THE IMPACT OF A VISUAL ACTIVITY SCHEDULE FOR TEACHING SWIMMING TO CHILDREN WITH DISABILITIES

by

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Abstract

As a physical activity, swimming has many sociological and safety benefits (Brenner, Saluja, & Smith, 2003; Rogers, Hemmeter, & Wolery, 2010). Past research has investigated different methods for teaching swimming lessons to children with autism and other developmental disabilities (Jull, 2012; Pan, 2010; Pan, 2011; Rogers et al, 2010; Yilmaz, Birkan, Konukman, & Yanardag, 2010). However, no research to date has specifically examined the impact of a visual activity schedule (VAS) during swimming lessons. Moreover, the focus of past research has been mainly on 1:1 instruction, rather than group instruction. The purpose of this study was to determine the effectiveness of a VAS in a group swimming lesson. Three participants with autism and other developmental disabilities participated in 14 30-minute group swimming lessons taught by a qualified instructor. A single-subject reversal (ABAB) design was used to examine the effect of VAS on child cooperation. Skill acquisition was assessed by comparing the videos from the beginning and the end of the study. Social validity was assessed by surveying participants' parents about the perceived effectiveness of the VAS and their overall satisfaction with the program. The results showed no significant difference in child cooperation among the three participants between baseline and VAS phases, primarily because compliance was high for all three children during baseline. However, skill acquisition was observed across all three participants. In terms of social validity, all parents reported that they were satisfied with the way the study was conducted as well as the progress they saw on their child. The results are explained with reference to instructor training, generalized compliance, and the impact of group intervention.

Preface

This thesis is an unpublished, original intellectual product of the author, B. Larryant. The project's method was approved by the University of British Columbia's Research Ethics Board (certificate #H13-02033).

The identification of the research topic and the design of the study were the product of the collaboration between the author, B. Larryant, and his thesis supervisor, Dr. P. Mirenda. The author implemented the intervention throughout the study with supervision from Dr. Mirenda. The data were analyzed by both the author, B. Larryant, and a research assistant, L. Service.

The visual activity schedule board used during data collection was based on one created by S. Jull from a previous study. The picture symbols used in the study were designed and created by the author.

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CHAPTER 1: REVIEW OF THE LITERATURE

This chapter reviews the literature on motor planning issues and autism spectrum disorder (ASD); the benefits of physical activity, particularly swimming; the current research on swimming lessons and ASD; and research on the effectiveness of visual activity schedules (VAS).

Motor Deficits and Health Risks Associated with Autism Spectrum Disorder (ASD)

Motor Deficits Associated with ASD

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) defines ASD as a disorder that affects social communication skills and repetitive patterns of behaviors, interests, or activities. In addition to these characteristics, research suggests that many individuals with ASD also have motor impairments, such as hypotonia, motor apraxia, reduced mobility, and gross motor delay (Ming, Brimacombe, & Wagner, 2007). For example, Dziuk et al. (2007) asked 47 high-functioning children with ASD and 47 typically developing children to complete basic motor skills assessments. The result showed that children with ASD exhibited significantly increased signs of apraxia and dyspraxia – the inability to perform skilled motor tasks despite having normal motor dexterity – in comparison to the control group. Similarly, Dewey, Cantell, and Crawford (2007) showed that children with ASD, attention deficit hyperactivity disorder (ADHD), and developmental coordination disorder (DCD) demonstrated significant motor coordination impairments. However, only children with ASD in this study demonstrated significantly more errors in imitation tasks and responding to commands. Additionally, Rinehart et al. (2006) explored movement kinematics in individuals with high-functioning ASD and discovered that both impaired motor preparation and imitation skills present in the study sample. They noted that

these impairments might express themselves as either motor clumsiness or abnormal posturing. While none of these impairments are used for diagnostic purposes, they have been categorized as "associated symptoms" that may require intervention.

Health Risks and ASD

In addition to motor impairments, individuals with ASD also face health risks that may be associated with reduced activity levels. Ho, Eaves, and Peabody (1997) assessed the eating habits of 54 children with ASD and found that less than 10% of the children met the recommended daily nutrient intake. Additionally, half of the children in the study were found to be obese, with half of these having low levels of physical activity. Curtin, Anderson, Must, and Bandini (2010) analyzed data collected from the National Survey of Children's Health to compare the prevalence of obesity in children and adolescents with ASD with typically developing children. They found that the rate of obesity in individuals with ASD (30.4%) was significantly higher than the rate in typically developing individuals (23.6%). Stewart et al. (2009) found similar rate of obesity (36%) in the population of individuals with intellectual disability in United Kingdom.

Benefits of Physical Activity

A growing body of research has been conducted to examine physical exercise as a way to improve motor skill deficiencies and reduce obesity-related health risks in individuals with ASD (Sowa & Meuloenbroek, 2012). Physical exercise has been shown to produce benefits such as a decrease in stereotypic behaviors, aggression, and off-task behaviors; improvements in attention span and work performance (Lang et al., 2010; Rosenthal-Malek & Mitchell, 1997); and improved social behaviors (Pan, 2010; Sowa & Meulenbroek, 2012). In addition, Smith and Patterson (2012) described many of the health benefits of physical activity, including improved

cardiovascular fitness, higher levels of muscular endurance, reduced body fat, improved coordination, overall good health, and longer life expectancy. Moreover, teaching basic motor skills to individuals with ASD – such as throwing ball, kicking a ball, or jumping – can open doors to a number of related activities in which these individuals might be able to participate throughout their lives. Participation in physical activity also enables children and families with ASD to be a part of their communities which, in turn, can lead to opportunities for children to generalize intervention targets to novel, functional settings, leading to increased independence. All of these benefits suggest that further research into different of physical activity as an intervention is warranted.

Advantages of Swimming as a Physical Activity

One type of physical activity that has been of interest to researchers in the past is swimming. The popularity of swimming as the physical activity of choice can be explained by its numerous desirable characteristics. There are many health benefits associated with swimming, including improved cardiovascular performance, increased muscle tone and muscle strength, reduced stress, increased mobility, and the potential for weight reduction (Smith & Patterson, 2012). In addition, Rogers, Hemmeter, and Wolery (2010) described a number of sociological benefits associated with swimming. First, it is an age-appropriate activity for individuals across the age range, so individuals with ASD can participate in this activity throughout the course of their lives. Second, swimming tends to occur in an enclosed area (i.e., a pool) which, with proper supervision, makes it a safe activity for most people. Third, swimming can be performed appropriately as an individual activity, such as swimming laps; or as a group activity, such as water polo. This provides individuals with ASD opportunities to either engage in the activity alone or to use swimming as a context for practicing and developing social skills. Finally,

swimming is a safety skill that everyone should have, including individuals with ASD. Brenner, Saluja, and Smith (2003) conducted a review of the current evidence to see if there was a relationship between swimming ability and the risk of drowning. They reviewed data collected by the Canadian Red Cross in 1998 and found about 31% of recreational drowning victims aged 15 years or older were reported to be weak or non-swimmers, with the rest being average to strong swimmers. A study of 111 childhood drowning and serious non-fatal immersions (i.e., immersions in which respirations were compromised and the child was hospitalized) found that about 30% of the drowning incidents in children aged 16 years and younger happened among children who were able to swim. The authors suggested that there seemed to be a relationship between increased swimming ability and decreased risk of drowning, though further research is necessary.

Research on Teaching Swimming to Individuals with ASD

A number of methods have been proposed to teach aquatic skills to individuals with ASD. Rogers et al. (2010) utilized a constant time delay procedure to teach a number of swimming skills to three children with ASD. In this study, a 4-second delay was inserted between the delivery of instruction and delivery of a prompt during teaching. The procedure was used to teach foundational swimming skills, including the flutter kick, front crawl, and breathing on the side. The study showed that constant time delay was a viable instructional method to teach swimming skills to children with ASD in an almost errorless fashion. Moreover, the study collected anecdotal data from participants' parents, who reported an increase in language across all participants. Similarly, Yilmaz, Birkan, Konukman, and Yanardag (2010) used a most-to-least prompting procedure to teach simple swimming skills (Halliwick's Method) to three children with ASD. The procedure employed a progression of physical prompts to gestural prompts to

verbal prompts, and was effective for teaching skills that were maintained up to 4 weeks after instruction was terminated.

Pan (2010) implemented a comprehensive water exercise swimming program (WESP) aimed at teaching aquatic skills to children with ASD. In this study, 16 boys between the ages of 6 to 9 participated in a 10-week swimming program based on the Halliwick Method, which consists of five distinct stages: Mental Adjustment, Introduction to Water Environment, Rotations, Balance and Controlled Movement, and Independent Movement in Water. Each class lasted 90 minutes and included floor activities, 2:1 instruction (i.e., two children for every one instructor), group instruction, and cool-down activities. The structure of the lesson was designed to teach aquatic skills as well as to promote social interactions among the children. The study showed that the program was successful in teaching aquatic skills to children with ASD. While the study reported no significant increase in social competence behaviors, it showed a significant decrease in antisocial behaviors across all participants.

In 2011, Pan replicated this study using a 14-week aquatic program involving 15 children with ASD and their typically developing siblings. The aim of the program was to determine its efficacy in improving overall physical fitness as well as developing aquatic skills in both children with ASD and typically developing children. Participants' gains in aquatic skills were measured using the four-stage Humphries Assessment of Aquatic Readiness (HAAR). In order to determine the physical fitness level of the participants, the study measured their Body Mass Index (BMI), percent of body fat, the number of curl ups they could perform in both 30 and 60 seconds, the distance they were able to reach with their arms while sitting down, and the number of repetitions they were able to complete in a 16-meter shuttle run (i.e., running back and forth between two markers, 16 meters apart). The study found that the aquatic program was effective

in significantly increasing both basic aquatic skills and physical fitness in both children with ASD and typically developing children.

Most recently, Jull (2012) trained community swim instructors to support children with ASD during swimming lessons. In this study, the community swim instructors participated in a staff training package comprised of a 3-hour workshop followed by a 2.5 hours of hands-on in-pool practice. The training focused on seven instructional components, including using visual supports, maintaining a one meter distance from the child, capturing children's attention prior to instruction, using clear and concise instructions, providing prompts after 3-4 seconds of non-responding, using praise for attempts to respond correctly, and building rapport. Eight children between the ages of 5 to 9 participated in the program. The results indicated that the community swim instructors learned to use the instructional components with fidelity; and that participants showed increased cooperation as well an increase in the number of aquatic skills acquired.

Limitations of Current Research

Although several studies have been conducted to examine various approaches to swimming instruction for individuals with ASD, gaps remain in the body of research to date. In a recent meta-analysis of 16 behavioral studies across a total of 133 participants with ASD, Sowa and Meuloenbroek (2012) compared the outcomes of both group and individual interventions aimed at increasing physical activity. They noted that individual interventions allow programs to be designed to meet a participant's specific needs and may reduce the likelihood that learners with ASD will face negative appraisals from others. They also noted that, because group interventions are less predictable, they might cause increased stress for individuals with ASD. Not surprisingly, the results of their meta-analysis suggested that individual programs resulted in more improvement in the motor domain, compared to group interventions. Surprisingly, their

results also indicated more improvement in the social domain following individual interventions; however, the authors noted that "in the eight studies…categorized as group interventions, it was not always clear whether there actually were any meaningful social interactions between the participant with ASD and (one or more of) his/her other team or staff members" (p. 56).

While private lessons that offer individualized attention may be available to some children, they come with a significant cost. For example, the city of Vancouver (2012) offers group lesson at a cost of $60.00 to $80.00 per lesson set (i.e., 8-12 classes), while private lessons cost approximately $28.00 per class (i.e., $100.00-$300.00 per lesson set). Many families simply cannot afford this additional expense. In combination with the review by Sowa and Meuloenbroek (2012), this suggests the need for research that specifically examines swimming instruction in group settings.

Visual Activity Schedules

One of the components of the staff training package described by Jull (2012) was the inclusion of a visual activity schedule (VAS). Anecdotally, several instructors in this study commented that they believed that the VAS was the most effective and most important part of the instructional package. This perception was reinforced in a review conducted by the National Autism Centre (NAC, 2009), which endorsed VASs as an "established" practice for use with individuals with ASD. According to the NAC, schedules are particularly effective because they allow individuals with ASD, who often have difficulties dealing with unpredictability, to prepare themselves for future events. Overall, NAC's assessment provided evidence that VASs are (a) effective for children aged 3-14 years of age; (b) associated with favorable outcomes for individuals with ASD; and (c) shown to help improve self-regulation skills.

Subsequent to the NAC review, Lequia, Machalicek, and Rispoli (2012) conducted a systematic review of the literature across 18 studies that examined the effectiveness of VASs for decreasing disruptive behaviors in children with ASD across different situations. One of the studies incorporated a participant diagnosed with both ASD and ADHD. Four studies showed that VASs were effective in increasing self-regulation. Three studies endorsed the effectiveness of VASs for promoting child independence while simultaneously decreasing disruptive behaviors. Seven studies showed the effectiveness of VASs for decreasing disruptive behaviors during transition periods between activities or settings. Finally, four studies examined the effectiveness of VASs aimed at decreasing disruptive behaviors during play and found that they were effective in doing so. The review also looked at the implementation of VASs across different settings and found that they were effective in both home and school settings. Overall, the review supported the conclusion that VASs are effective in decreasing disruptive behaviors across a wide range of contexts.

In a related review, Banda and Grimmett (2008) reviewed 13 studies investigating the use of VASs with persons with ASD, focusing on improving social interaction skills, transition behaviors, and decreasing problem behaviors. Four out of 13 studies found an increase in on-task behaviors as a result of VAS implementation for 10/10 participants. Four studies examined the use of VASs to increase appropriate transition behaviors of five participants and again found unanimous improvements. Three studies investigated the effectiveness of VASs for increasing social interaction skills and found an increase in social initiation, improvements in social engagements, and play behaviors for all seven participants. Three studies used VASs to increase independence and showed an increase in this variable for 10/10 participants during performance of work routines, daily living skills, or play skills.

Koyama and Wang (2011) conducted a review of 23 studies that examined the effectiveness of VASs to promote independence in individuals with intellectual disabilities, three of whom were also diagnosed with ADHD. The most common variable measured among the studies in the review was engagement/on-task behavior. Engagement/on-task behavior was defined as participants engaging in a planned activity or task as described in on the schedule. Fifteen studies measuring this variable showed that activity schedules were successful in increasing the rate of engagement/on-task behavior. The review also demonstrated that activity schedules were successful in reducing prompt dependency and thus increasing independence, among many of the participants.

Bryan and Gast (2000) conducted a study investigating the effectiveness of a teaching package that incorporated graduated guidance and VASs to teach young students with autism to increase on-task and on-schedule behavior. The result of the study showed that graduated guidance was successful in teaching the students how to use the VASs to increase their on-task behavior. The study also demonstrated that the presence of a VAS was successful in maintaining high level of on-task behaviors, and that its removal decreased the level of on-task behaviors significantly.

It seems clear from these systematic reviews, in combination with the endorsement from the NAC (2009), that VASs are an evidence-based practice for individuals with ASD. However, only one unpublished study to date has specifically examined the effectiveness of VASs during physical activity routines. In that study (a doctoral dissertation), Fittipaldi-Wert (2007) investigated the use of VASs for students with ASD in inclusive physical education. Dependent variables included on-task behaviors, off-task behaviors, and the amount of assistance required by each of four participants in an elementary school. The VAS employed line drawings or words

to depict the sequence of activities in each session (e.g., jumping jacks, bowling, etc.) as well as general commands (e.g., stand, throw, etc.). The study showed an increase in on-task behaviors, a decrease in off-task behaviors, and a decrease in the amount of assistance required across all four participants.

Statement of the Problems and Research Question

A number of methods for teaching swimming to children with ASD have been examined in previous research, including most-to-least prompting (Yilmaz et al., 2010) and constant time delay (Rogers et al., 2010). Based on these studies and others, Jull (2012) developed a multi-component training intervention designed to teach swimming instructors how to provide community-based swim lessons to children with ASD. Five of the six instructors in Jull's study – as in most of the other swimming studies to date – provided lessons to only one child per session. This instructor:child ratio is not sustainable in most community swimming programs, where group lessons -- with ratios ranging from 3:1 to 6:1 -- are more readily available. In addition, most community pools do not have access to the somewhat time-consuming staff training such as that provided by Jull (2012). Thus, there is a need for simple, efficient instructional supports that can be used by swimming instructors to provide effective instruction to children with ASD and other developmental disabilities in group lessons.

In past research, VASs have been shown to be effective in helping children with ASD improve on-task behaviors, increase independence, and decrease disruptive behaviors (Banda & Grimmett, 2008; Lequia et al., 2012; NAC, 2009). In addition to being effective, VASs are also simple, efficient, and readily adaptable to a wider range of contexts and situations. Several instructors in Jull's study identified the use of a VAS as key to successful outcomes; however, the design of that study prevented examination of VASs in isolation of the other elements of the

training package. In fact, no research to date has examined the impact of a VAS to increase cooperation by children with ASD or other developmental disabilities during group swimming lessons taught by an experienced swim instructor. This study was designed to address this need by answering the following question: Is there a functional relation between the use of a VAS during group swimming lessons (three children with developmental disability to one instructor) and an increase in child cooperation following the delivery of instruction? A secondary question was: To what extent can children with developmental disabilities acquire independent swimming skills when taught in a small group format? Finally, the study also assessed social validity from the perspective of participants' parents.

CHAPTER 2: METHOD

Recruitment and Participants

Recruitment

Three children were invited to participate in the study. In order to be eligible, the children had to be:

(a) diagnosed with ASD, Down syndrome, or another developmental disability that does not involve a significant physical impairment requiring 1:1 physical support in the pool, such as severe cerebral palsy;

(b) between 4 to 8 years of age;

(c) able to tolerate physical touch and physical guidance by the instructor;

(d) at a beginning level of swimming instruction; and

(e) able to learn safely in a class where there is one adult per three children.

Children who met the criteria were excluded if they showed evidence of:

(a) fear of water such that they were unwilling to enter a pool; and

(b) serious problem behavior, such as aggression or self-injurious behaviors, in community recreation settings.

The children were recruited through the City of Vancouver Adapted Aquatics program. The program coordinator was informed of the purpose of the study, the basic procedures that would be used, and the inclusion and exclusion criteria for participants. When eligible children registered for the program, Ms. Joseph distributed a recruitment notice (Appendix A) to their parents. If a parent indicated that he or she was interested in having his or her child participate in the study, the researcher met with the parent and child, discussed the study in detail, and – if the

child met all the inclusion criteria and none of the exclusion criteria – invited them to participate and provided a consent form (Appendix B).

Participants

All participants' names are pseudonyms.

Edward was a 6-year-old boy who was diagnosed with ADHD and was taking medication to help control it. At the onset of the study, he was being seen for suspected ASD; however, he did not receive this diagnosis. Edward was attending a public school on a part-time basis and was placed in a grade 1 classroom with support. Edward communicated verbally in full sentences. He had never participated in swimming lessons prior to the study. Edward attended 13 out of 14 swimming lessons during the study; he missed one session to a death in the family.

Amanda was a 6-year-old girl diagnosed with Prader-Willi syndrome. She was enrolled in a regular grade 1 classroom at a public school with the support of an aide. Amanda communicated verbally in full sentences. Prior to the start of the study, she had participated in private swimming lessons at a community pool for approximately one year. Amanda attended 13 out 14 swimming lessons during the study; she missed one session when her family went on vacation.

Kevin was a 5-year-old boy diagnosed with ASD. At the time of the study, Kevin was enrolled in a regular kindergarten classroom at a public school with the support of an aide. Kevin was able to communicate in full sentences and also exhibited some vocal stereotypy. Prior to the study, he had been enrolled in an adapted aquatic program with a one-to-one instructor to student ratio. Kevin attended all 14 swimming lessons during the study.

Setting, Personnel, and Materials

Setting

In total, there were 14 30-minute lessons during the study (14 was the maximum number of lessons allowed by the Vancouver Parks Board, the community partner). All of the lessons were conducted at the Stan Stronge Therapeutic Pool in Vancouver (700 West 57th Avenue, Vancouver, BC). The shallow end of the pool was 1.0 meter (approximately 3 feet) deep, while the deep end of the pool was 1.5 meter (5 feet) deep. The pool also contained a pair of Speedo Aqua Steps (approximately 17 cm in height) in the shallow end that enabled two of the participants, Amanda and Kevin, to stand up safely in the water, which was over their heads. Edward was able to stand safely in the water unassisted. Amanda and Kevin remained on the island when they were not being asked to follow an instruction. Concurrent with the study, two additional private lessons (one child each plus instructor) were held in the other half of the pool opposite the study lessons.

Personnel

The three participants were instructed in a group by the researcher, who is a certified Red Cross Water Safety Instructor and a certified lifeguard (LIT, 201). Throughout the sessions, four volunteers were available at the side of the pool to ensure the participants' safety, as required by the community partner agency. The volunteers did not participate in the delivery of the instruction, but were available to assist a child if he or she left the pool area, slipped under the water, or was in danger in any way. During the course of the study, the volunteers never had to intervene with any of the participants. In addition, a volunteer filmed each swimming lesson using a Panasonic SDR-S26 camcorder in 704x480 resolutions. The resulting videos were viewed by the researcher, research supervisor, and research assistant for coding the data. Finally,

participants' parents attended every session and watched the lessons while seated on chairs on the pool deck.

Materials

The researcher incorporated equipment such as a pool "noodles," kickboards, and other swimming aids throughout the sessions, based on the interest and needs of each participant. In addition, a visual activity schedule (VAS) that was modelled after Jull (2012) was used during the intervention (B) phase of the study (Appendix C). The VAS was placed on the pool deck next to the class, so that it was easily accessible by the instructor. The instructor also wore an Adidas Training Reversible Headband on which he placed a picture symbol (with Velcro on the back side) corresponding to each activity in which the participants were engaged (Appendix D).

Measurement

The study investigated child cooperation as its primary dependent variable. Two secondary variables, skill acquisition and social validity, were also assessed. The variables were modelled after the variables assessed in Jull (2012).

Child Cooperation

Child cooperation was defined as the child attempting to perform an action within 3-4 seconds, following the first request by the instructor. The attempt had to bear some resemblance to the action requested by the instructor but did not have to be 100% correct. For example, if the instructor asked the child to perform a front float for 5 seconds, but the child did it for only 3 seconds, the attempt was still marked as cooperation. The percent of child cooperation (i.e. the number of instructions followed after the first request, divided by the total number of instructions issued) was calculated for each child for every lesson.

Skill Acquisition

Swimming skill acquisition was assessed using the definitions provided in the Red Cross Swim Kids 1 Class curriculum (Appendix E). Using these criteria, the researcher compared the swimming skills of each participant from the second and twelfth lessons of the study, to determine whether the participant was able to perform each part of a skill independently. If the participant was able to complete all of the parts of a specific skill correctly and independently, the skill was considered completed. Skill levels were assessed during the second because the first lesson was used primarily as a pairing (i.e., rapport building) session between the instructor and the participants. The twelfth lesson was chosen to determine the post-intervention skill level of each participant because one of the participants, Edward, was scheduled to be absent on the thirteenth lesson and the researcher wanted to present the skill results to participants' parents on the fourteenth (final) lesson.

Social Validity

The researcher assessed the social validity of the study using a survey that was completed by the participants' parents at the completion of the study. The survey consisted of a number of statements that were scored on a Likert-type scale from 1 to 5, evaluating the parents' opinions about (1) how the instructor used the VAS; (2) the perceived effect of VAS on their child's cooperation; (3) whether or not their child was more focused with the VAS; (4) whether or not their child gained new swimming skills with the VAS; (5) the child's enjoyment of the swimming lessons with the VAS; (6) whether or not they would recommend using a VAS for future swimming lessons; and (7) their overall satisfaction with the study (Appendix F). The survey also consisted of open-ended questions for parents to provide specific feedback for the researcher as well as suggestions for future research in community setting.

Treatment Fidelity

To assess treatment fidelity, the researcher coded the intervention provided during each swimming lesson, using an instructor skills checklist that was created for each phase of the study (i.e., baseline and intervention; see Appendix G). Using the schedule in Table 1, the researcher viewed the appropriate participant's videotape to determine how many steps on the checklist were completed accurately for each activity. A treatment fidelity percentage for each lesson was calculated by adding the number of steps completed correctly divided by the number of correct plus incorrect steps, multiplied by 100. Altogether, treatment fidelity was calculated for 38.5% of lessons for both Edward and Amanda and 28.6% of lessons for Kevin, across all study phases.

Table 1 Treatment Fidelity and Inter-Observer Agreement Coding Schedule

	Baseline 1				Intervention 1				Baseline 2			Intervention 2		
Lesson	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Participant (A, E, and K)	E	A	K	E	A	K	E	A	K	E	A	K	A	E

Table 2 summarizes the treatment fidelity results.

Table 2 Treatment Fidelity Scores

Phase	Mean Treatment Fidelity (%)	Range (%)
Baseline 1	96.0	94.8 – 97.6
Intervention 1	94.1	90.6 – 95.7
Baseline 2	93.2	91.7 – 94.4
Intervention 2	96.4	96.0 – 96.8

The scores in Table 2 indicate an acceptable level of instructor fidelity (i.e., greater than 80%) across all phases of the study.

Inter-observer Agreement (IOA)

Child cooperation. To determine the IOA for child cooperation, the researcher adopted the coding procedure developed by Jull (2012), and practiced the procedure using videotapes that were not associated with the present study. The researcher then trained a research assistant (RA) to use the same procedures until the RA was able to code with 90% accuracy (compared to researcher codings) over three consecutive videotapes. The researcher coded all swimming sessions for child cooperation, and the RA independently coded a proportion of the sessions across all phases, using the coding schedule in Table 1. Thus, the RA coded 5 out of 13 sessions (38.5%) for Edward and Amanda and 4 out of 14 sessions (28.6%) for Kevin. IOA was calculated by dividing the number of agreements between the researcher and the RA by the number of agreements plus disagreements, multiplied by 100. Table 3 summarizes the IOA scores for child cooperation.

Table 3 IOA for Child Cooperation

Participant	Baseline 1 (%)	Intervention 1 (%)	Baseline 2 (%)	Intervention 2 (%)
Edward	88.6	100	94.1	100
Amanda	93.8	100	100	100
Kevin	100	100	100	100

IOA scores for child cooperation were acceptable (i.e. > 80%) for all three participants across all phases of the study.

Skill acquisition. IOA for skill acquisition was not measured because the research assistant was not trained as a Water Safety Instructor and thus, could not accurately assess the progress of each participant.

Treatment fidelity. To determine the IOA for treatment fidelity, the RA independently coded the videotapes selected for this purpose, using the same checklists that were described previously. The researcher then compared the treatment fidelity percentages for each activity between the two codings. IOA was calculated by adding the number of agreements between the two codings and then dividing the result by the sum of agreements plus disagreements, multiplied by 100. Table 4 summarizes the IOA scores for treatment fidelity.

Table 4 IOA for Treatment Fidelity

Phase	Mean IOA (%)	Range (%)
Baseline 1	91.4	86.7 – 93.3
Intervention1	90.7	84.6 – 92.9
Baseline 2	91.1	85.7 – 100
Intervention 2	90.6	85.7 – 93.3

IOA scores for treatment fidelity were acceptable (i.e. > 80%) across all phases of the study.

Research Design

The study used a single-subject-reversal design with replication across three children to determine the effect of the independent variable on the dependent variable. The design had two phases: baseline and intervention. These two phases were repeated once to create an A-B-A-B design, where A represented baseline and B represented the intervention phase. The first baseline and intervention phases consisted of four lessons each and the second set of A and B phases consisted of three lessons each, for a total of 14 lessons (the maximum number of sessions that were available for the study at the Stan Stronge Pool). This arrangement was selected in order to maximize the time spent in the first baseline and intervention phases. The reversal process was

appropriate for the study because child cooperation was not taught directly and this could be expected to vary with the introduction and removal of the VAS.

Procedure

Baseline (A)

During baseline (4 sessions), the instructor taught the group using procedures that are commonly employed by experienced swim instructors. This included keeping a child within arm's length and delivering an instruction only when the child was paying attention. The instructional procedure was as follows: First, the instructor made a verbal request (e.g. "blow bubbles"). If the child complied within 3-4 seconds, the instructor delivered verbal praise. If the child did not comply, the verbal request was reissued and praise was delivered if the child complied. If the child still did not comply, the instruction was delivered a third time, along with a physical prompt to assist the child to perform the target action. Verbal praise was delivered even if the third request and a prompt were required. This cycle was repeated as necessary for every instructional unit.

Intervention (B)

During the first intervention phase (4 sessions), the instructor introduced the VAS, which was placed on the pool deck next to the class. Prior to each lesson, the instructor set up the activities for the lesson, using Picture Communication Symbols (PCS; Mayer Johnson, LLC, 1981-2008) or other pictures that were placed on the VAS. At the beginning of each lesson, the instructor reviewed the VAS with the children by bringing them to the VAS, pointing at each picture, and labeling each one. Then, for each activity, the instructor placed the related symbol from the VAS on his headband (see Appendix D) and then followed the identical instructional procedure described previously for baseline.

Baseline 2 (A)

Baseline 2 (3 sessions) was identical to the initial baseline phase and differed from the first intervention phase with regard to the absence of the VAS only.

Intervention 2 (B)

This phase (3 sessions) was identical to the first intervention phase. In addition, during the twelfth lesson in this phase, the instructor conducted a skill assessment to determine which skills, if any, were mastered by each participant. During this phase, the social validity survey was also distributed to participants' parents for completion.

Data Collection and Analysis

All lessons were videotaped by a volunteer. The researcher used the videotapes to code for both child cooperation and skill acquisition for each child, as well as the treatment fidelity of the study. The RA used the videos to code for child cooperation and treatment fidelity IOA. The impact of the intervention on child cooperation was assessed by the change in the percentage of cooperation across phases. The impact of the study on skill acquisition was determined by comparing the video from the second and twelfth sessions to determine which skills each child was able to perform independently.

CHAPTER 3: RESULTS

In this chapter, I will summarize the results of the study for each participant in terms of child cooperation and skill acquisition. I will also summarize the result of the parents' social validity survey.

Child Cooperation

Figure 1 displays the results for child cooperation for Edward.

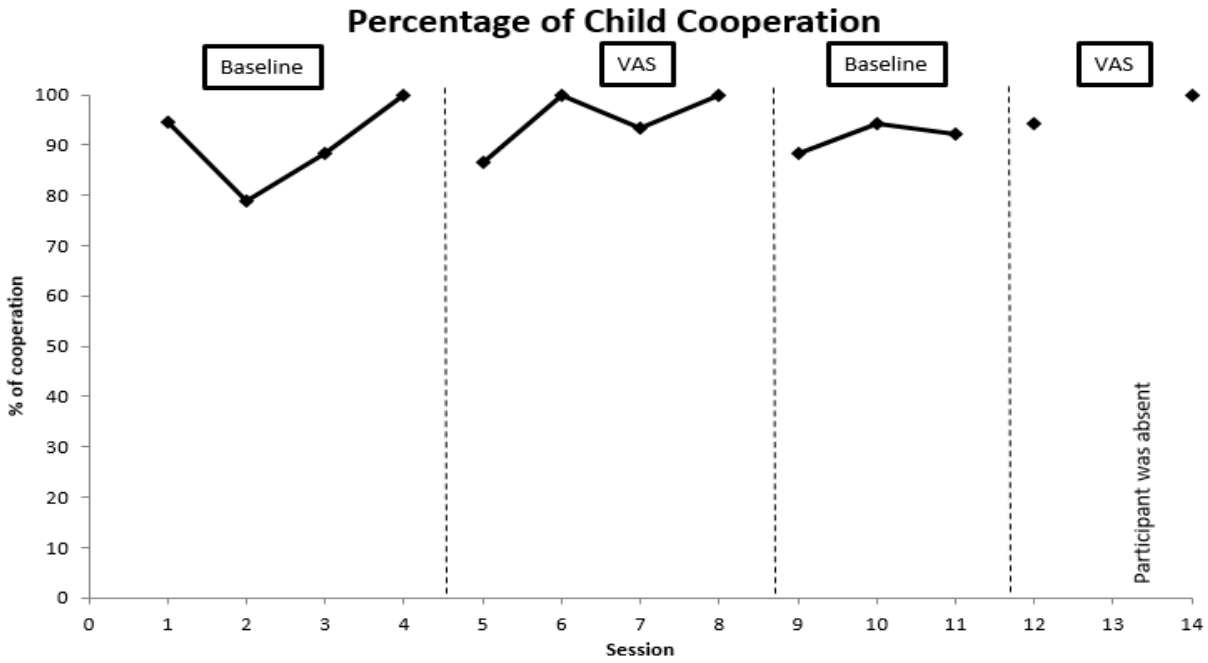

Figure 1. Percentage of child cooperation across baseline and intervention phases for Edward.

Edward showed a high level of cooperation, responding to a mean of 90.4% (range = 78.9% - 100%) of instructions during the first baseline phase. There was no noticeable change in level during either the first intervention phase (mean = 95%, range = 86.7% - 100%), the second baseline phase (mean = 97.1%, range = 94.1% - 100%), or the second intervention phase (mean = 91.6%, range = 88.2% -94.1%). However, there was a decrease in variability across the four

phases, with a percentage difference of 21.1% during the first baseline and 13.3% (a 7.8% reduction in variability) in the first intervention phase. During the second baseline phase and the final intervention phase, there was a percentage difference of 5.9% (a 7.4% reduction in variability), with no change across these two phases. In terms of trend, there was a slight upward trend across all four phases. However, there was no evidence of a functional relationship between the use of the VAS and child cooperation for Edward.

Figure 2 displays the result for child cooperation for Amanda.

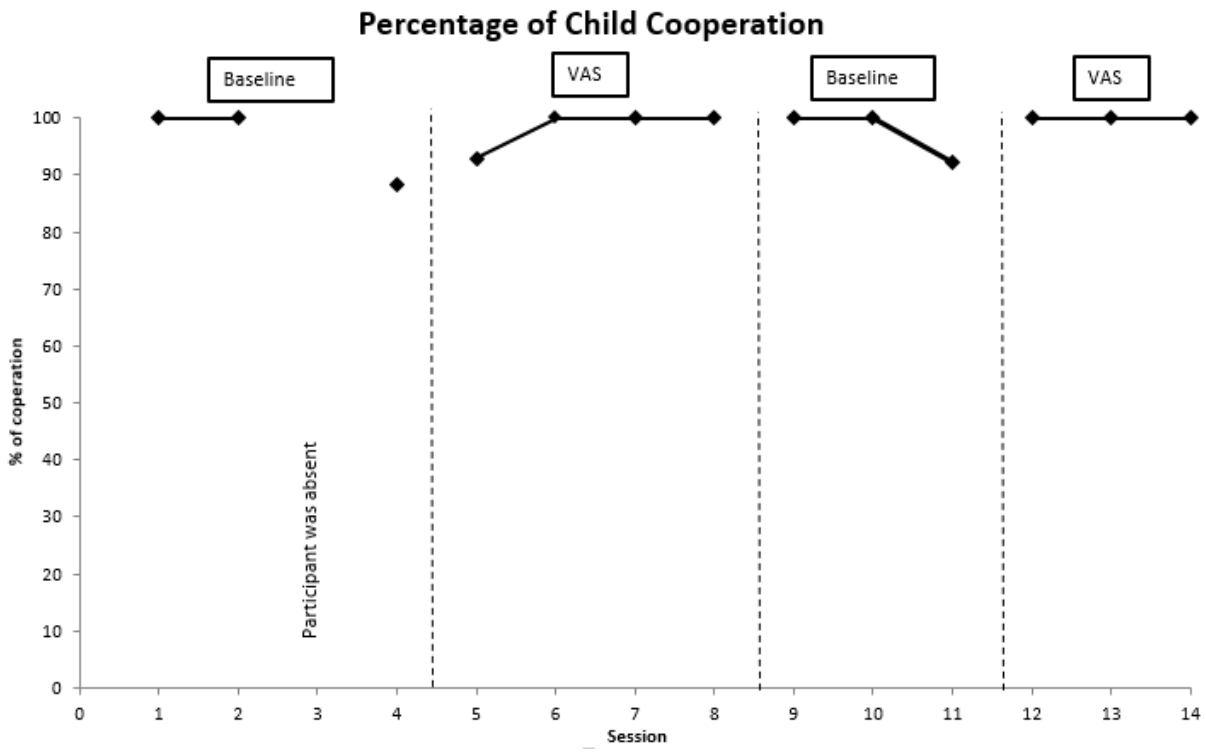

Figure 2. Percentage of child cooperation across baseline and intervention phases for Amanda

During the first baseline phase, Amanda showed a high level of cooperation, with a mean of 96.1% of instructions followed (range = 88.2% - 100%). Similar levels of cooperation were also observed during the first intervention phase (mean = 98.2%, range = 92.9% - 100%); the

second baseline phase (mean = 97.4%, range = 92.3% - 100%); and the final intervention phase (mean = 100%). There was minimal change in level and variability across the four phases, and there was no change in the trend of the data. There was no evidence of a functional relationship between the use of the VAS and child cooperation for Amanda.

Figure 3 displays the results for child cooperation for Kevin.

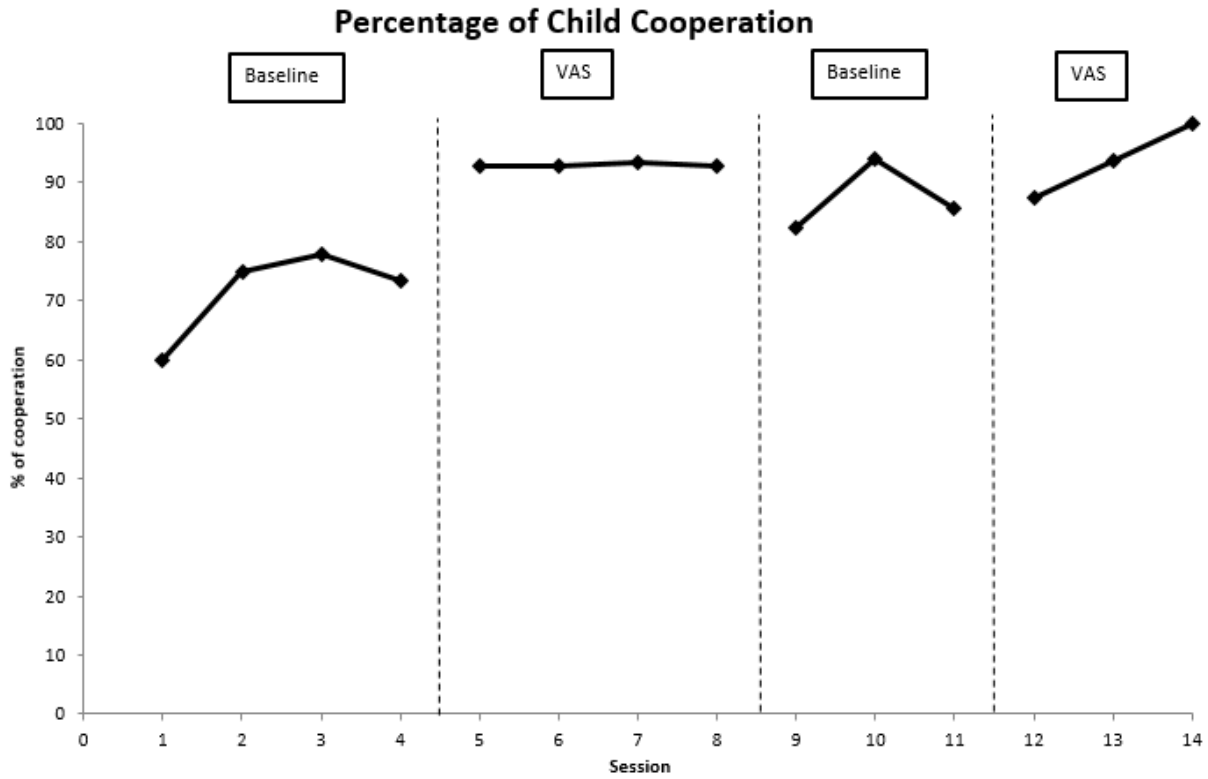

Figure 3. Percentage of child cooperation across baseline and intervention phases for Kevin

During the first baseline phase, Kevin showed a moderate level of cooperation (mean = 71.5%, range = 60% - 77.8%), with a slight upward trend. During the first intervention phase, the mean level of cooperation was 93.0% (range = 92.9% - 93.3%), with a variability of only 0.4%. This amounted to an increase of 21.5% in level and a decrease of 17.4% in variability between the first two phases. When the second baseline phase was introduced, there was a slight decrease in the level of cooperation (mean = 87.4%, range 82.4% - 94.1%), as well as an increase in

variability, with a percentage difference of 11.7%. However, one of the three data points overlapped with the data from the first intervention phase. Upon introduction of the final intervention phase, there was a slight increase in the level of cooperation, with an average of 93.8% (range = 87.5% -100%), a slight change in variability (a percentage difference of 12.5%), and an upward trend in the data path. Despite the change between the first and second baseline phases, the data did not provide evidence of a functional relationship between the use of the VAS and child cooperation for Kevin.

Skill Acquisition

Figure 4 shows the number of skills that were mastered by the three participants during the second and twelfth sessions of the study.

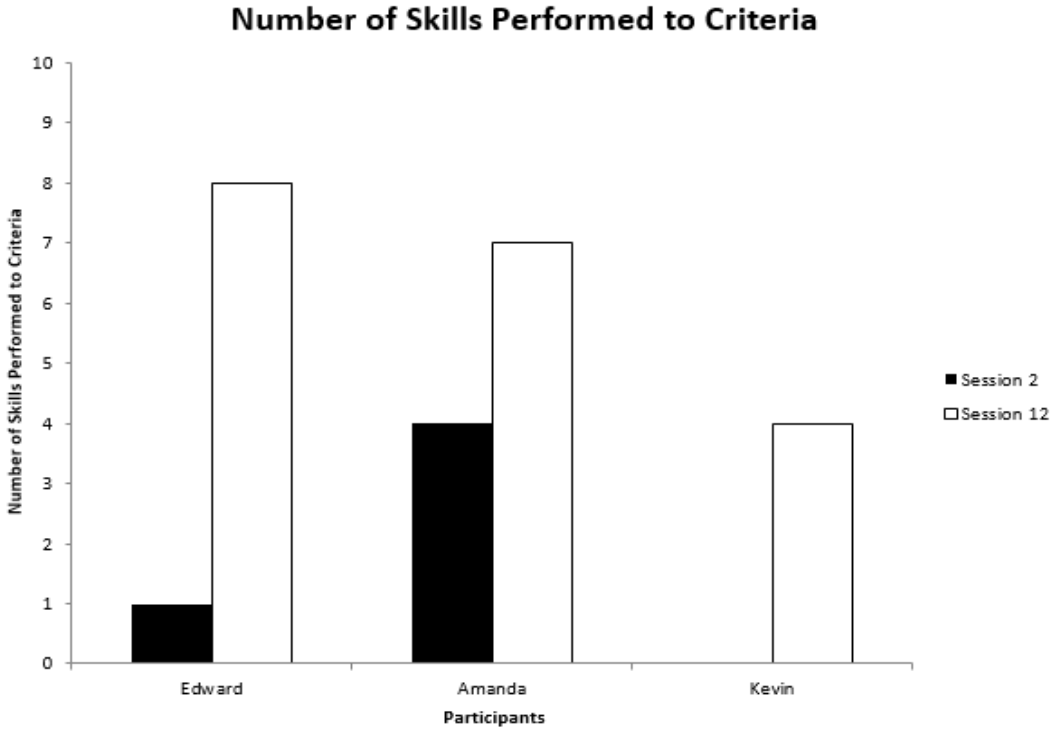

Figure 4. The number of skills Edward, Amanda, and Kevin were able to perform to criteria on the second and twelfth lessons.

As shown in Figure 4, all three participants acquired new swimming skills by the end of the study. Edward gained seven additional skills; Amanda gained three new skills; and Kevin gained four new skills by the end of study. Appendix H details the skills of participant during the second and twelfth lessons. There was evidence of an association between the instructional package and the acquisition of novel, independent swimming skills.

Social Validity

The results for social validity are summarized in Table 5.

Table 5 Parent Social Validity Scores

Statement	Average Score (1-5) (1= disagree; 5=agree)	Range of Scores (1-5) (1=disagree; 5=agree)
The instructor used the visual support appropriately.	5	5
My child cooperated more when the instructor used a visual schedule than when he did not.	3.67	3-4
The visual support helped my child stay focused during the lesson.	4	4
The visual support did not help my child learn new swimming skills.	3.67	3-4
My child enjoyed swimming lessons more when the instructor used the visual schedule than when he did not.	3	3
I would not recommend using a visual support for future swimming lessons.	2.67	1-4
Overall, I am satisfied with my child's progress during the lesson.	5	5

The results of the social validity survey indicated that parents agreed that the VAS was used appropriately during the study. The parents also believed that VAS helped their children to stay focused during the lesson. However, in their opinion, the VAS's impact on their children's cooperation, ability to learn new skills, and enjoyment of the lessons were in the neutral range. Two of the three parents indicated that they would recommend using a visual support for future lessons and all three indicated that they were very satisfied with their child's progress during the study.

CHAPTER 4: DISCUSSION

The purpose of this study was to investigate the impact of using a VAS for teaching swimming lessons to children with disabilities in a group context. The study measured the VAS's impact on child cooperation, using a single-subject reversal design with replication. Based on previous research, we hypothesized that the VAS would help with both child cooperation and skill acquisition.

The results did not support the conclusion that the VAS had significant impact on the cooperation of the children. This can be explained by a number of factors. First of all, two of the three participants exhibited a high level of cooperation during baseline phase prior to intervention; this, there was little room for improvement with regard to this variable. The second factor was that the instructor had close to a decade of experience teaching swimming lessons, and was also a graduate student in special education with extensive experience working with children with special needs. This may have masked the extent to which the VAS was effective; perhaps, with a less experienced instructor, its utility would have been more evident.

Another factor that could have contributed to the result is that the instructional package as a whole was both powerful and effective, which influenced the compliance levels of the participants. The instructional package contained six elements in addition to the VAS, including: (1) issuing instructions only when the child was within one meter of the instructor; (2) issuing instructions when the child's ears were above the water, and when the child was not talking or playing with a toy; (3) using short, directive statements, and not issuing instructions in the form of questions; (4) prompting the child (using physical prompts or modeling) if the child did not respond within 3-4 seconds of an instruction; (5) praising the child after each instruction that he

or she attempted to perform; and (6) starting and ending each lesson with a rapport-building activity that the child enjoyed.

Each of these components has been shown to be effective in past research related to compliance. For example, Magito-McLaughlin and Carr (2005) investigated the impact of establishing good rapport between caregivers and people with disabilities. The study found a relationship between poor rapport and increased problem behaviors associated with clients' noncompliance with instructions. Conversely, the study also found that an instructional package designed to establish positive rapport between caregivers and clients resulted in a reduction in noncompliance-related problem behaviors and an increase in task completion. Matheson and Shiver (2005) investigated the effects of teachers' effective commands on student compliance across three participants. In the study, the teachers were trained to provide effective commands, defined as any instructions that (a) elicited an outcome, (b) were precise, (c) were specific and direct, and (d) were issued one at a time, followed by a 5-second wait period. In addition, the teachers were also trained to deliver praise following participants' compliance. The results showed an increase in compliance across all three participants. Similarly, Lemanek, Stone, and Fishel (1993) looked at videotapes of 63 children with various disabilities during a compliance activity with their parents, and evaluated the relationship between parents' behavior and their children's compliance. The study showed that compliance was positively correlated with (a) parents' use of clear instructions; (b) use of variety of prompts; as well as (c) reinforcement for compliance. Finally, Russo, Cataldo, and Cushing (1981) examined the effect of reinforcement on compliance and problem behaviors. They found that compliance increased when a reinforcement contingency was attached to it. Moreover, they also found that problem behaviors

decreased as compliance increased, even though no contingencies were directly attached to the problem behaviors.

While the study did not provide support for the use of a VAS to increase child cooperation, it did demonstrate the viability of a group swimming format for teaching swimming skills to children with disabilities. All three participants acquired novel swimming skills, regardless of whether or not they had had experience with swimming lessons prior to the study. For example, Kevin acquired more new skills during the study than he had acquired in previous adapted aquatic programs where he received 1:1 support. A possible explanation is that one-to-one support has the potential of hindering, rather than supporting, children's learning progress. In this regard, Giangreco, Edelman, Luiselli, and MacFarland (1997) suggested that the close proximity of an instructional assistant can result in a child's reliance on an adult to help complete an activity. This might explain why Kevin was unable to demonstrate any independent swimming skills prior to the study, despite a history of 1:1 instruction.

The results of the parent survey indicated that the parents were satisfied with the progress their children made during the study. However, only one of the three parents provided additional feedback, commenting that she believed that her child was more focused and attentive in this study than in previous swimming lessons. She felt that this was not necessarily due to the implementation of VAS, but more to the ability of the instructor.

Limitations of Current Study

There are some limitations to the current study. First of all, the study failed to demonstrate a functional relationship between the implementation of VAS and an increase in child cooperation. Additionally, the participants exhibited very low levels of off-task behaviors at baseline, which likely affected the outcome. It would have been better to screen for

participants with more substantial off-task behaviors that might have been more responsive to a VAS, as indicated in previous research (Bryan & Gast, 2000). Additionally, the study was conducted in a private pool that lacked many of the distractions found in a community pool, such as numerous other swimmers and loud noises. As a result, it was easier for the children to remain 'focused' and to be more cooperative with the instructor. Another limitation was that the instructor/researcher is highly skilled and very experienced in both teaching swimming lessons and working with children with special needs. This could have influenced the impact of VAS on the participants' cooperation. Finally, IOA was not assessed for skill acquisition in the study, so it is possible that the data collected on skill acquisition is inaccurate, to some degree.

Future Research

The utility of VASs in teaching swimming lessons to children with special needs still needs to be demonstrated. Moreover, the current study involved participants who were highly responsive to verbal instructions. Future research should include individuals with language impairments (non-verbal or minimally verbal) where VAS might be expected to be more important to mediate verbal instructions. In addition, future research should examine this issue with instructors who have less experience teaching swimming in general and/or less experience working with children with special needs in particular. The effect of larger class sizes on the child cooperation should also be investigated in the future, to examine the effectiveness of VASs during classes that are more similar to regular swimming lessons in community pools (i.e., often 6:1 to 10:1). Future research should also be conducted in a community pool to account for the distractions found in a typical pool and how they will impact the effectiveness of the VAS.

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Appendix A: Study Recruitment Notice

The University of British Columbia

OPPORTUNITY TO PARTICIPATE IN A RESEARCH PROJECT AIMED AT SUPPORTING KIDS WITH DISABILITIES TO LEARN TO SWIM!

My name is Bernardus Larryant and I am a graduate student at the University of British Columbia. I am also a certified swimming instructor and have taught swimming sills to children with autism and other developmental disabilities for many years through the Vancouver Parks Board. Many parents value swimming because it is a safety skill and an appropriate leisure activity across the entire lifespan. In addition, learning to swim provides many opportunities for social interaction and having fun! For my master's thesis, I will be conducting a study to determine the effectiveness of the use of a visual schedule in the form of pictures, to teach swimming skills to children with autism and other disabilities in small group lessons.

I am hoping to recruit three children for my study. To qualify for this study, a child must:

- be diagnosed with autism, Down syndrome, or another developmental disability that does not involve a significant physical impairment that requires 1:1 physical support in the pool (e.g., severe cerebral palsy)
- be between 4-8 years of age
- be able to tolerate physical touch and physical guidance by the instructor
- be at a beginning level of swimming instruction
- be safe learning in a 1:3 class (1 adult per 3 children)
- not have a seizure disorder
- not have fear of water (i.e., be willing to enter a pool)
- not exhibit serious problem behavior in community recreation settings

All swimming lessons will occur at the Stan Stronge Pool (700 West 59th Avenue, Vancouver, BC), on Tuesday evenings for 30 minutes per week, starting on September 10th, 2013 and ending on December 10th, 2013. Parents will be responsible for transporting their child to and from the pool for every lesson. However, parents will not be required to pay the $70.00 fee charged by the Vancouver Parks Board for swimming lessons; the research project will pay this fee for you. Parents must be willing to allow their child's swimming lessons to be videotaped, for data collection purposes. The potential benefit is that your child may learn new swimming skills or improve his or her current skills. In addition, participation will contribute to research regarding how to support children with disabilities to learn to swim in community recreation settings.

If you are interested in finding out more or having your child participate in this study, please contact me. Alternatively, you may contact my advisor, Dr. Pat Mirenda. Thank you for your consideration!

Appendix B: Consent Form

The University of British Columbia

Informed Consent Form
The Impact of a Visual Activity Schedule for Teaching Swimming to Children with Disabilities

Principal Investigator
Pat Mirenda, Ph.D., BCBA-D, Professor (Faculty Advisor)
Department of Educational Psychology and Counseling Psychology, and Special Education (ECPS)
Faculty of Education, University of British Columbia

Co-investigator
Bernardus Larryant, Graduate Student (Masters)
Department of Educational Psychology and Counseling Psychology, and Special Education (ECPS)
Faculty of Education, University of British Columbia
Research for the fulfillment of degree requirements for the Master of Arts degree (public document).

Purpose of the Study
The purpose of this study is to investigate the effectiveness of a visual schedule that uses pictures to teach swimming skills to children with autism or another developmental disability in small group lessons. Your child is invited to participate because he or she has a developmental disability, is between 4-8 years old, and is at a beginning level of swimming instruction.

Study Procedures and Time Commitment
The study will examine the impact of the use of a visual activity schedule (VAS) during swimming lessons. A VAS is a series of pictures that depicts what a child is expected to do, how long or how many times he or she is expected to do it, and what will happen afterwards. For example, a picture might show a child blowing bubbles in the water for a count of 5 or kicking his legs 10 times, followed by a high five or another preferred activity.

Prior to participating in swimming lessons, the researcher will visit your home to meet you and your child and to ask you about your child's swimming ability, tolerance of physical prompting, ability to enter a pool independently, and ability to participate in instruction in a small group setting. Then, during some swimming lessons, the instructor will use a VAS and verbal directions to show/tell your child what is expected. During

other lessons, the instructor will use verbal directions only to tell your child what is expected. All swimming lessons throughout the study will be video recorded, and the researcher will use these videos to record data on both instructor and child behaviour. At the end of the study, you will be asked about the usefulness of the swimming lessons for your child.

The swimming lessons take place at the Stan Stronge Pool, 700 West 57th Avenue, Vancouver, BC. The lessons will start on September 10, 2013 and end on Dec. 10, 2013, for 30 minutes each week, after school. The time commitment will be 30 minutes x 14 lessons = 7 hours, plus 1 additional hour for the initial interview and home visit. The total time commitment for your child will be 8 hours.

You will be responsible for registering your child for swimming lessons by phoning Melanie Josephs by August 23, 2013. You will also have to transport your child to and from the lessons each week and provide a swimsuit and towel for him or her to use at the pool.

Study Results

The results of this study will be reported in a graduate thesis and may also be published in journal articles and books. Your child will not be identified by name in any reports or publications.

Potential Risks

Because the lessons take place in a swimming pool, there is always the possibility that your child may slip on the pool deck, swallow water, etc. However, the instructor is fully qualified and experienced and has provided swimming instruction to children with disabilities for several years. In addition, a volunteer will be assigned to your child during every swim lesson, to make sure that your child is safe in the pool and surrounding area. During or before a lesson, if your child indicates, either verbally or by his/her behavior, that he or she does not want to participate, he will not have to do so.

Potential Benefits

The potential benefits include improved swimming skills for your child and increased knowledge about how to provide swimming instruction to children with disabilities.

Confidentiality

All information from this research will be kept strictly confidential. Your child will not be identified by name in any reports of the completed study. All data records and videotapes will be identified by a code number and kept on a password-protected computer in Dr. Pat Mirenda's research lab at UBC, and will be destroyed 5 years after the study is published. Only the principal investigator, the co-investigator, and a research assistant will have direct access to the data. The Vancouver Parks Board and you will receive a final report of the study, but your child will not be identified by name in that

report.

Payment
You will not have to pay the usual fee ($70.00) charged by the Vancouver Parks Board for a 14-week swim program at Stan Stronge pool. If you are among the first three families to agree to have your child participate in the study and register your child for swimming lessons by August 23, 2013, the research project will pay the fee for you.

Contact
If you have any questions or would like more information about this study, you may contact either Bernardus Larryant or Dr. Pat Mirenda. If you have any concerns about your child's treatment or rights as a research
participant, you may contact the Research Subject Information Line in the UBC Office of Research Services at (604) 822-8598, or if long distance e-mail to RSIL@ors.ubc.ca or call toll free at 1-877-822-8598.

Consent
Taking part in this study is entirely up to you. You have the right to refuse to have your child participate in this study. If you decide to take part, you may choose to pull out of the study at any time without giving a reason and without any negative impact on your relationship with UBC, the Stan Stronge Pool, or the Vancouver Parks Board.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent for your child to participate in this study.

Please print your name and sign the appropriate section below.

_____
Parent/Guardian's name (please print)

_____ _____
Parent/Guardian's signature Date

_____ _____
Child's name (please print) Date

Appendix C: Example of the Visual Supports Used in a Typical Swim Lesson (Jull, 2012)

The visual schedule holders were approximately 45 cm long and 20 cm high. They were made of plywood with a pocket chart stapled to the front. Most symbols were Picture Communication Symbols™ created with the Boardmaker software program (Mayer-Johnson, LLC, 1981-2008). Symbols were laminated to be waterproof.

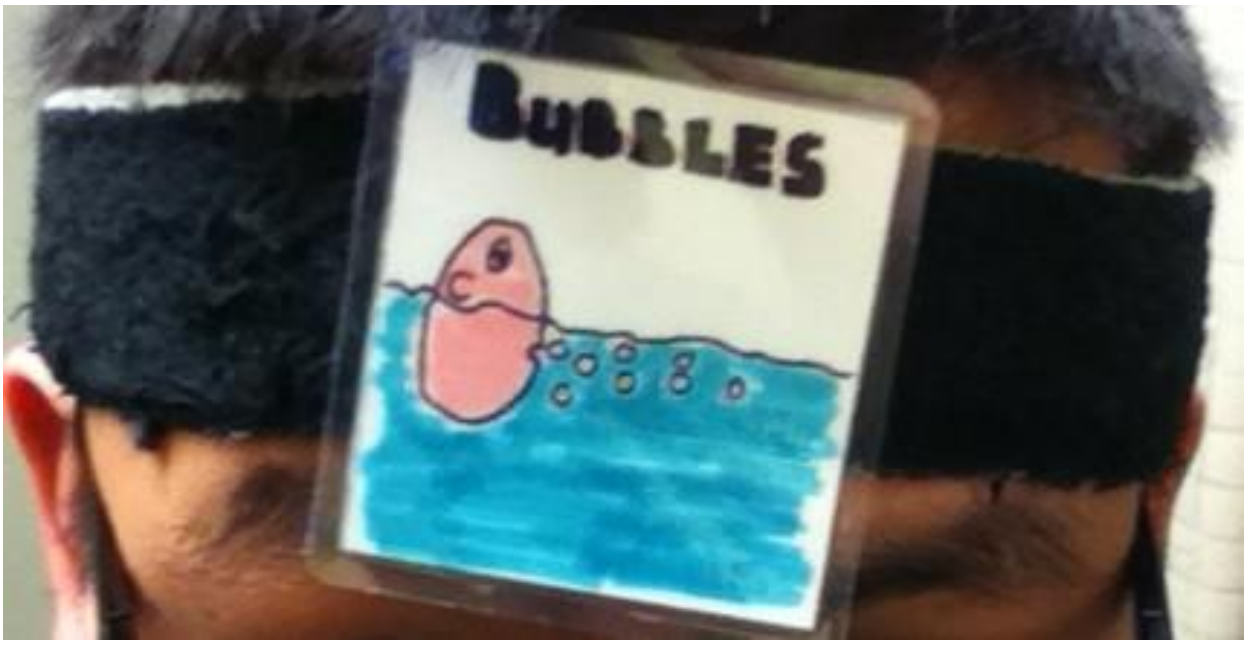
The symbols on the top row indicate the sequence of activities throughout this lesson. From left to right, they represent:

- Blowing bubbles – a basic skill to introduce swimming skills to the participants
- Face in the water – similar to blowing bubbles, it is another basic skill to introduce swimming skills to the participants
- Front float – participants are to lay on their front and spread their arms and legs for 5 seconds.
- Back float – participants are to lay on their back and spread their arms and legs for 5 seconds
- Front Glide – participants are to lay on their front and move through the water efficiently
- Back Glide – participants are to lay on their back and move through the water efficiently
- Kicking – participants are to sit at the edge of the pool and practice their kicking
- Jump – participants are to jump into the water from the edge of the pool
- Boat ride – an enjoyable activity as a built-in break in the lesson to keep the participants motivated and interested
- Back kick – participants are to glide on their back with propulsive kicks
- Front kick – participants are to glide on their front with propulsive kicks
- Front swim – participants are instructed to swim by kicking and moving their arms as means or propulsion
- The final picture indicates that it is time to get out of the pool (the lesson is over).

Once an activity is completed, the instructor flips over the card and places it on the bottom row of the board.

Appendix D: Headband

This is the headband worn by the instructor during the intervention phase of the study. At the start of each activity, a related symbol was removed from the VAS and placed on the headband to remind participants about the activity.



Appendix E: Red Cross Swim Kids 1 Worksheet

Canadian Red Cross

Performance Criteria

Red Cross Swim Kids 1

NOTE: Instructors—keep swimmers active and wet!
NOTE: Swimmers will demonstrate skill or stroke 3 times correctly in one lesson set.

FITNESS ACTIVITIES

NOTE: Must incorporate one item from below into each lesson.

Flutter Kick 5m (Assisted)

NOTE: Instructor may assist or swimmer may use aid (kickboard, water noodle, etc.).
- Maintains near-horizontal body position
- Kicks on front or back or uses a combination
- Starts kick from hip
- Moves legs in opposite up and down motion

Distance Swim 5m

NOTE: Proper techniques are encouraged and practised but NOT evaluated.
- Chooses front or back swim
- Uses any arm or leg movement
- Focuses on proper body position and flutter kick
- Body approaches horizontal on front or back
- Exhales underwater
- Completes distance

SKILLS AND WATER SAFETY

Prepare! Stay Safe! Survive!

Facility/Site Orientation

- Identifies shallow water, deep water, meeting place, and hazards particular to swimming area
- Waits for Instructor's permission to enter the water

Supervision

- Explains why adult supervision is important when in, on, and around the water

Shallow Water Entries and Exits

NOTE: Instructor may assist, hold hands.
NOTE: Progression is from assisted to unassisted.
- Makes sure an adult (Instructor) is already in the water and ready
- Performs shallow water entries and exits, appropriate to the facility/site, e.g., wading in, using ramp, stepping off ladder, jumping in, slipping in from seated position at water level
- Demonstrates safe exits

Submerge Head

NOTE: This skill is performed without goggles.
- Puts entire head in the water for at least 3 seconds
- Opens eyes underwater

Exhale through Mouth and/or Nose

- Exhales/blows bubbles through mouth and/or nose, just below the surface
- Exhales through mouth and/or nose with entire head in the water

SWIMMING

Rhythmic Breathing 5 Times

NOTE: Encourage swimmer to turn head to side during inhalation.
- Exhales through mouth and/or nose underwater and inhales through mouth just above surface
- Performs rhythmic and relaxed breathing with noticeable and effective exhalation and inhalation on EACH repetition
- Performs at least 5 repetitions in any body position

Front Float and Recovery 3 sec

NOTE: This skill is performed without goggles.
- Assumes stable floating position on front with face in water
- Floats for at least 3 seconds, in a relaxed manner
- Comfortably recovers to vertical position

Front Glide 5 sec

NOTE: Instructor may provide minimal assistance to start glide.
- Glides on front for at least 5 seconds with face in water, in a relaxed manner
- Maintains streamlined body position, with arms fully extended in front of head
- Comfortably recovers to vertical position

Front Glide with Kick 5m

NOTE: Instructor may provide minimal assistance to start glide.
- Performs front glide with basic flutter kick: opposite up and down leg motions
- Performs kick for at least 5m, with body approaching horizontal
- Fully extends arms over head; maintains streamlined body position
- Exhales underwater

Back Float and Recovery 3 sec

NOTE: This skill is performed without goggles.
- Assumes stable floating position on back, ears in the water
- Floats for at least 3 seconds, in a relaxed manner
- Comfortably recovers to vertical position

Back Glide 5 sec

NOTE: Instructor may provide minimal assistance to start glide.
- Glides on back for at least 5 seconds, in a relaxed manner
- Maintains streamlined body position with arms and hands resting along side of body
- Comfortably recovers to vertical position

Roll-Over Glides 5 sec (Assisted)

NOTE: Instructor may assist or swimmer may use aid (kickboard, water noodle, etc.).
- Glides on front with face in water, then rolls over to back and glides (or floats)
- Exhales through mouth and/or nose when face is in water and inhales through mouth when face is out
- Repeats back to front glide
- Glides in streamlined and relaxed manner
- Starts roll with head and shoulders
- Comfortably recovers to vertical position

Front Swim 5m

- Swims 5m using any arm or leg movement or combination of movement

StayWell

Appendix F: Parent Social Validity Measure

Please respond to the questions below.

1 = “strongly disagree,” 3 = “neither agree nor disagree” and 5 = “strongly agree.”

The instructor used the visual support appropriately.	1 2 3 4 5
My child cooperated more when the instructor used a visual schedule than when he did not	1 2 3 4 5
The visual support helped my child stay focused during the lesson.	1 2 3 4 5
The visual support did not help my child learn new swimming skills.	1 2 3 4 5
My child enjoyed swimming lessons more when the instructor used the visual schedule than when he did not	1 2 3 4 5
I would not recommend using visual support for future swimming lessons.	1 2 3 4 5
Overall, I am satisfied with my child’s progress during the lesson	1 2 3 4 5

Do you have any other feedback for the researcher regarding your child’s participation in this study? (e.g., child outcomes, instructor skills, etc.?)

What suggestions do you have for future research regarding supporting children with ASD in community recreation settings?

Appendix G: Instructor Skills Checklist

Did the instructor review the VAS at the beginning of the session? *Baseline – N; Intervention – Y*	
Skill:	
Did the instructor place the picture symbol from the VAS on to his headband? *Baseline – N; Intervention – Y*	
Did the instructor model the skill? *Baseline/Intervention – Y*	
Did the instructor provide a clear verbal instruction? *Baseline/Intervention – Y*	
If the child complied, did the instructor praise or reinforce the child? *Baseline/Intervention – Y*	
If the child did not comply after the first request, did the instructor reissue the instruction? *Baseline/Intervention – Y*	
If the child complied after the instruction was issued the second time, did the instructor praise or reinforce the child? *Baseline/Intervention – Y*	
If the child did not comply after the second request, did the instructor reissue the instruction with a prompt? *Baseline/Intervention – Y*	
If the child complied after the instruction was issued the third time, did the instructor praise or reinforce the child? *Baseline/Intervention – Y*	

The italicized section under each question represents the desired answer for each question for each phase.

Appendix H: Summary of Skills Completed by Participants

NAME: Edward

DATE: September 18, 2013 (Session 2)

FLUTTER KICK 5M (ASSISTED)	
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	I
Start kick from hip	P
Moves legs in opposite up and down motion	I
SUBMERGE HEARD	
Puts entire head in the water for at least 3 seconds	I
Opens eyes underwater	P
EXHALE THROUGH MOUTH AND/OR NOSE	C
Exhales/blows bubbles through mouth and/or nose just below the surface	I
Exhales through mouth and/or nose with entire head in the water	I
FRONT FLOAT AND RECOVERY 3 SECS	
Assumes stable floating position on front with face in water	I
Floats for at least 3 seconds in a relaxed manner	P
Comfortably recovers to a vertical position	P
FRONT GLIDE 5 SEC	
Glides on front for at least 5 seconds with face in water in a relaxed manner	I
Maintains streamlined body position with arms fully extended in front of head	P
Comfortably recovers to a vertical position	P
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	I
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	P
Exhales underwater	I
BACK FLOAT AND RECOVERY 3 SECS	
Assumes subtle floating position on back , ears in water	P
Floats for at least 3 seconds in a relaxed manner	P
Comfortably recovers to a vertical position	P
BACK GLIDE 5SEC	
Glides on back for at least 5 seconds in a relaxed manner	P
Maintains streamlined body position with arms and hands resting alongside of body	P
Comfortably recovers to a vertical position	P
BACK GLIDE WITH FLUTTER KICK 5M	
Performs back glide with basic flutter kick – alternating up and down leg motion	
Performs kick for at least 5 m with body approaching horizontal	
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	
FRONT SWIM 5M	
Swim 5m using any arm or leg movement or combination of movement	

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 10/24 Total (C) = 1/8**

NAME: Edward

DATE: November 26, 2013 (Session 12)

FLUTTER KICK 5M (ASSISTED)	C
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	I
Start kick from hip	I
Moves legs in opposite up and down motion	I
SUBMERGE HEARD	C
Puts entire head in the water for at least 3 seconds	I
Opens eyes underwater	I
EXHALE THROUGH MOUTH AND/OR NOSE	C
Exhales/blows bubbles through mouth and/or nose just below the surface	I
Exhales through mouth and/or nose with entire head in the water	I
FRONT FLOAT AND RECOVERY 3 SECS	C
Assumes stable floating position on front with face in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
FRONT GLIDE 5 SEC	C
Glides on front for at least 5 seconds with face in water in a relaxed manner	I
Maintains streamlined body position with arms fully extended in front of head	I
Comfortably recovers to a vertical position	I
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	I
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	P
Exhales underwater	I
BACK FLOAT AND RECOVERY 3 SECS	C
Assumes subtle floating position on back , ears in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
BACK GLIDE 5SEC	C
Glides on back for at least 5 seconds in a relaxed manner	I
Maintains streamlined body position with arms and hands resting alongside of body	I
Comfortably recovers to a vertical position	I
BACK GLIDE WITH FLUTTER KICK 5M	
Performs back glide with basic flutter kick – alternating up and down leg motion	I
Performs kick for at least 5 m with body approaching horizontal	P
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	I
FRONT SWIM 5M	C
Swim 5m using any arm or leg movement or combination of movement	I

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 25/28 Total (C) = 8/10**

NAME: Amanda

DATE: September 18, 2013 (Session 2)

FLUTTER KICK 5M (ASSISTED)	
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	I
Start kick from hip	P
Moves legs in opposite up and down motion	I
SUBMERGE HEARD	C
Puts entire head in the water for at least 3 seconds	I
Opens eyes underwater	I
EXHALE THROUGH MOUTH AND/OR NOSE	C
Exhales/blows bubbles through mouth and/or nose just below the surface	I
Exhales through mouth and/or nose with entire head in the water	I
FRONT FLOAT AND RECOVERY 3 SECS	C
Assumes stable floating position on front with face in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
FRONT GLIDE 5 SEC	
Glides on front for at least 5 seconds with face in water in a relaxed manner	I
Maintains streamlined body position with arms fully extended in front of head	P
Comfortably recovers to a vertical position	I
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	I
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	P
Exhales underwater	I
BACK FLOAT AND RECOVERY 3 SECS	C
Assumes subtle floating position on back , ears in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
BACK GLIDE 5SEC	
Glides on back for at least 5 seconds in a relaxed manner	I
Maintains streamlined body position with arms and hands resting alongside of body	P
Comfortably recovers to a vertical position	I
BACK GLIDE WITH FLUTTER KICK 5M	N/A
Performs back glide with basic flutter kick – alternating up and down leg motion	N/A
Performs kick for at least 5 m with body approaching horizontal	N/A
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	N/A
FRONT SWIM 5M	N/A
Swim 5m using any arm or leg movement or combination of movement	N/A

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 19/24 Total (C) = 4/8**

NAME: Amanda

DATE: November 26, 2013 (Session 12)

FLUTTER KICK 5M (ASSISTED)	
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	I
Start kick from hip	P
Moves legs in opposite up and down motion	I
SUBMERGE HEARD	C
Puts entire head in the water for at least 3 seconds	I
Opens eyes underwater	I
EXHALE THROUGH MOUTH AND/OR NOSE	C
Exhales/blows bubbles through mouth and/or nose just below the surface	I
Exhales through mouth and/or nose with entire head in the water	I
FRONT FLOAT AND RECOVERY 3 SECS	C
Assumes stable floating position on front with face in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
FRONT GLIDE 5 SEC	C
Glides on front for at least 5 seconds with face in water in a relaxed manner	I
Maintains streamlined body position with arms fully extended in front of head	I
Comfortably recovers to a vertical position	I
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	I
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	I
Exhales underwater	I
BACK FLOAT AND RECOVERY 3 SECS	C
Assumes subtle floating position on back , ears in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
BACK GLIDE 5SEC	C
Glides on back for at least 5 seconds in a relaxed manner	I
Maintains streamlined body position with arms and hands resting alongside of body	I
Comfortably recovers to a vertical position	I
BACK GLIDE WITH FLUTTER KICK 5M	
Performs back glide with basic flutter kick – alternating up and down leg motion	I
Performs kick for at least 5 m with body approaching horizontal	P
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	P
FRONT SWIM 5M	C
Swim 5m using any arm or leg movement or combination of movement	I

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 24/28 Total (C) = 7/10**

NAME: Kevin

DATE: September 18, 2013 (Session 2)

FLUTTER KICK 5M (ASSISTED)	
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	P
Start kick from hip	P
Moves legs in opposite up and down motion	P
SUBMERGE HEARD	
Puts entire head in the water for at least 3 seconds	P
Opens eyes underwater	P
EXHALE THROUGH MOUTH AND/OR NOSE	
Exhales/blows bubbles through mouth and/or nose just below the surface	P
Exhales through mouth and/or nose with entire head in the water	P
FRONT FLOAT AND RECOVERY 3 SECS	
Assumes stable floating position on front with face in water	P
Floats for at least 3 seconds in a relaxed manner	P
Comfortably recovers to a vertical position	P
FRONT GLIDE 5 SEC	
Glides on front for at least 5 seconds with face in water in a relaxed manner	P
Maintains streamlined body position with arms fully extended in front of head	P
Comfortably recovers to a vertical position	P
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	P
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	P
Exhales underwater	P
BACK FLOAT AND RECOVERY 3 SECS	
Assumes subtle floating position on back , ears in water	P
Floats for at least 3 seconds in a relaxed manner	P
Comfortably recovers to a vertical position	P
BACK GLIDE 5SEC	
Glides on back for at least 5 seconds in a relaxed manner	P
Maintains streamlined body position with arms and hands resting alongside of body	P
Comfortably recovers to a vertical position	P
BACK GLIDE WITH FLUTTER KICK 5M	N/A
Performs back glide with basic flutter kick – alternating up and down leg motion	N/A
Performs kick for at least 5 m with body approaching horizontal	N/A
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	N/A
FRONT SWIM 5M	N/A
Swim 5m using any arm or leg movement or combination of movement	N/A

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 1/24 Total (C) = 0/8**

NAME: Kevin

DATE: November 26, 2013 (Session 12)

FLUTTER KICK 5M (ASSISTED)	
Maintains near horizontal body position	I
Kicks on front or back or uses a combination	I
Start kick from hip	P
Moves legs in opposite up and down motion	I
SUBMERGE HEARD	C
Puts entire head in the water for at least 3 seconds	I
Opens eyes underwater	I
EXHALE THROUGH MOUTH AND/OR NOSE	
Exhales/blows bubbles through mouth and/or nose just below the surface	P
Exhales through mouth and/or nose with entire head in the water	P
FRONT FLOAT AND RECOVERY 3 SECS	C
Assumes stable floating position on front with face in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
FRONT GLIDE 5 SEC	C
Glides on front for at least 5 seconds with face in water in a relaxed manner	I
Maintains streamlined body position with arms fully extended in front of head	I
Comfortably recovers to a vertical position	I
FRONT GLIDE WITH KICK 5M	
Performs front glide with basic flutter kick opposite up and down big motions	I
Performs kick for at least 5m with body approaching horizontal	P
Fully extends arms over head – maintains streamlined body position	P
Exhales underwater	P
BACK FLOAT AND RECOVERY 3 SECS	C
Assumes subtle floating position on back , ears in water	I
Floats for at least 3 seconds in a relaxed manner	I
Comfortably recovers to a vertical position	I
BACK GLIDE 5SEC	
Glides on back for at least 5 seconds in a relaxed manner	P
Maintains streamlined body position with arms and hands resting alongside of body	I
Comfortably recovers to a vertical position	I
BACK GLIDE WITH FLUTTER KICK 5M	
Performs back glide with basic flutter kick – alternating up and down leg motion	I
Performs kick for at least 5 m with body approaching horizontal	P
Maintains near horizontal body position with arms resting alongside of body and hands at hips using effective propelling action	P
FRONT SWIM 5M	
Swim 5m using any arm or leg movement or combination of movement	P

I – independent P – prompted C – completed N/A – not assessed **Total (I) = 18/28 Total (C) = 4/10**