Effects of Wii Game Console on Increased Engagement and Peer Interactions

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Abstract

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The "Effects of Wii Game Console on Increased Engagement and Peer Interactions" studied the use of the Wii video game system in a blended preschool classroom and engagement and peer interactions on children with Autism Spectrum Disorder. The study used a Multiple Baseline Design across participants and found an increase in peer interactions and engagement subsequent to playing the Wii game during Free Choice time.

INTRODUCTION

Autism Spectrum Disorder (ASD) is defined by the Center for Disease Control (CDC) as a complex behavioral disorder that is characterized by a lack of social skills and verbal and non-verbal communication, and difficulties with repetitive behaviors. Children with ASD often exhibit global delays in social skills. The diagnostic criteria of the Diagnostic and Statistical Manual, fourth edition, Text Revision for ASD is: Qualitative impairment in social interaction, as manifested by at least two of the following: Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction, failure to develop peer relationships appropriate to developmental level, a lack of spontaneous seeking to share enjoyment, interest, or achievements with other people (e.g., by lack of showing, bringing, or pointing out objects of interest), lack of social or emotional reciprocity.

Engagement in school contributes to social and cognitive development (Finn, 1993). Additionally, students who are engaged with school are more likely to learn, and to eventually graduate high school and higher education (Marks, 2000). Engagement in school is an important aspect of education because it directly correlates to academic achievement later in life. Engagement in the classroom setting is often defined as describing specific behaviors (Carahan & Musti-Rao2009, Fredricks, Blumenfeld, & Paris, 2004; Klem & Connell, 2004; Tucker et al., 2002) such as attention towards the teacher (Carahan & Musti-Rao 2008, Greenwood, Horton, & Utley, 2002), involvement in learning tasks (Carahan & Musti-Rao 2009, Skinner & Belmont, 1993), and initiating activities (Carahan & Musti-Rao 2009, Kelm & Connell, 2004). Children with ASD often display decreased engagement with materials and engagement with individuals. Much research and many intervention strategies (e.g., activity schedules, specialized

reinforcement schedules) has focused on improving engagement for children with ASD.(Carahan & Musti-Rao, 2009; Bryan & Gast, 2000; MacDuff, Krantz, & McClannahan, 1993; Pelios, MacDuff, & Axelrod, 2003).

Social disengagement and difficulties in peer relationships are core deficits of ASD and have serious implications for educational programming and long term outcomes. Individuals with decreased social skills and decreased social independence have a lesser likelihood for independent living and employment (Schuem and Webber, 2002, as found in Reed, Hyman & Hirst). Additionally, difficulties around social skills paired with an intellectual disability have been shown to predict problem behaviors such as stereotypy, aggression, and property destruction (Matson, Fodtand, and Rivit, 2009, as found in Reed, Hyman & Hirst).

Social interactions are a foundational skill considered critical to early development, and usually seen in the very early stages of childhood (Brown, Conroy & Odom, 2001). Researchers have found that peer interactions and social interactions provide an important context for the acquisition and development of language and cognitive abilities (Bijou, 1993; Vygotsky, 1978 as found in Brown, Conroy & Odom, 2001).

Quality peer interactions are vital for the development of children. Research shows that children who have difficulty interacting with their peers often fail to develop positive peer relationships. Additionally, children who struggle with the ability to develop positive peer relationships are at a greater risk for behavioral and social maladjustment later in life (Brown, Conroy & Odom, 2001). Two consistent findings in the literature have been found around social competency: 1) positive social interactions are important for childhood development and 2) difficulties with peer interactions are a predictor for future failures in social situations.

Research shows that children with disabilities have a harder time engaging with their

peers in all aspects of play. Children are less successful joining play, are often rejected by their peers, engage in higher levels of solitary play, initiate less than their typically developing peers, and are unable to maintain play for extended periods of time (Guralnick,Connor, Hammond, Gottman, & Kinnish,1996a; Guralnick & Groom, 1987, 1987; Guralnick& Weinhouse, 1984; Kopp, Baker, & Brown, 1992; Wilson, 1999). Because the research is so clear that it is more challenging for children with disabilities to sustain quality interactions with peers, it is imperative that teachers support students in their interactions.

It is the job of educators to find instructional strategies and practices that support children with autism engage with and interact with their peers in socially appropriate ways.

Throughout the years, many interventions have been put in place to increase the number and quality of peer interactions in preschool settings. However, there has been limited research on the effectiveness of technology as an educational tool for teaching young children with and without disabilities. In the past, technology as an intervention was used in the forms of stationary computers and TVs for video modeling. Research shows that both the use of computers and TVs as instructional tools has been effective in increasing social interactions.

Today, technology is all around us. As a society, we are constantly adapting the every changing and ever growing technological world. In a study in 2003, Rideout, Vanderater, and Wartella studied 1000 families and the computer usage in their home. Of the families, 70% have children between the ages of 4 and 6 using the computers. With this information, educators can assume that most families and children are engaging with technology, so the implementation of technology in the classroom won't be a completely novel idea. Early childhood educators need to be prepared for the benefits of technology, and be prepared to use various forms of technology in their classrooms (NAEYC, 2012).

The use of technology in homes is constantly growing. In a survey given to families (at random) by the Princeton Data Source, over 75% of children between the ages of 0 and 6 years old watch the television for 1-2 hours per day. Additionally, children 5-6 years old use the computer for an average of 50 minutes per day (Vanderwater, Rideout, Wartella, 2005). This study is the first to provide "comprehensive information regarding the extent of media use among young children in the United States" (Vanderwater, et. al, 2005). The results of this study indicate the mass amounts of technology being used in homes around the United States

Anderson (1998) studied 42 kindergarten students and their social interactions at a variety of free choice areas. The researcher videotaped the students across all free choice areas. The researcher and assistants coded the interactions and determined that the number of and quality of interactions at the computer were just as high as in other areas of the classroom. This study concluded that despite common belief that the computer is a completely solitary activity, rather, it is just as likely to produce social interactions as other free choices areas in preschool classrooms.

Recently, more literature on the appropriateness and effectiveness of technology, like computers, in the classroom has emerged. The National Association of Education of Young Children (NAEYC) states in their review of computers in the preschool classroom, that the software must be "developmentally appropriate" and be "integrated into the regular learning environment and be used as one of the many options to support child learning" (NAEYC, 2012). With this statement, NAEYC suggests that with developmentally appropriate software, the use of computers in the preschool setting can improve cognitive and social abilities in preschool age children.

In addition to the support from NAEYC on the use of computers in the classroom, the Federation of American Scientists supports the use of computers as well as video games in preschool classrooms. The Federation of American Scientists suggests that the use of video games allows for repeated measures until mastery, clear goals, intrinsic motivation, and personalized learning. All of these things, they suggest, benefit child outcomes. (FDS, 2006).

Educators and parents of children with autism often report that children with ASD are drawn towards technological devices. It is important for individuals work with children with ASD to jump on the fascination and use it as a tool or strategy for instruction (Colby, 1973). Additionally, individuals with autism often find various technological mediums highly motivating and engaging (Edutopia, 2013).

For many years, educators have been exploring the use of video modeling to teach children with autism. Video modeling uses video recordings of target behaviors to teach the appropriate skills, and providing feedback. Video technology is an economically feasible and readily available technology that has been proven effective in teaching children with autism.

In addition to video modeling, a growing number of studies have been done around computer-based intervention and children with autism. Studies show that similar to video-based intervention; computer-based interventions are beneficial tools for teaching children with autism. Moore & Calvert (2000) compared computer-based instructional strategies with low cost, low-tech strategies and found a decrease in behavior problems and an increase in motivation in children with autism.

Technology can be used as a curricular modification that might increase engagement in various free choice areas. The use of preferred materials throughout free choice to enhance engagement and interactions with various materials and areas is an effective instructional

strategy. By identifying and integrating child preference into the free choice routine, such as the use of technology in the classroom, educators can look for an increase in child participation (Sandall & Schwartz, 2008).

The purpose of this study is to use the Wii Video Game Consol a tool to study engagement and peer interactions with children with Autism Spectrum Disorder (ASD). The questions being answered are: Do children playing the Wii have increased engagement during a subsequent free choice activity? And, do Children playing the Wii game have increased interaction with peer during a subsequent free choice activity?

METHOD

Participants

The participants of the study were three boys with ASD between the ages of 3 and 5 who attend an inclusive preschool program for approximately 20 hours a week. All of the boys had some expressive language, but were socially isolated from their peers. Each boy was imitative, and had the ability to play the Wii game appropriately and without adult prompts.

Setting

The setting of the study took place in the preschool classroom. There are 16 students total, 8 with disabilities 8 typically developing. The study took place during free choice.

Materials

The materials necessary to complete the study were one Wii Game Console, 3 child-friendly video games: Dora the Explorer Dance Video, Nickelodeon Dance, and Zoo Adventures, a video camera, and 2 chairs for students to wait in (when waiting for a turn to play).

Experimental Design

The effects of playing games on the Wii Game Console were evaluated using a multiple baseline design across participants. This design requires that intervention be implemented in a staggered fashion across 3 different series so that each participant serves as a control for other participants (Scattone, Wilczynski, Edwards, & Rabian, 2002).

Procedure

Dependent Variables and Observation Procedures

The dependent variables for this study were the student's engagement and peer interactions. Engagement was when the child is commenting and/or manipulating materials in an appropriate manner, or interacting with peers, or interacting with teachers.

Peer interactions were defined as actively talking or playing with a peer, responding to a peer verbally or non-verbally, and the interaction does not violate any classroom rules.

Children were observed for 10 minutes using 10-second intervals. The observation protocol was the same across phases.

Baseline

Baseline was conducted within the preschool classroom. The researchers observed the target students for 10 minutes during free choice. The coding definitions and core sheet are attached in appendix A. After a steady baseline trend was determined, intervention was put into place. Except for the presence of the data collectors, adults who were familiar to the participants, no changes were made to the classroom schedule, materials, activities, or routines during baseline.

Intervention

The independent variable used for this study is the Wii Game Console, with various interactive video games. The Wii game was set up in the preschool classroom during free choice. During intervention, children, the target child and a peer, were invited over to play the Wii game. Wii sessions lasted 2 to3 minutes. After playing Wii, children were directed to make a choice of a different free choice activity available in the classroom. The addition of the Wii Game Console was the only change made to the classroom schedule, materials, activities, or routines during intervention.

Interobserver Reliability

Interobserver reliability was conducted every third session. The lead researcher trained two assistants to simultaneously, but independently, code the sessions. Dividing the number of agreements by the sum of the agreements and disagreements and multiplying that number by 100 calculated inter-observer agreement.

Procedural Fidelity

To ensure integrity of the study, the researcher will measure how engaged the students were with the Wii game. Student engagement during the Wii sessions as measured using a 10 second momentary time sample. Engagement was considered to be the procedural fidelity measure because our research questions was what effect would playing Wii with peers have on social interaction after the Wii session. If the participants did not play the Wii game, in other words were not engaged during this time, they did not receive the intervention.

Social Validity

Conducting research on a topic that is important to the consumers is very important to the researcher. To measure the social validity of the study, the researcher provided a survey on the ease and effectiveness of the intervention to the classroom teachers.

Results

Results of the multiple baseline design across participants using a Wii game console are shown in figure 1.

Participant 1

During the baseline observations, participant 1 was interacting with his peers at an average of 26.5% of the intervals of a 10 minute observation period during free choice times and was engaged 40.8 percent of the time. After intervention was implemented, his interactions increased to 44.8% of the intervals. Additionally, participant 1 engagement increased to an average of 59%.

During the baseline phase, the teacher behavior coded was at 17.5% of the 10 minute session. After intervention was put into place, teacher behavior increased to 48.6% of the 10-minute sessions.

Procedural fidelity checks were made during 40% of participant 1's Wii playing. Of these fidelity checks, Participant 1 as engaged with the game 77.4% of the game.

Participant 2

In baseline, participant 2 was interacting with his peers during an average of 7.4% of the intervals during a10-minute free choice period. Additionally, he was appropriately engaged 56.1% of the time. After intervention was put into place, participant 2 had increase in peer interactions to, on average, 21.1% of the intervals and his engagement increased to 58.4%.

Teacher behavior during the baseline phase had a mean of 48.5%. After intervention was implemented, teacher behavior decreased to 35.1% of the 10-minute sessions.

Procedural fidelity checks were made during 50% of Participant 2's Wii playing. Of these fidelity checks, Participant 2 was engaged 33.5 percent of the game.

Participant 3

In baseline, the mean peer interactions for participant 3 across 10-minute free choice times, was 6.5% of the intervals. His mean engagement was 27.8%. After intervention was implemented, there was an increase in peer interactions to 29.2% and an increase in engagement to 54%.

During baseline, teacher behavior was 63.3%of the 10-minute sessions. After intervention was put into place, teacher behavior decreased to 53%.

Procedural fidelity checks were made during 40% of Participant 3's Wii playing. Of these fidelity checks, Participant 3 was engaged for 79% of the game.

Discussion

The results of this study demonstrate that after preschool children with ASD played games on the Wii Video Game Console with their peers, they demonstrated increased rates of peer interaction in a free play session that followed immediately. The purpose of this study was to use the Wii Video Game Console a tool to study engagement and peer interactions with children with Autism Spectrum Disorder (ASD). The questions being answered were: Do children playing the Wii have increased engagement during a subsequent free choice activity? And, do children playing the Wii game have increased interaction with peer during a subsequent free choice activity?

The study took place in a preschool classroom at a school in the greater Seattle area. The school was a blended classroom, with 50% of children with special needs and 50% typically developing. All therapies and services are embedded into the 2 hour and 15 minute school day within the context of the classroom.

Each of the participants has a diagnosis of Autism. Participant 1 is the highest functioning of the three participants, in that his cognitive functioning and communication skills are much more advanced than the other two. Participant 3 is the most impacted with Autism. His expressive language is limited, and his executive functioning is impaired. Though there was a range in "levels" of autism, each individual had increased interactions with peers subsequent to playing the game.

Research has shown that movement and exercise before academic tasks leads to increased attention and engagement. A study done in 2006 on the effects of a classroom-based program on physical activity showed an increase in on-task behavior of 3rd and 4th graders who participated in the intervention group of the study (Mahar, Murphy, Rowe, Golden, Shields & Raedeke, 2006). The effects of the Wii Game on engagement and peer interactions could very well be correlated to the implications of previous studies revolving around movement and attention because the students were moving and dancing to the Wii game, and then left to play. Each individual had an increase in their engagement, which could be due to the movement prior to interacting with toys and peers.

A noteworthy study on the use of "Affection Activities" (McEvoy, 1991) looked at increased social interactions of young children with disabilities. Affection activities are times when children with and without disabilities are reinforced for interacting with peers in an affectionate way during circle time, songs, and other structured settings (ie: laughing together,

tickling one another, putting an arm around a friend) as to increase social interactions during other times of day. The studies around affection activities have been very successful due to the fact that individuals with disabilities are exposed to potentially non-preferred things, such as interacting with peers, in a highly motivating way. Secondly, the individuals with disabilities were expected to demonstrate the target behaviors in the context of a game, rather than a task. The use of the Wii game in the classroom with children with autism was likely very preferred. Additionally, the participants in the study were using this motivating tool to play with their peers. Not only were they interacting in a fun and motivating way, as opposed to a task oriented way, but also their membership within the classroom was likely increased because they were in charge of a novel and exciting game, and being reinforced for playing it.

It is important to note that though the participants each had an increase in engagement and peer interactions, that the researcher cannot conclude that there is a causal connections between the Wii and peer interactions and engagement. Because the school year was progressing and students were continually being taught social skills and how to appropriately engage with a variety of materials, it is just as likely that the students were maturing as learners. A way to test this would be to reverse back to baseline. If the students had a decrease in both areas, we could make connections directly between the Wii and peer interactions and engagement, but if not, we will continue to note that there is a connection yet not a causal relationship.

Two of the three participants had a decrease in teacher behavior (initiations, comments and directions from teachers in the room) subsequent to Wii intervention. Participant 1, on the other hand, had a significant increase in teacher behavior. One conclusion that can be drawn from this data is that the teachers in the classroom knew the study was taking place, and perhaps they were trying harder to facilitate interactions between participant 1 and his peers, thus,

interacting with him more than usual. Also, related service staff was pushed into the preschool classroom 1 day per week during the study. On day 2 of intervention for participant 1, he was working with an Occupational Therapist using the Ipad for 75% of the 10-minute session. Because of this increase in teacher behavior, we cannot conclude that the Wii was effective because he had so much teacher support during intervention. As for the other two individuals, they often engage in repetitive play plans (building a tower, and knocking it down, over and over again). Post Wii playing, their appropriate engagement with materials and peers went up, so perhaps due to the increased engagement, adults in the room felt less inclined to intervene and interact with the individuals.

A momentary time sample was used to code procedural fidelity. Every 10 seconds the researcher looked up and coded whether or not the individual was actively engaged in the game (imitating the actions, moving with the game, doing what the peer they were playing with was doing). The momentary time sample often underestimates the total occurrences of the target behavior because the behavior is only coded once in an interval, not for the seconds between and leading up to an interval (ie: a ten second interval is only coded on the 10^{th} second, not on seconds 1-9, even if the behavior is happening). In this case, the participants could have been playing the Wii for 9 of the 10 seconds before the researcher looked up, and then stopped. For all three participants, they were always watching the Wii ("eyes on the action") or watching their peer. However, they were not always imitating the individual on the screen (e.g., Dora the Explorer) and doing the actions.

The strengths of this study include the concept that teachers can use technology as a tool to increase peer interactions and engagement in their students within the classroom setting. It is convenient that it was a free choice activity, and it is fun for the students.

The limitations of this study include that this study took place within my preschool classroom. If I were to do this study again, I would do it in a classroom *other* than one I teach in. I think there is an intrinsic bias to a teacher collecting data on students she knows well. Also, switching from the educator to researcher role midway through the school day was a challenge.

Having the Wii in the classroom was exciting, but it was only used during the times when this study was being taken place. I think for next time, the Wii should be a free choice activity for all students at all free choice times. This way, when it is on, it isn't such a distraction for students.

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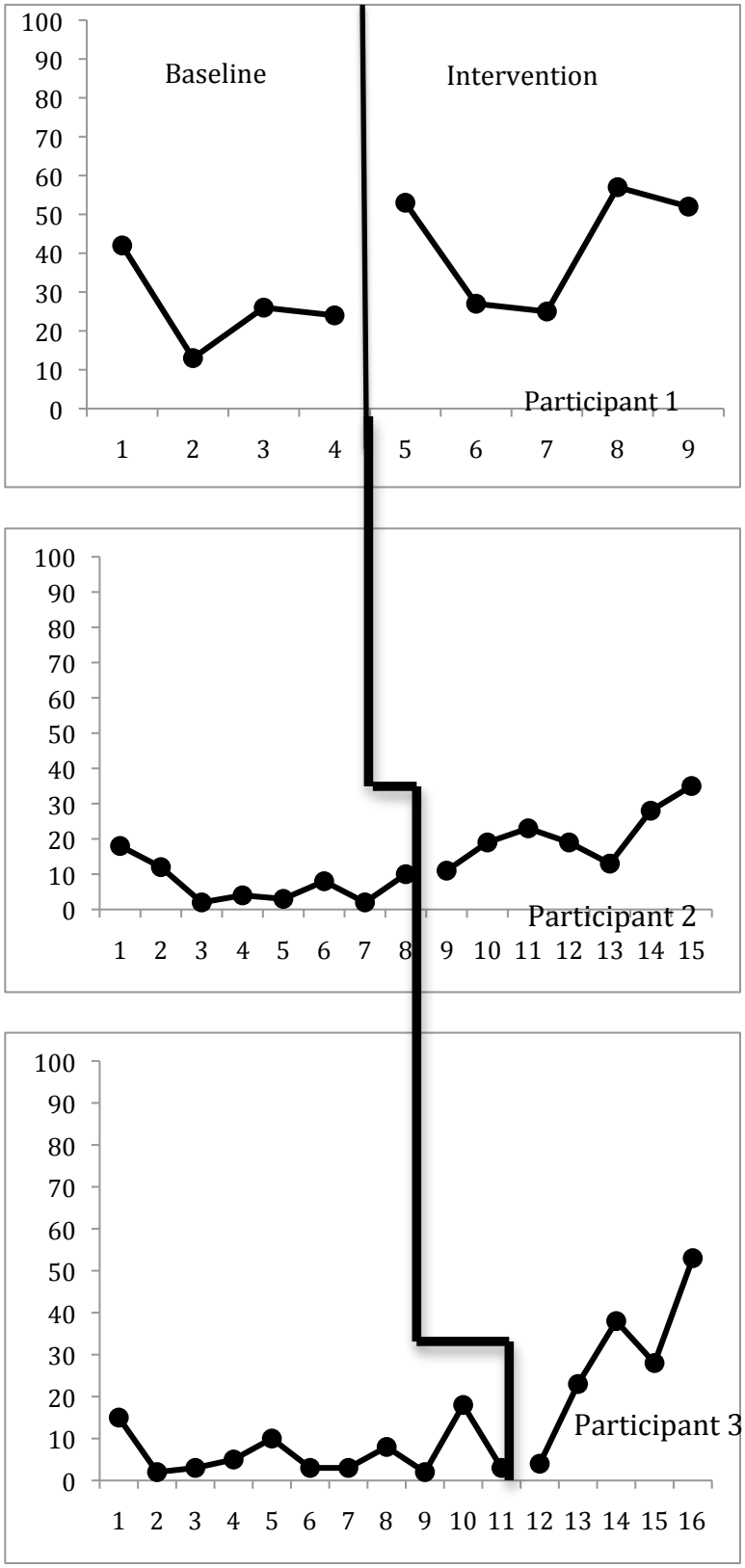
Figure 1


Baseline
Intervention
Participant 1
Participant 2
Participant 3