrated in Figure 3 (open triangles, tier 3). Probe conditions prior to intervention indicated mean percent steps completed correctly of 32.5% (range 30% - 40%). Intervention of peer observation introduction resulted in an immediate level change with an accelerating trend, stabilizing at or above 90% for six consecutive trials. Kevin completed 97% critical steps during three final intervention trials. Follow-up probes, where observational opportunities were not available, resulted in maintained levels of accuracy with mean and range percent critical steps completed correctly of 100%.

Figure 3 (open triangles, tier 4) depict Rachel's percent steps completed correctly for the Nintendo DS. Probe conditions occurring before intervention resulted in low levels of accuracy for accessing the game with a mean of 17.5% (range 0% - 35%). Upon introduction of observing Randy, Rachel's data showed a slight change in level with an accelerating trend, stabilizing at or above 80% critical steps completed correctly over five consecutive trials. Follow-up probe conditions resulted in maintained steps performed correctly with a mean of 87% (range 80 – 90%).

Power-Joy Plug and Play Video Game. Fred, Randy, and Rachel observed Kevin play the Power-Joy. Results are illustrated in non-shaded areas of Figure 3 (open circles). Students observing the target student demonstrated learning some to all of the steps necessary to access the Power-Joy. Students had immediate changes in level; intervention data trend varied by student. All students had 100% PND between pre-intervention probe conditions and intervention.

Figure 3 (open circles, tier 1) illustrate Fred's percent critical steps completed correctly in the Power-Joy task analysis. During pre-intervention probe conditions, Fred's mean percent correct was 22% (range 0% - 38%). Introduction of observing Kevin accessing the game resulted in an immediate change in level, with an accelerating trend (range 60% - 100%). Fred's last three intervention trials resulted in 100% critical steps completed correctly. Follow-up probes, where observing was not occurring, resulted in high levels of accuracy with a mean of 92% (range 88 – 100%).

Randy's percent critical steps completed correctly in the task analysis for the Power-Joy are depicted in Figure 3 (open circles, tier 2). Pre-intervention probe data reveal low levels of accuracy with a mean of 7.1% (range 0% - 13%). Upon introduction of observing a peer access the Power-Joy, Randy's level increased immediately and abruptly with a zero-celerating trend at

75% for five consecutive trials. Accuracy increased to 88% during the final five intervention trials. Immediate follow-up probes, where observing was not occurring, resulted in maintained mean and range of 88% accuracy for critical steps completed.

Rachel's percent steps completed correctly in the task analysis for the Power-Joy are shown in Figure 3 (open circles, tier 4). During pre-intervention probe conditions, Rachel's mean percent steps completed correctly was 4.6% (range 0% - 25%). Observation of Kevin resulted in an immediate and abrupt change in level with a variable trend (range 38% - 88%). Immediate follow-up probes, where observing was not occurring, resulted in a stable trend with a mean and range of 75% critical steps completed.

Effectiveness of Observational Learning Followed by Video Models

Students not mastering activities (e.g., performing 100% critical steps in a given task analysis) were individually shown video models and performance was evaluated. Shaded areas of Figure 3 (trials 53 – 64) illustrate video model performance following prior observational learning opportunities. Randy required video model intervention for two activities; Rachel required video model intervention for all activities. Fred and Kevin mastered all activities, and did not require additional video model instruction.

Nintendo Wii Video Game. Observational learning followed by a video model for accessing the Wii was assessed for Randy and Rachel. Results are included in the shaded area of Figure 3 (trials 53 – 64, open squares). Randy mastered the Wii after four video model trials (range 85 – 100%, with 100% accuracy during the last three consecutive trials). Rachel received 11 trials of video modeling following observational learning. Results indicated range performance falling within observational learning alone performance (range 38 – 62%) with a mean accuracy of 54.7%.

Nintendo DS. Effectiveness of video model trials following prior observational learning trials were assessed for Rachel. Shaded areas of Figure 3 (trials 60 – 63, open triangles) illustrate her performance. Rachel mastered accessing the Nintendo DS in four trials (e.g., mean 97.5%, with three consecutive trials at 100%).

Power-Joy Plug and Play Video Game. Observational learning followed by a video model for accessing the Power-Joy was assessed for Randy and Rachel. Results are depicted in shaded areas of Figure 3 (trials 57 – 59, open circles, for Randy; trials 61 – 64, open circles, for Rachel). Randy required three trials to demonstrate mastery, with a mean and range of 100% accuracy. Rachel received five trials of the Power-Joy video model. Results indicated mean and range performance of 88%.

Efficiency

Efficiency of intervention was evaluated via trials to criterion, number and type of errors made during pre-video model probes, and material preparation time. Trials to criterion were evaluated for students receiving video models. Mastery criteria were set at 100% accuracy of critical steps in each task analysis, over three consecutive trials for the target student (e.g., student receiving video model). Fred mastered the Wii in 14 trials. Trials to criterion for Randy accessing the Nintendo DS were 13 trials. Power-Joy trials were mastered in 11 trials.

Each step not completed correctly was recorded as an error. Four error types were coded: (a) latency errors were steps not initiated or completed correctly within 10s of the task direction or completion of previous step; (b) duration errors were steps initiated but not completed correctly within 10s; (c) sequential errors were steps completed correctly but out of order; and (d) topographical were steps attempted within 10s of the task direction or completion of previous step, but completed incorrectly (e.g., choosing the wrong game, number of players, etc.). Errors types and totals are outlined in Table 13 across participants and recreation/leisure activities. Latency errors occurred most often, consisting of 55.1% of all errors. Duration errors made up 4.6% of total errors and sequential errors accounted for 6.8%. Other, topographical errors, accounted for 34.7% of errors. Critical errors (e.g., those hindering access to the game) comprised 21.8% of all errors. Critical errors were errors made on critical steps in the task analyses (*see Tables 7 – 10, steps marked with an asterisk*). Number of errors per student decreased for each student with each new activity.

Material preparation time is outlined in Table 14; results include time per recreation/leisure activity, materials, and total time. Total task analysis development took 43min, 48sec. Time to video was 44min, 9sec; time to burn movies to the laptop was less than 3min.

Social Validity

Social validity was assessed via questionnaires completed by parents and professionals familiar to both students and current study. Appendix G and H include questionnaires collected from parents, paraprofessionals and other professionals that worked with students who participated in the study. Questions were scored using a Likert scale format ranging from 1 (strongly disagree) to 5 (strongly agree). Table 15 presents the mean and range scores for each of the six questions addressed by parents. Parents agreed that their homes had gaming systems (mean = 4). All parents indicated that prior to participation in the study, their child did not participate in playing the recreation/leisure games at their house (mean = 1.25) but interest increased at home after involvement in the study (mean = 3.75). Parents agreed that teaching recreation/leisure skills were important (mean = 4.75). Parents strongly agreed that video modeling and observational learning were both important instructional strategies (means = 5). Results of the eight questions addressed by professionals are included in Table 16. Raters agreed that teaching recreation/leisure skills to individuals with disabilities is important (mean = 4.7). Raters strongly agreed that video modeling and observational learning were important and effective instructional strategies (means = 5). The raters disagreed that the study was time consuming (mean = 1.7). All raters strongly agreed that the intervention was worth replicating across students and activities (mean = 5), meaningful to students (mean = 5), and should be used in the future (mean = 5).

Upon mastery of the recreation/leisure activities taught (e.g., Wii, Nintendo DS, and Power-Joy), students were given the choice to “pick one and play.” Their individual choices are outlined in Table 17. There were minimal similarities in student choice. Fred chose the activity learned via video modeling once (e.g., Wii) and an activity learned observationally twice (e.g., Nintendo DS). Randy chose to play the Wii each time, an activity he mastered after peer observation and video modeling. Kevin chose the Power-Joy all three times, the game he learned via video modeling. At study completion, Rachel had mastered one activity; she did not participate in student choice.

Table 12

Inter-Observer Agreement. Percentages for trials and agreement are displayed below. Grey shaded columns indicate percent inter-observer agreement for probe trials, pre-video trials, post-video trials, and total trials.

	Probe		Pre-Video Probes		Post-Video Probes		Total	
	% Trials IOA Collected	% Agreement	% Trials IOA Collected	% Agreement	% Trials IOA Collected	% Agreement	% Trials IOA Collected	% Agreement
Wii	50.0%	100%	54.9%	98.7%	63.3%	96.9%	58.3%	98.5%
Nintendo DS	50.0%	100%	39.5%	98.9%	45.8%	89.7%	46.3%	96.2%
Power-Joy	35.7%	100%	90.3%	93.2%	90.3%	88.7%	83.9%	93.9%
V-Flash	35.7%	100%	n/a	n/a	n/a	n/a	n/a	100%
Total	42.8%	100%	61.5%	96.9%	66.4%	91.7%	61.8%	97.1%

Table 13

Error Analysis During Pre-Video Probes. Errors are reported by type and total for individual students and activities; total errors for each are also included.

		Fred	Randy	Kevin	Rachel	Total
Wii	Latency	53	111	44	134	342
	Duration	4	4	6	1	15
	Sequential	2	5	9	0	16
	Topographical	24	21	25	151	221
Nintendo DS	Latency	21	36	19	27	103
	Duration	8	8	0	4	20
	Sequential	5	0	4	4	13
	Topographical	13	13	16	29	71
Power-Joy	Latency	11	19	6	8	44
	Duration	0	1	4	1	6
	Sequential	0	6	5	21	32
	Topographical	1	0	3	13	17
Total	All	142	224	131	393	890 (32.3%)
	Critical	37	82	48	234	401 (21.8%)

Table 14

Time Spent on Material Preparation.

	Nintendo Wii	Nintendo DS	Power-Joy	V-Flash	Total
Task Analysis Development	17m, 14s	5m, 3s	7m, 2s	14m, 29s	43m, 48s
Making Video	32m, 17s	7m, 49s	4m, 3s	n/a	44m, 9s
Saving Video to Computer	<1min	<1min	<1min	n/a	<3min

Table 15

Social Validity Questionnaire: Mean Score and Range per Question – Parents.

Question	Mean	Range
1. We have gaming systems in our home (e.g., Wii, X-Box, Nintendo DS, etc.).	3 – 4	4
2. Prior to participating in this study, my child participated in playing recreation/leisure games at our house (e.g., Wii, Nintendo DS, other gaming systems).	1 – 2	1.25
3. My child has shown an increased interest in playing these games since being involved in the study.	3 – 5	3.75
4. I think teaching recreation/leisure skills are important.	4 – 5	4.75
5. I think video modeling is an important instructional strategy.	5	5
6. I think observational learning, where my child can learn from others, is an important instructional strategy.	5	5

Table 16

Social Validity Questionnaire: Mean Score and Range per Question – Professionals.

Question	Mean	Range
1. I think teaching recreation/leisure skills to students with disabilities is important.	4 – 5	4.7
2. I think video modeling is an effective instructional strategy.	5	5
3. I think observational learning, where students can learn from watching others, is an important instructional strategy.	5	5
4. The intervention used in this study was effective.	5	5
5. The intervention in this study was time consuming	1 – 3	1.7
6. The intervention used in this study is worth replicating with other activities and/or other students.	5	5
7. The intervention used in this study was meaningful to the students.	5	5
8. The intervention used in this study should be used in the future.	5	5

Table 17

Social Validity – Student Choice

	Fred	Randy	Kevin
Choice 1	Wii	Wii	Power-Joy
Choice 2	Nintendo DS	Wii	Power-Joy
Choice 3	Nintendo DS	Wii	Power-Joy

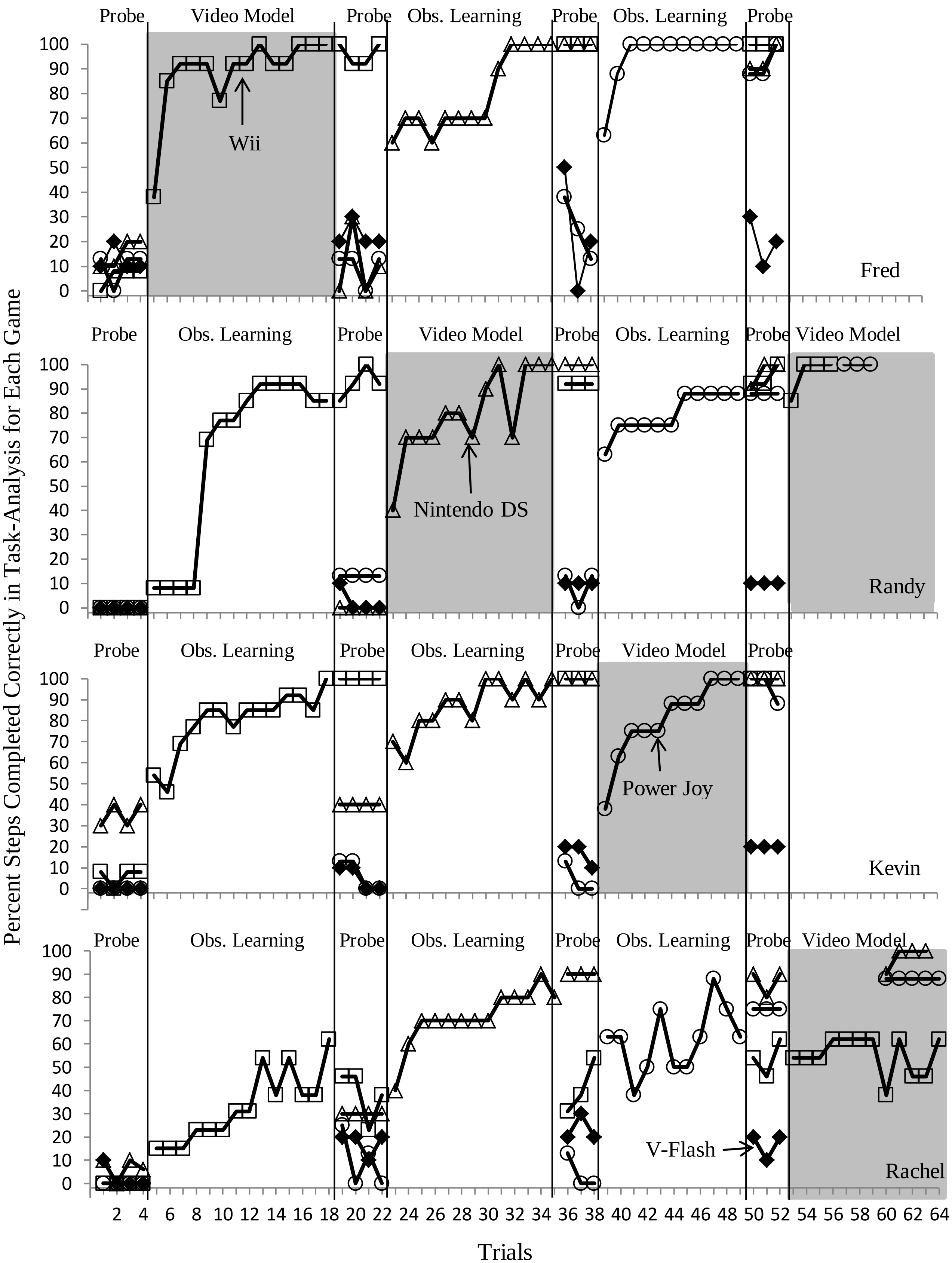
Probe
Video Model
Probe
Obs. Learning
Probe
Obs. Learning
Probe
Wii
Fred
Probe
Obs. Learning
Probe
Video Model
Probe
Obs. Learning
Probe
Video Model
Nintendo DS
Randy
Probe
Obs. Learning
Probe
Obs. Learning
Probe
Video Model
Probe
Power Joy
Kevin
Probe
Obs. Learning
Probe
Obs. Learning
Probe
Obs. Learning
Probe
Video Model
V-Flash
Rachel
Percent Steps Completed Correctly in Task-Analysis for Each Game
Trials

Figure 3. Percent critical steps completed correctly for each task analysis. Grey shaded areas represent trials where video models occurred; observational learning trials occurred without video model instruction

CHAPTER FIVE

Discussion

The purpose of this study was (a) to examine effects of video modeling on accessing various recreation/leisure activities found within the classroom for students with Autism Spectrum Disorder (ASD) and (b) to determine if students could learn to access those same activities observationally by watching their peers perform the tasks. This study expands the literature on using video models to teach chained tasks, observational learning in small group instructional settings for students with ASD, and teaching recreation/leisure skills to students with disabilities. All students receiving video model instruction (e.g., Fred, Randy, and Kevin) learned to perform 100% of the critical steps needed to access their recreation/leisure activity when receiving video models. Observationally, all students learned 38 – 100% steps necessary to access the recreation/leisure activities. Upon study completion, all students were able to access one to three age-appropriate recreation/leisure activities independently; all students could access all three activities with varying degrees of accuracy (e.g., on the Wii, Rachel performed 46 – 64% steps independently; on the Power-Joy, she completed 88% steps independently).

Results

Results of video modeling and observational learning to teach students with ASD to access various recreation/leisure activities was evaluated via multiple probe designs (Gast & Ledford, 2010). Video modeling was assessed using a multiple probe design across participants where students were each taught to access novel chained recreation/leisure tasks. Shaded areas of Figure 3 illustrate the multiple probe for video models. Observational learning was assessed using multiple probe designs across activities and replicated across students. Removing shaded areas of Figure 3 and looking at each student individually illustrates the multiple probe for observational learning across activities, replicated across students for the activities where they were not receiving video models. Functional relations were established between video modeling and independent access to various recreation/leisure activities for three students; functional relations were also established between observational learning and increases in percent steps completed independently when accessing various recreation/leisure activities. These functional relations were evaluated via multiple probes. Increases in level and trend only after introduction of intervention for students across activities for both video models and observational learning suggest that functional relations between video models and observational learning for accessing recreation/leisure activities exists. Pre-intervention data were compared to intervention data; all students demonstrated 100% PND, signifying intervention likely caused the increased performance. Pre-intervention data remained low for all students until introduction of intervention (video modeling or observational learning) and maintained intervention levels of accuracy during follow-up probes strengthening the possibility of functional relations between video modeling, observational learning, and accessing chained recreation/leisure tasks. The V.Flash served as a control; probes maintained low levels of accuracy (range 0 – 48%) across students regardless of intervention applied to other activities. Students not mastering activities observationally were shown video models and performance was assessed. Randy mastered both the Wii and Power-Joy; Rachel mastered the Nintendo DS and 8 of 9 steps on the Power-Joy. Rachel's performance accessing the Wii was similar via observing a peer (2nd half range 38 – 62%) and via video modeling (range 38 – 62%). Data suggests that while some students learned to access all steps observationally, 50% students in this study required direct instruction (e.g., video models) to demonstrate all critical steps.

There were several student errors made during the course of this study. Many can be attributed to the nature of the activities; each recreation/leisure activity had multiple games within each game, settings that could be accessed, and options to change various aspects of the game. Although not demonstrated in the video model, students did click into other games (e.g., tennis instead of bowling in the Wii, "Adventures" instead of "Play Any Game" in the Nintendo DS). Even with errors made, students learned to correctly access all critical steps via video models and at least some critical steps via observational learning.

In answering the research questions outlined in Chapter 1, students with ASD did learn to access chained recreation/leisure activities via video models. Students who were observers of students engaged in chained recreation/leisure activities learned to perform 38 – 100% steps necessary to access the activities. There were differences in percent critical steps performed between students receiving the video model and students observing peers in vivo. While all students exposed to initial video models learned 100% critical steps via videos, students observing (with the exception of Fred) learned 49% - 97% critical steps. Fred, the first student receiving the video model, learned 100% accuracy prior to target students reaching mastery criteria. Two reasons might explain this: (a) he was highly motivated by each gaming system, to the point of requesting to play during non-recreation/leisure times, and (b) his probe data were higher than Randy's on the Nintendo DS and his probe data ranged within to above Kevin's range on the Power-Joy. Kevin mastered 100% accuracy during follow-up probes for both activities learned observationally. For questions four and five, more data would be required to determine if accuracy improves for observers and target students (e.g., those receiving the video model) as they learn to access subsequent activities; having more replications for each student would aide in answering these questions.

Conclusions

Results of this study are promising and expand current literature in numerous areas. All students were able to learn how to access a single recreation/leisure activity via video models. Data were evaluated via multiple probe across participants guidelines. Typically intervention is staggered across participants for the same independent variable (e.g., one single recreation/leisure activity taught via video models). Probe data are collected for all students; one student receives intervention until mastery criteria are met and then probe data are collected again. Due to the nature of this study, as a student learned to access a recreation/leisure activity via video models, they were subsequently demonstrating what they learned to other participants in the study. The flexibility of Single-Subject Research designs allowed for simultaneous multiple probes to occur. Effects of video models were evaluated across behaviors (e.g., Wii, Nintendo DS, and Power-Joy); effects of observational learning were assessed across students and behaviors.

While all students demonstrated all critical steps necessary to access their targeted recreation/leisure activity, data for steps completed correctly during observational learning varied for some students. There are several possible explanations for this. Procedural differences between video models and observational learning opportunities may account for some of the differences. Students receiving video models saw procedurally reliable demonstrations of accessing the recreation/leisure activity each time it was viewed; each step on the videos were also narrated. Students observing saw a non-narrated demonstration with and without errors and missed or out of sequence steps. These variances could account for the differences in percent critical steps completed correctly for students receiving video models vs. students learning observationally. Students not reaching criteria via observational learning were shown video models; performance was assessed. With the exception of Rachel accessing the Wii, all students participating in this condition increased accuracy. Randy mastered all games; Rachel mastered one game and learned all but one step in another.

Research to Practice

Occurring in an applied setting, practical challenges developed during the study. All recreation/leisure activities were pre-selected by the teacher using the following criteria: (a) available in the classroom, (b) low difficulty level, and (c) high interest aspects. It was assumed students would be motivated to access the game in order to play the game. While 3 of 4 students appeared to enjoy playing the games (e.g., smiling while playing, asking to play during non-recreation/leisure time, etc.), Kevin did not want to play. He often screamed "no" when told "It's time to play the _____." He did eventually play the games. He could complete most critical and non-critical steps independently; when it was time to perform the step, "Play the game," Kevin would ask "Can I be all done?" The teacher response was, "Play the game." As soon as he played the first portion of a game (e.g., one frame of bowling in the Wii), he would proceed to the next step in the task analysis. According to Dattilo and Schleien (1994). "recreation is typically defined as an activity that people engage in for the primary reasons of enjoyment and satisfaction… leisure describes a person's perception that he or she is free to choose to participate in meaningful, enjoyable, and satisfying experiences" (p. 53). Allowing student choice of games learned prior to intervention might have increased desire to play, ensuring recreation/leisure aspects by definition. Fred appeared to enjoy playing games. In every game played, for at least three trials, after Fred successfully completed the step, "Play the game," he would attempt to play the game again instead of completing the next step in the task analysis. When this was blocked and the next step completed for him, Fred engaged in self-injurious behaviors. These behaviors were mild in intensity and short in duration, but they did occur; he did complete at least some of the remaining steps in the task analysis after behaviors stopped.

A second issue with teacher-selection of games was determination of pre-requisite skills. To participate in the study, students were required to meet specific selection criteria (e.g., ability to follow multi-step directions, ability to imitate simple gross and fine motor movements, etc.). One prerequisite skill that might have proved useful was functional computer mouse skills. Rachel was the only participant without this skill; she had difficulty completing steps for the Wii where excessive hand-eye coordination was required (e.g., moving hand onto correct position to TV and pushing the “A” button); each of these steps was completed incorrectly or not all for Rachel. Other students were able to correctly complete these steps.

Methods used for data collection also caused challenges. Steps were scored correct if a step was initiated and completed within 10s (with the exception of wait for game to load or play the game, if those steps took longer than 10s). Steps were scored incorrect if they were not initiated (e.g., latency) or completed (e.g., duration) within 10s, completed out of sequence, or completed incorrectly (e.g., selecting the wrong game). In following the task analysis and video model, students were expected to complete each step in the task analysis in order. Several steps in each task analysis had to occur in order for correct game execution (e.g., the yellow and white cords had to be plugged into the TV prior to Galaga game selection for the Power-Joy). There were, however, several steps that were not sequentially imperative (e.g., it did not matter if the white cord was plugged in before or after the yellow cord prior to Galaga game selection for the Power-Joy). Sequential errors were scored incorrect across participants and recreation/leisure activities. Pre-determining which steps in each task analysis were sequentially imperative could have increased student performance, ultimately allowing access to the activities in less time (e.g., students would not have to be stopped and blocked for teacher performance of the task). In following the task analysis, students were also expected to select the teacher-selected game to get credit for those steps in each task analysis. Several students attempted to choose alternative games (e.g., tennis in the Wii, pirate boat in the Nintendo DS). While students were appropriately accessing a game, they were stopped, blocked, and put into the teacher-selected game. Programming videos for multiple correct responses at the point of choosing and playing the game could have prevented this. A second issue arose with regard to errors made. When playing the Nintendo DS, Randy chose "Adventures" instead of "Play Any Game." This was incorrect according to the task analysis and video model; the mode of "Play Any Game" needed to be selected due to the device saving games under "Adventures," thus hindering each player's next attempt to play. As a result all three observers chose "Adventures" and were scored incorrect. Once students began following the task analysis, it became apparent that unnecessary steps were included. For example, in accessing the Wii, the console could have been turned on via step 2, *Press the power button on the Wii*, or step 3, *Pick-up game and insert game disk into Wii*. Having typical peers access games for task analysis development may have brought this to researcher's attention prior to video creation as children may access gaming systems in ways different than adults.

Student performance was assessed directly after video model/observational learning opportunities and the following school day via cold probes. Delayed cold probe data indicated higher accuracies than immediate probes across students and behaviors. This could be attributed to afternoon sessions happening immediately after intervention occurred during outside recess time. Conducting post-intervention trials during other non-preferred activity times might have increased performance.

Several aspects of this study were time-consuming given the public school setting. Executing the video models took between 4m, 3s and 32m, 17s to film. This was due to filming in the applied setting; waiting until the students were gone, taping was often interrupted by afternoon announcements, the custodian vacuuming, or another teacher coming in without realizing taping was in progress. A sign on the door helped decrease amount of time required to capture an accurate video. Another time consuming piece to this study was collecting probe data. Executing all four activities across all four students was difficult given the amount of time justified to recreation/leisure activities in one given school day. During probe collections, 30 minutes each morning and afternoon often did not afford enough time to complete all four activities for all four students.

Although not feasible in this particular setting, and possibly time consuming, having two to three groups of students where activities (e.g., the Wii) could be staggered across participants could have strengthened inter-subject replication. Although inter-subject replication occurred for video-modeling in this study, a stronger case could have been made if those replications occurred for the same activities. Another replication limitation arose in this study due to time constraints; there was no intra-subject replication of effect for video modeling. Having each student receive a second video model for a novel recreational/leisure activity (e.g., eight total activities) could have demonstrated intra-subject replication for each student, if results mirrored current results. The current study spanned 64 trials, over 64 school days. Rachel was originally selected to learn to access the V.Flash via video models, with Fred, Randy, and Kevin observing. The decision to use the probe data for the V.Flash as a control was made for two reasons. First, mastering another recreation/leisure activity followed by probes was unlikely given the time constraints. The third game (e.g., Power-Joy) was mastered with 12 days left in the school year. Previous games were mastered in 11 to 14 trials followed by 3 to 4 probe trials. Second, independently accessing recreation/leisure activities was the main focus of this study. Showing video models (the intervention with more accurate success in this study) to students already demonstrating some steps accurately in each activity was likely to accelerate performance, possibly to mastery levels. At study completion, all students could independently access one to three recreation/leisure activities.

Visual Strengths, Observational Learning, and Video Modeling

Individuals with ASD are often described as visual learners, frequently demonstrating strengths processing visual stimuli versus auditory stimuli (Mesibov & Hearsey, 1995; Tissot & Evans, 2003). Quill (1997) suggested that using visually cued instruction might enhance strengths often associated with ASD in areas of perception, information processing, memory, language, and general intelligence. According to Albert Bandura’s Social Learning Theory (1997), “most human behavior is learned observationally through modeling: from observing others one forms an idea of who new behaviors are performed, and on later occasions, this coded information serves as a guide for action” (p. 22). Visual aspects of observational learning where students are required to “watch then do” via live or symbolic models are ideal for students with ASD (Quill, 1997). “The preference for visual processing and learning approaches has been noted as a factor contributing to the success of such interventions for individuals with autism” (Rayner, Denholm, & Sigafoos, 2009, p. 292).

Limitations

Very few research limitations existed in this study. One evident limitation was probable testing effects. Fred mastered the Power-Joy via observational learning in five trials; Kevin required 11 trials. Fred demonstrated accuracy on steps not directly observed via peer observation. For example, Fred demonstrated step 6, *Move arrow (using thumbstick) to #36* in his 3rd trial, Kevin did not demonstrated this accurately until trial 9. One explanation for this is, although the teacher blocked the step, the arrow on the TV was next to #36 when she allowed accessing step 7, *Press start*. It is possible Fred learned to complete step 6 via arrow placement on the TV.

Regardless of limitations, video modeling was effective in teaching access to chained recreation/leisure activities for students with ASD. Observational learning occurred for all students with varying success; all students learned at least some critical steps to accessing recreation/leisure activities via watching peers.

Future Implications

Video models have been effective in teaching students with autism a variety of chained tasks. Most focus on chained self-help skills (Ayres & Langone, 2007; Ayres, Maquire, & McClimon, 2009; Keen, Branigan, & Cuskelly, 2007; Lasseter & Brady, 1995; Murzyanski & Bourret, 2007; Norman, Collins, & Schuster, 2001; Rosenburg, Schwartz, & Davis, 2010; Shipley-Benamou, Lutzker, & Taubman, 2002). Four focus on community and/or vocational tasks (Alcantara, 1994; Allen, et al., 2010; Cihak & Schrader, 2008; Haring, et al., 1987). One, to date, focuses on teaching recreation/leisure skills to students with ASD. Blum-Dimaya, Reeve, Reeve, and Hoch (2010) used embedded video modeling to teach three students with ASD to play Guitar Hero. The current study adds to this literature and opens possibilities for future video modeling research. Replicating the current study with four more activities would be ideal; providing intra-subject replication of video modeling would strengthen the functional relation between video models and accessing chained recreation/leisure activities. Changing the scoring criteria to include student choice of games, together with allowing non-critical sequential errors might demonstrate less trials to criterion in the future. It might also prove useful to show the video model to the entire group and assessing individually; if direct instruction (via teacher or video model) is required to teach 100% critical skills to most students with ASD, trials to criterion for all students could be lessened if video models were used as the sole component.

Observational learning research on chained tasks is limited; research including individuals with ASD is limited to one. Tekin-Iftar and Birkan (2010) taught food and drink preparation. The current study adds to the literature on observational learning. While students in this study did learn observationally, it is important to point out that not all students learned 100% critical steps to access the activities. If left alone or with someone who did not know how to access the game, it is unlikely knowing some of the steps would be functional in accessing the game. If direct teaching is required, it might save time to criterion if video models were used initially. Replicating portions of this study to include typical peers, who already know how to access the activities, as in vivo models might provide insight into what or how much students with ASD can learn observationally. Although Ihrig and Wolchick (1984) found no difference in peer vs. adult models within video models, having a peer model the skill in vivo, as opposed to observing the peer receiving the video model, could increase the procedural reliability of performing the recreation/leisure activity. If effective, it could add a stronger case for including observational learning opportunities when providing instruction to students with ASD. Together with allowing typical peers the opportunity to act as the target student to facilitate observational learning, social validity could be strengthened if typical students or targeted students selected activities to be taught, as opposed to teacher selection. Having peers select games to be played ensures activities are age-appropriate and increases the likelihood typical peers would want to play alongside students with ASD, once games are learned. Having target students select games to be played ensures true recreation/leisure activities being learned by each student.

Left together, video modeling and observational learning provide endless research opportunities. Replicating this study with non-technological activities could add to literature on effectiveness of video models to teach chained tasks. It is possible the intrinsically motivating nature of the video games motivated students to pay attention to the video model and each other to a greater degree than if the activity were a non-preferred activity (e.g., setting the table). Showing the video to the group while allowing only one student to demonstrate knowledge via post-video model probes could answer a variety of interesting questions. Could others, seeing the video and their peer, perform the tasks at the point the student being probed reaches mastery criteria? Would there be a difference for students instructed to watch the video versus students just in the classroom?

Future research could also expand the current study to include attending measures. Video-taping the students as they receive the video model and comparing those to videos of students while they are learning observationally could prove useful in acquisition differences and/or specific aspects that might be included in one versus the other that seem to be facilitating learning. Fluency comparisons to determine differences between skills learned via video models compared to those learned observationally might also provide useful information.

Using video models as an instructional tool provides endless benefits and possibilities. Potential portability makes its availability useful across settings, increasing the likelihood of acquisition (e.g., if shown the video in the setting, right before the student is required to perform tasks) and generalization (e.g., if accessed and/or demonstrated in a variety of settings). Usefulness within a classroom setting also makes it ideal; engaging multiple children, freeing up the teacher, and providing procedurally reliable demonstrations of the targeted skills are just a few. Observational learning, if effective, can open a multitude of instructional opportunities. Teaching a group of students with severe ASD can be difficult; if students can learn at least some of what their peers are being taught, amount and impact can be positively influenced. Incorporating video modeling and observational learning to teach recreation/leisure activities can give students with ASD skills necessary to not only participate with typical peers, but may also foster acceptance. It is not often students with severe ASD perform academically near their same-age peers; the differences as they become older become move obvious and difficult. Explicit teaching of most skills are necessary for children with ASD; allowing some of these skills to include recreation/leisure activities can make successful inclusion less difficult and more promising.

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APPENDIX A

Parental Consent

I agree to allow my child, ____________________, to take part in a research study titled, "Video Modeling to Teach Recreation/Leisure Skills to Students with Autism", which is being conducted by Amy Spriggs, from Oakwood Elementary School (Hall County School District) and the University of Georgia (678-525-6979) under the direction of Dr. David Gast (706-542-5069). I do not have to allow my child to be in this study if I do not want to. My child can refuse to participate or stop taking part at any time without giving any reason, and without penalty or loss of benefits to which she/he is otherwise entitled. I can ask to have the information related to my child returned to me, removed from the research records, or destroyed.

- The reason for the study is to find out if students will learn to access recreation/leisure skills through video modeling or observational learning.
- The recreation/leisure skills to be taught are available within the classroom.
- Children who take part may learn how to access a variety of recreation/leisure activities. The researcher also hopes to learn something that may help other children learn how to access recreation/leisure activities in the future.
- If I allow my child to take part, my child will be asked to view a short video of an adult accessing a pre-selected recreation/leisure activity (e.g., Wii, Nintendo DS, Power Joy Stick, V-Flash, etc.). After watching the video, my child will be asked to access the pre-selected recreation/leisure activity (learned via video models). My child will either access it independently or with the help of the researcher. My child will be allowed to play the game once he/she accesses it (either independently or with prompts). When other children in the class are being shown videos, my child will have an opportunity to observe his/her classmates access their targeted recreation/leisure tasks. My child will have an opportunity to access these recreation/leisure activities (learned via observational learning). My child will either access it independently or with the help of the researcher. My child will be allowed to play the game once he/she accesses it (either independently or with prompts). The researcher will ask my child to do these activities 4 – 5 times a week for up to 30 minutes during typically scheduled recreation/leisure times. This activity will not interfere with other instructional lessons. If I do not want my child to take part then he/she will be engaged in other recreation/leisure activities at the same time.
- The research is not expected to cause any harm or discomfort. My child can quit at any time. My child's grade will not be affected if my child decides not to participate or to stop taking part.
- Any individually-identifiable information collected about my child will be held confidential unless otherwise required by law. My child's identity will be coded, and all data will be kept in a secured location. Selected trials will be videotaped for data collection purposes. At study completion, it will be my decision if the tapes of my child can be retained for future educational purposes (teacher education, presentations on video modeling, etc.) or if the tapes of my child will be destroyed.
- The researcher will answer any questions about the research, now or during the course of the project, and can be reached by telephone at: 678-525-6979. I may also contact the professor supervising the research, Dr. David Gast, Department of Communication Sciences and Special Education, at 706-542-5069.
- I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

Amy Day Spriggs ___________________________
678-525-6979 Signature
Date _____________

amy.spriggs@hallco.org

________________________ ____________________________
Name of Parent or Guardian Signature
Date _____________

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your child's rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

APPENDIX B

Probe, Pre-Video Model, Post-Video Model, and IOA Data Sheet

Wii - Bowling

Wii - Bowling

Name: ___________________________________

Circle Condition: Probe Pre-Video Model Probe Post-Video Model Probe

Observer Initials									
Trial									
Date									
1. Press Square button on TV to turn on.									
2. Press the power button on the Wii.									
3. Pick up game and insert game disc into Wii.									
4. Pick up remote control.									
5. Press power button on the remote control.									
6. Move hand to Wii Sports title and press A.									
7. Move and to start and press A.									
8. Put on wrist strap and wait.									
9. Press A and B together to start game.									
10. Move hand to bowling and press A.									
11. Move hand to 1 (# of players) and press A.									
12. Move hand to character (Mii) and press A.									
13. Move hand to yes (continue?) and press A.									
14. Move hand to OK and press A.									
15. Move hand to OK (play with this Mii?) and press A.									
16. Press A (again).									
17. Play game.									
18. Press power on remote to turn remote and Wii console off.									
19. Press power button on TV to turn off.									
% Steps Completed Independently									

(+) = step completed correctly and independently within 10s of the task direction or completion of the previous step.
(L) = latency error (step not initiated 10s of the task direction or completion of the previous step).
(D) = duration error (step initiated but not completed within 10s of the task direction or completion of the previous step).
(S) = sequential error (step attempted out of sequence).

APPENDIX C

Probe, Pre-Video Model, Post-Video Model, and IOA Data Sheet

Nintendo DS – Backyardigans

Nintendo DS - Backyardigans

Name: ___________________________________

Circle Condition: Probe Pre-Video Model Probe Post-Video Model Probe

Observer Initials									
Trial									
Date									
1. Insert game into DS.									
2. Open DS.									
3. Slide power button.									
4. Touch screen with stylus (to start).									
5. Touch game name on screen with stylus.									
6. Touch screen with stylus to begin.									
7. Touch #1 (choose profile).									
8. Touch “any game” (choose game).									
9. Touch “pirates” (choose the kind of game you want to play).									
10. Touch “pirate flag” (choose the game you want to play).									
11. Play game.									
12. Slide power off.									
13. Close DS.									
14. Eject game.									
15. Put game and stylus in game box.									
16. Hand DS to teacher.									
% Steps Completed Independently									

(+) = step completed correctly and independently within 10s of the task direction or completion of the previous step.
(L) = latency error (step not initiated 10s of the task direction or completion of the previous step).
(D) = duration error (step initiated but not completed within 10s of the task direction or completion of the previous step).
(S) = sequential error (step attempted out of sequence).

APPENDIX D

Probe, Pre-Video Model, Post-Video Model, and IOA Data Sheet

Power-Joy Joy Stick - Galaga

Power Joy Stick - Galaga

Name: ___________________________________

Circle Condition: Probe Pre-Video Model Probe Post-Video Model Probe

Observer Initials									
Trial									
Date									
1. Get joy stick out of basket.									
2. Plug yellow cord into front of TV.									
3. Plug white cord into front of TV.									
4. Press square power button on TV to turn on.									
5. Slide power button on joy stick to ONI.									
6. Move arrow (using thumbstick) to #36.									
7. Press start.									
8. Press start (1 player).									
9. Wait for game to load.									
10. Play game.									
11. Move power button to OFF.									
12. Turn TV off.									
13. Unplug white cord from TV.									
14. Unplug yellow cord from TV.									
15. Put game into basket.									
% Steps Completed Independently									

(+) = step completed correctly and independently within 10s of the task direction or completion of the previous step.
(L) = latency error (step not initiated 10s of the task direction or completion of the previous step).
(D) = duration error (step initiated but not completed within 10s of the task direction or completion of the previous step).
(S) = sequential error (step attempted out of sequence).

APPENDIX E

Probe, Pre-Video Model, Post-Video Model, and IOA Data Sheet

V-Flash – Scooby Doo

V-Flash – Scooby Doo

Name: ___________________________________

Circle Condition: Probe Pre-Video Model Probe Post-Video Model Probe

Observer Initials									
Trial									
Date									
1. Press power button on TV to turn on.									
2. Push open button on V-Flash.									
3. Insert game into V-Flash system.									
4. Close machine.									
5. Press “on” button to turn V-Flash on.									
6. Wait for game to load.									
7. Pick up controller.									
8. Press “enter” when you see game title.									
9. Press “enter” (to game zone).									
10. Move joy stick to “x”/no (continue last game?)									
11. Press “enter.”									
12. Press “enter” (new game).									
13. Press “enter” (Level one; One player).									
14. Wait for game to load.									
15. Play game.									
16. Move joy stick to “x” (play again?).									
17. Press “enter.”									
18. Press “off” on V-Flash.									
19. Press power button on TV to turn off.									
% Steps Completed Independently									

(+) = step completed correctly and independently within 10s of the task direction or completion of the previous step.
(L) = latency error (step not initiated 10s of the task direction or completion of the previous step).
(D) = duration error (step initiated but not completed within 10s of the task direction or completion of the previous step).
(S) = sequential error (step attempted out of sequence).

APPENDIX F

Procedural Reliability Data Sheet

Procedural Reliability

Date									
Observer Initials									
1. The teacher had materials pre-arranged.									
2. The teacher provided a specific task direction.									
3. The teacher showed the video to only one student; other students were not able to view video.									
4. The teacher had all students arranged in the small group instructional format prior to the target student attempting to access the activity.									
5. The teacher allowed all steps in the TA to be completed by the student.									
6. The teacher completed any steps not completed correctly, in sequence, or within 10 seconds.									
7. The teacher blocked the student's view when completing steps for the student.									
8. The teacher allowed all students the opportunity to access the activity.									
Percent Steps Completed Correctly									

KEY: (+) Step completed correctly; (-) step not completed correctly; (n/a) step not applicable to this trial
Percent Steps Completed Correctly: Number (+) divided by Number (+) + Number (-), multiplied by 100

APPENDIX G

Social Validity: Parent

Parent Questionnaire

Please rate the following statements using the scale 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), 5 (Strongly Disagree).

1. We have gaming systems in our home (e.g., Wii, X-Box, Nintendo DS, etc.).

   1 2 3 4 5

2. Prior to participating in this study, my child participated in playing recreation/leisure games at our house (e.g., Wii, Nintendo DS, other gaming systems).

   1 2 3 4 5

3. My child has shown an increased interest in playing these games since being involved in the study.

   1 2 3 4 5

4. I think teaching recreation/leisure skills are important.

   1 2 3 4 5

5. I think video modeling is an important instructional strategy.

   1 2 3 4 5

6. I think observational learning, where my child can learn from others, is an important instructional strategy.

   1 2 3 4 5

7. Please list any other comments/feedback you would like to share about your child's participation in this study: ____

   ____

   ____

APPENDIX H

Social Validity: Professional

Professional Questionnaire

Please rate the following statements using the scale 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), 5 (Strongly Disagree).

1. I think teaching recreation/leisure skills to students with disabilities is important.

   1 2 3 4 5

2. I think video modeling is an effective instructional strategy.

   1 2 3 4 5

3. I think observational learning, where students can learn from watching others, is an important instructional strategy.

   1 2 3 4 5

4. The intervention used in this study was effective.

   1 2 3 4 5

5. The intervention used in this study was time consuming.

   1 2 3 4 5

6. The intervention used in this study is worth replicating with other activities and/or other students.

   1 2 3 4 5

7. The intervention used in this study was meaningful to the students.

   1 2 3 4 5

8. The intervention used in this study should be used in the future.

   1 2 3 4 5

9. Please list any other comments/feedback you would like to share about your involvement, perceptions, etc. with this study on the back of this form.