

Aquatic Therapy in Children with Special Needs

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Content

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- **Primer Special Needs**
- **ASD**
- **Adapted Aquatics**
- **Instructional Planning**
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Definition

- **Special Needs**

Those children who have or at risk for a chronic physical, developmental, behavioral or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.

(U.S. Department of Health and Human Services)



Primer Special Needs

- **Mental retardation**
- **Learning disorder**
- **Communication disorders**
- **Autism Spectrum Disorders (Autism, Asperger, ...)**
- **Disruptive behavior disorders (ADD)**
- **Feeding and eating disorders**
- **Tic disorders**
- **Elimination disorders**
- **Other disorders of infancy, childhood or adolescence**

(Diagnostic and Statistical Manual of Mental Disorders)



ASD

- Impaired

1-Social interaction

2-Communication

3-Restricted behavior pattern

(*DSM-IV-TR*)

- Impaired

1-Social interaction and communication (conjoined problem)

2-Restricted behavior

(*DSM-V)**

**DSM-V will be published in May 2013!*

ASD

- **Autism**
- **Atypical Autism**
- **Asperger's Syndrome**
- **Rett's Disorder**
- **Childhood Disintegrative Disorder**

(*DSM-IV-TR*)

- **ASD (Autism, Asperger, and Atypical Autism)**
 - **Uniform**
 - **Only ASD**
- (*DSM-V*)

*About 20 in 10.000 children (NICHD, 2001)

*About **113** in 10.000 children (CDC, 2012)

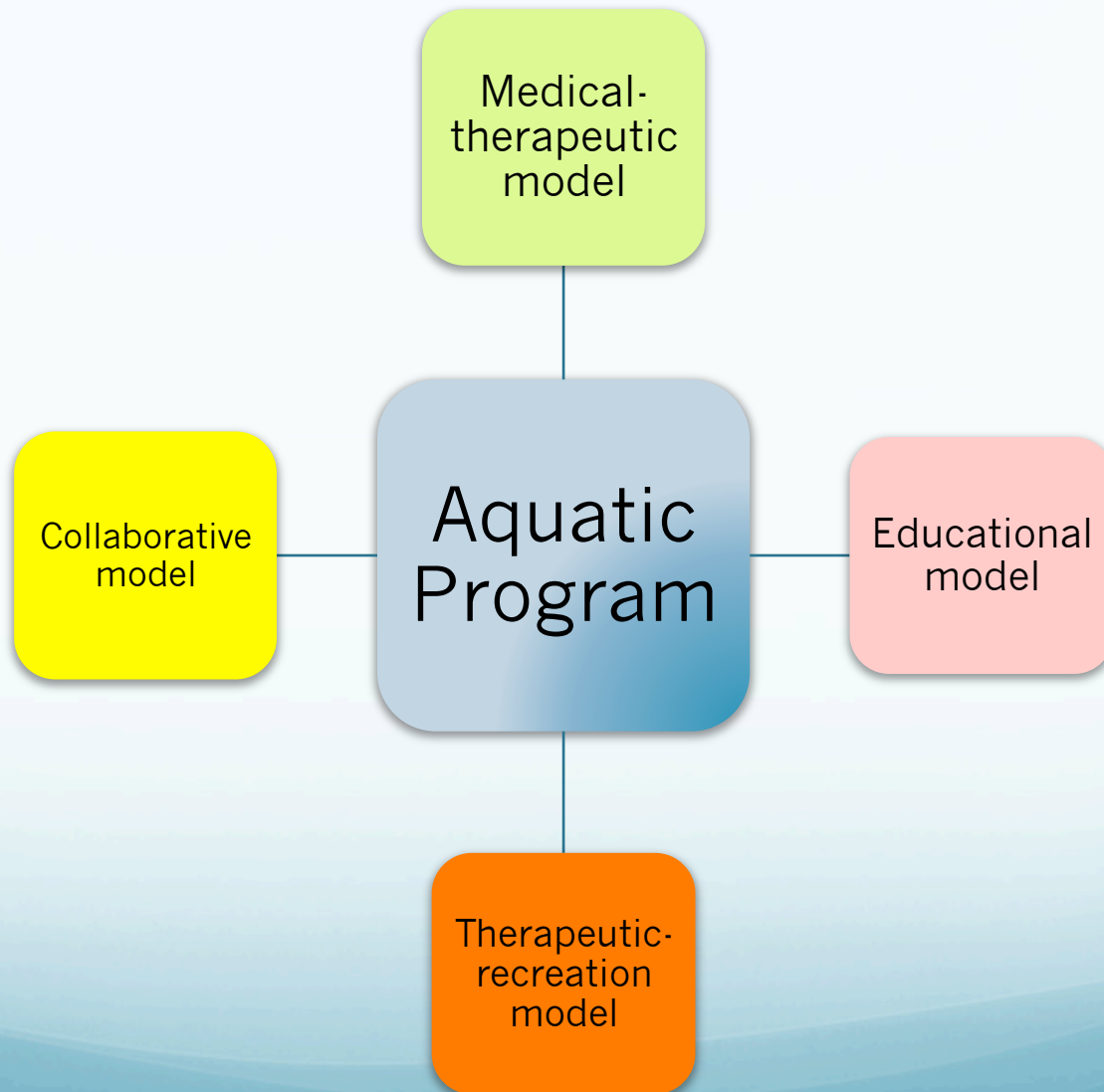
Adapted Aquatics

Referring ;

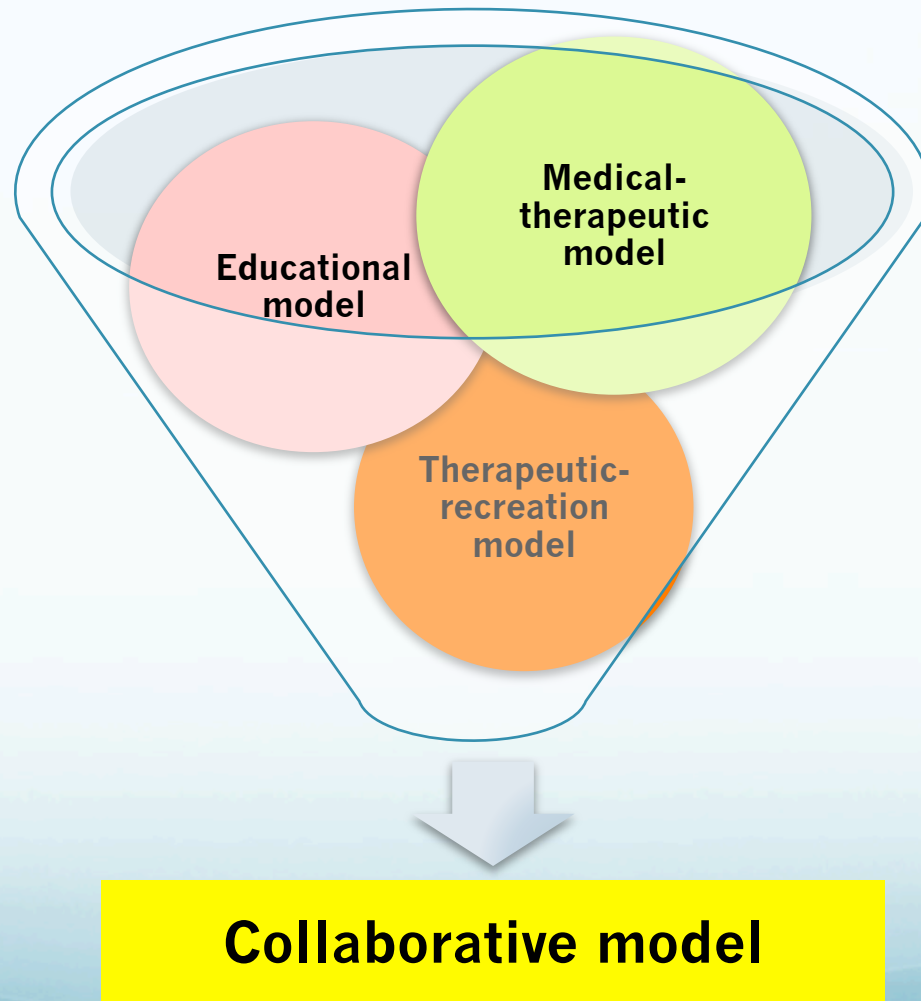
- **Aquatic programs**
- **Instructional planning**
- **Instructional strategies**
- **Facilities**
- **Equipment**
- **Mobility**
- **Communication**
- **Movement**
- **Rules of several pool games**



Adapted Aquatics



Adapted Aquatics



Adapted Aquatics

Participant goals:

- **To develop orientation skills**
- **To improve communication skills**
- **To enhance lifetime leisure skills**
- **To increase self-confidence**
- **To understand the relationship**
- **To improve posture**
- **To maintain rhythmic breathing**



Collaborative Model

Instructional Planning

- Defining what skills a child needs to learn and assessing his present level of performance in aquatic skills!
- **Collecting of data!**
- **Formal observation!**
- **Informal observation!**
- **Interview!**
- **Reading background records!**
- **Test forms!**



Instructional Planning

Before Aquatic Assessment;

- What is the child interested in learning?
- What does the caregiver believe to be important skills for the child?
- Where will the child use the skills outside of the aquatic class?
- What are the peers doing in aquatics?
- What are the medical, therapeutic, educational, and recreational needs of the child?



Instructional Planning

- Remember that assessment of the child will be based on following model under which you are working!
- So, assessment battery may include;
 - *basic swimming
 - *water safety
 - *socialization skills



Instructional Planning

- **Sports Skills Assessment-Level I-II, Water Adjustment-Level I, Water Safety Skill Sheet (Special Olympics International)**
- **The Water Orientation Checklists (Killian, 1987)**
- **Aquatic Orientation Checklist (Killian, 1984)**
- **Beginning Competency Levels of Swimming Sherrill Model (Sherrill, 1993)**
- **Conatser Adapted Aquatics Screening Test Sheet (Conatser, 1995)**
- **Carter, Dolan, and LeConey Aquatic Assessment (1994)**
- **Aquatic Readiness Assessment (ARA) (Langendorfer & Bruya, 1995)**
- **Lone Star Adapted Aquatics (Apache, Hisey & Blanchard, 2005)**
- **Developmental Aquatics (Doremus, 1992)**
- **INSPIRE Aquatic Assessment (Texas Woman's University)**

Instructional Planning

	Water orientation/ adjustment	Water entry/exit	Breath control	Buoyancy/ Floatation	Body positioning	Arm action	Leg Action	Combined Movement
LSAA	√	√	√	√	√	√	√	√
ARA	√	√	√	√	√	√	√	√
Inspire	√	√	√	√		√	√	√
Conatser	√	√	√	√		√	√	
Developmental	√	√	√	√		√	√	

Instructional Planning

	Different Levels	Aligned curriculum/ activities	Initial screen test	Validity	Reliability	Safety		
LSAA	√	√	√	√		√		
ARA	√	√		√	√			
Inspire	√							
Conatser								
Developmental								

Instructional Planning

- **Individualized Aquatic Program Plan (IAPP) is developed by collaborative team effort!**

For a child with ASD;

- Parents
- Special Education Teacher
- Physical or Occupational Therapist
- Adapted Physical Education Teacher
- Assistance Teacher



Instructional Planning



- Determining Setting Priorities;

“A Systemic Procedure for Prioritizing IEP Goals” (Dardig & Heward, 1981)

- a. Child can use task in current environment.
- b. Child can use task future environment.
- c. The activity provides opportunity for socialization.

...Total 17 statements!

0= Strongly disagree

1= Somewhat disagree

2= Somewhat agree

3= Strongly agree

Instructional Planning



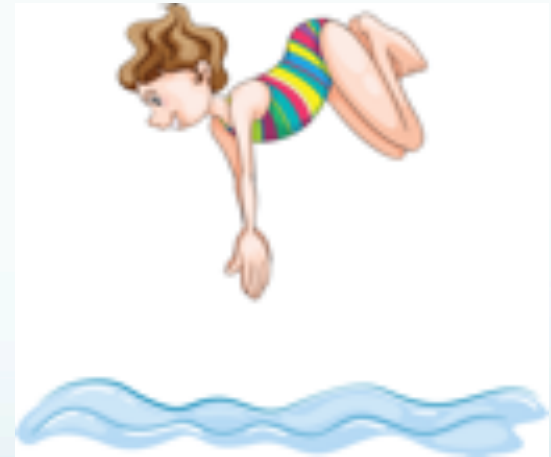
- **Writing Goals and Objectives;**

“Ali will improve water confidence as shown by increasing the amount of time “submerge entire face” for ten sec. by the end of April.”

Instructional Planning

*Objectives should include the performance of the child will be doing;

- How well?
- How fast?
- How deep?
- How many times?



Instructional Planning

- Determining Sequence;

*What order the child may be able to display the skills;

***Task Analysis!**

***Prerequisite skills!**



Instructional Planning

- **Task Analysis for Swimming Underwater;**

1. Submerge full body underwater while holding instructors' hands!
2. Submerge full body underwater and move to horizontal position, with instructor's assistance in position him or her!
3. Submerge full body underwater five times per session by!
4. Submerge full body underwater and move to a horizontal position ready to swim by!
5. Submerge full body underwater and swim using arms, touch bottom of four-foot-deep pool, for 3 m., by!
6. Submerge full body underwater and swim 4.5 m. using arms and legs by!
7. Swim fully underwater for five body lengths by!

Instructional Planning

- **Task Analysis for Kangaroo Play Skill;**

1. Turn to me!
2. Holds my hands!
3. Jump



Instructional Planning

- Determining Number of Teaching Skills;
- Group size
- Instructor-to-child ratio
- Support staff needed
- Time of a day
- Instructional time per week
- Instructor experience
- Child ability and readiness
- Child fitness level



Instructional Planning

- Aquatic Lesson Plan Evaluation;
 1. Goals are convenient with individual program plans!
 2. Performance objectives contain observable behavior and criterion!
 3. Performance objectives reflect functional behaviors!
 4. Activities to meet objectives are age-appropriate!
 5. Plan includes progression or task analysis!
 6. Plan includes specific intervention for ASD!
 7. Plan includes teaching approaches for ASD!
 8. Plan includes management of the inappropriate behaviors!

Instructional Strategies

- Addressing Problem Behaviors;

*Keeps on task!

*Increase learning time!

Why the problem behaviors occur;

- a. Avoiding nonpreferred tasks
- b. Gaining access to preferred tasks
- c. Providing sensory stimulation!



Instructional Strategies

- **Motivational Problem Behaviors;**

- *Biological

- *Environmental

- *Social

- **Intervention Strategies;**

- *Alteration of the motivational variables!

- *Use of antecedent control procedures!

- *Use of response-contingent procedures!

Instructional Strategies

Alteration of motivational variables	Antecedent control	Response procedures
Neutralizing routines	Task fading	Differential reinforcement
Intersperse request	Session fading	Interruption prompting
Different physical activity	Choice making	Non-contingent reinforcement
Treatment of physical discomfort	Instructional procedures	

Instructional Strategies

Reinforcement schedule:

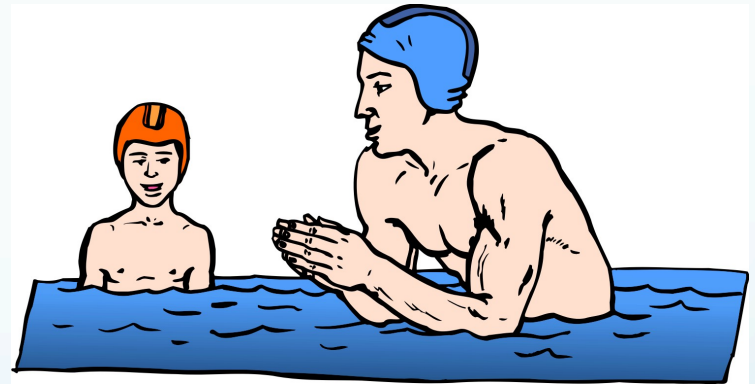
- Fixed-time schedule (NCR)!
- Fixed percent schedule!



Instructional Strategies

Prevention Strategies;

1. Reinforcement schedule!
2. Ignoring!
3. Redirecting!
4. Removing!
5. More structuring!
6. Routine!



Instructional Strategies

Errorless Learning

- Use of instructional procedures that aim at ensuring the occurrence of only correct or few incorrect responses by systematic fading of stimulus prompt.
- **Learner makes fewer errors!**
- **Not require as much error correction!**
- **Receives more frequent reinforcement!**

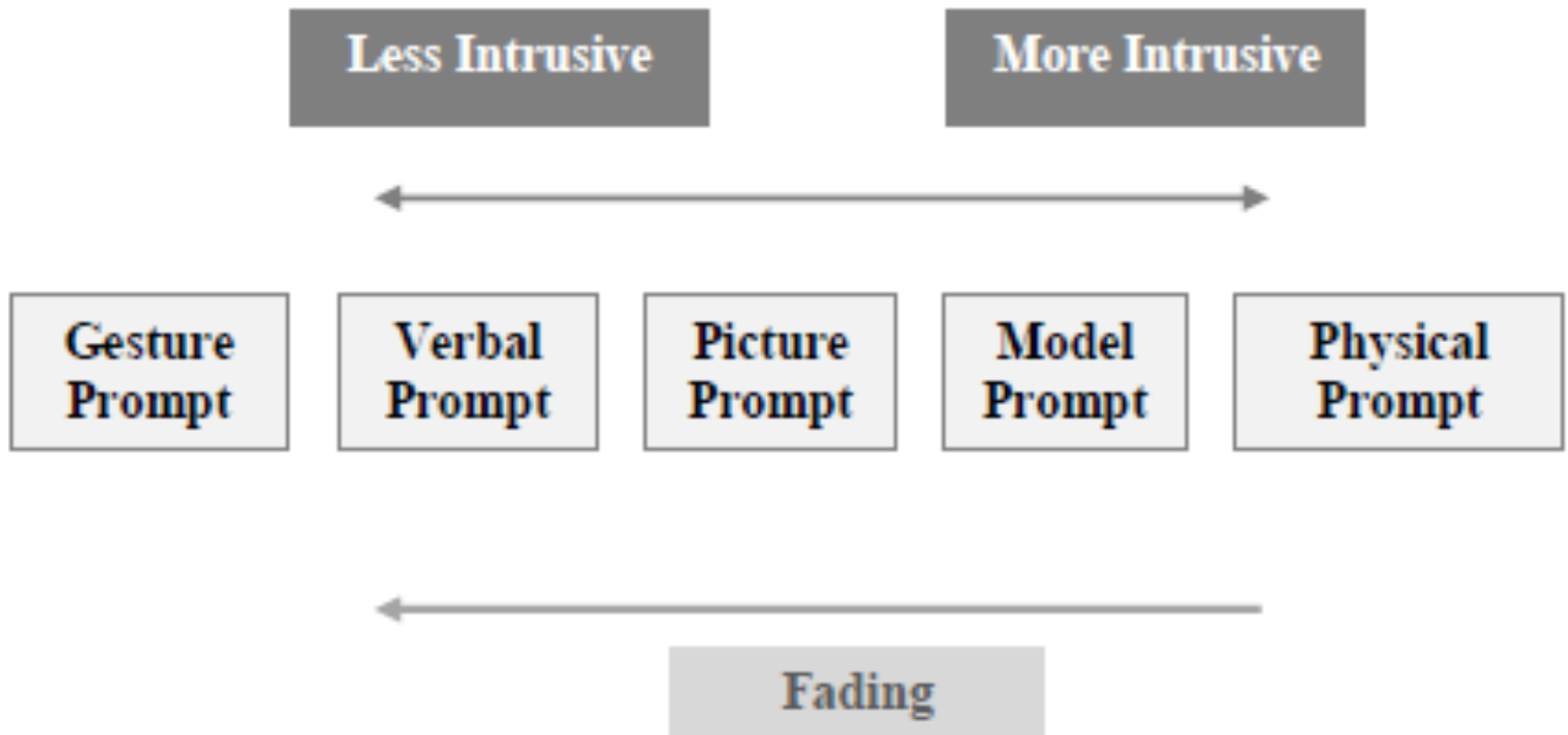
Basic Concepts

- ***Attention cue**
- ***Controlling prompt**
- ***Trial**
- ***Fading**
- ***Response interval**

Instructional Strategies



Instructional Strategies



Instructional Strategies

Video-based Instruction

- Video-based instruction was effective for teaching action-based tasks such as walking, running, and jumping for children with autism, owing to mobility of video records.
- Visual cues relevant to motor information can enhance attention and awareness of movement messages in children with autism.



Instructional Strategies

Video-based Instruction

- Two general procedures can be applied to benefit from video technology, including video model and video prompting.
- Video prompting covers a video clip of one step of a task for displaying an individual and then giving the person the opportunity to perform that step before the next step is shown.
- It is evidence-based instruction method for ASD (NAC, 2009).



Teaching Tips

There are three teaching tips and strategies in;

1-Organize and structure events!

2-Organize and structure space!

3-Organize and structure events in time!

(Houston-Wilson & Lieberman, 2003)



Teaching Tips

Organize and structure events

- **Events and skills should be organized in routines.**
- Because routines has beginnings and end points,
- Thus, they reduce sensory overload.



Teaching Tips

Organize and structure events

- **Task analysis should be planned.**

For example: Teaching leg kick with a prone body position on the pool deck (while sitting on the pool deck)

- 1-Lie back,
- 2-Return face down,
- 3-Leg kick



Teaching Tips

Organize and structure events

- **Use task direction, which is describing the movement, should be simple, and the same words should be used in each.**

For example, if the child is familiar with the phrase “cycling” while performing play skill “bicycle ride” in the pool, therapist should not use “biking” during another pool session!



Teaching Tips

Organize and structure events and time

- **Using pictures:** Such as showing the photos of therapist, therapist says “Lisa is time to get into pool” or showing activity photos.



Teaching Tips

Organize and structure space

- **Pool environment may create sensory overload.**
- **Therefore, teachers need to tell the students**
- “Where the things are done” Such as: in the gym, in the pool, on the mat, on the field.



Teaching Tips

Organize and structure space

- “Which side of the pool to use?”
- Such as “fenced area”



Teaching Tips

Organize and structure events in time

- **Teachers should provide cues to terminate a play or to begin a new play!**
- “Tom! In which you want to play the games?”
- “Snake or kangaroo?”



Teaching Tips

Interactions Facilitators

- Provide structure and routine within aquatic lesson!
- Tell participants what you are going to do before touching them!
- Reinforce appropriate behaviour with positive praise!
- Start with very small group!
- While arriving and departure from pool use “greeting phrase” such as “good morning” “bye”!



Teaching Tips

Lower Motivation

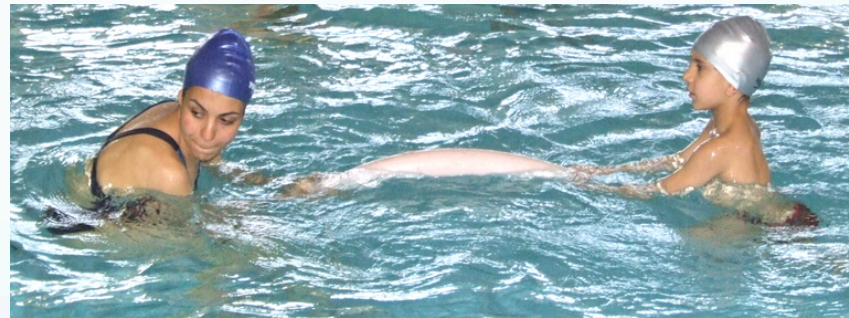
- Decrease stimuli in environment
- Reduce amount of space “use buoy”
- Use bright colors
- Use slow movements
- Provide free-time activities
- 5-30 min. lesson
- Frequently changing activities



Teaching Tips

Tactile Sensitivity

- Create turbulence around an extremity to increase awareness of its position in space!
- Use weight lifter's belt, to dress old clothes!
- Walk in neck-deep water!
- Use kick board!
- Use “aqua noodles” “sponges”
- Benefit from group aquatic plays (snake)



Teaching Tips

Understanding Problems

- Start with one-step directions and gradually move on to more step directions!
- Repeat directions!
- Use visual and verbal prompts “go on train game” “move arms now”
- Use lap counters to help participants keep track of laps or it should be counted by child!
- Use basic orientation questions “how many laps did you walk?” or “one more” or “last lap”



Teaching Tips

Communication Facilitators

- Use greetings phrase “hello”
- Providing choice making “red or blue ball?”
- Blowing ping-pong balls!
- Making bubbles with mouth!



Aquatic Lesson

- Introduction (warm-up phase)
- Individual instruction (activity phase)
- Free-time activities (pick up toys, net game)
- Goodbye (cool-down phase)



(Prupas et al., 2006)

Aquatic Lesson

Introduction Phase

- Formed a circle
- Routine welcomed song
- 10 minutes
- Mental adjustment
- Recognition pool environment



Aquatic Lesson

Individual Instruction Phase

- One-to-one instruction
- Relaxation
- Teaching aquatic activities in the vertical and horizontal position
- 20 minutes
- Use errorless teaching strategies and apply basic concept



Aquatic Lesson

Free Time Phase

- Play time!
- Making choice!
- Competition!
- To splash water
- Pick up balls and toys
- Parachute game
- Basketball nets



Aquatic Lesson

Good Bye Phase

- Signal for end of the session!
- Preparation for leaving!
- Use departure technique!



Research Application-1

Education and Training in Autism and Developmental Disabilities, 2010, 45(1), 124–135

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Effects of Constant Time Delay Procedure on the Halliwick's Method of Swimming Rotation Skills for Children with Autism

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Research Application-1

“The Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism”

Education and Training in Autism and Developmental Disaibilities, 2010; 45 (1): 124-135.

- A single subject multiple baseline model across behaviors with probe conditions was used.
- Subjects were three boys, 8-9 years old.
- Data were collected over a 10-week with session three times a week period using the single opportunity method as an intervention.
- Rotation skills are second phase of the Halliwick’s Method!

Research Application-1

“The Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism”

Education and Training in Autism and Developmental Disabilities, 2010; 45 (1): 124-135.

- Task Analyses for Vertikal Rotation Skills
 1. Subject turns his back to the trainer
 2. Subject slightly bends his head to the trainer
 3. Subject lays back
 4. Subject bends his head and tucks his legs to the chest
 5. Subject stands still

Research Application-1

“The Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism”

Education and Training in Autism and Developmental Disabilities, 2010; 45 (1): 124-135.

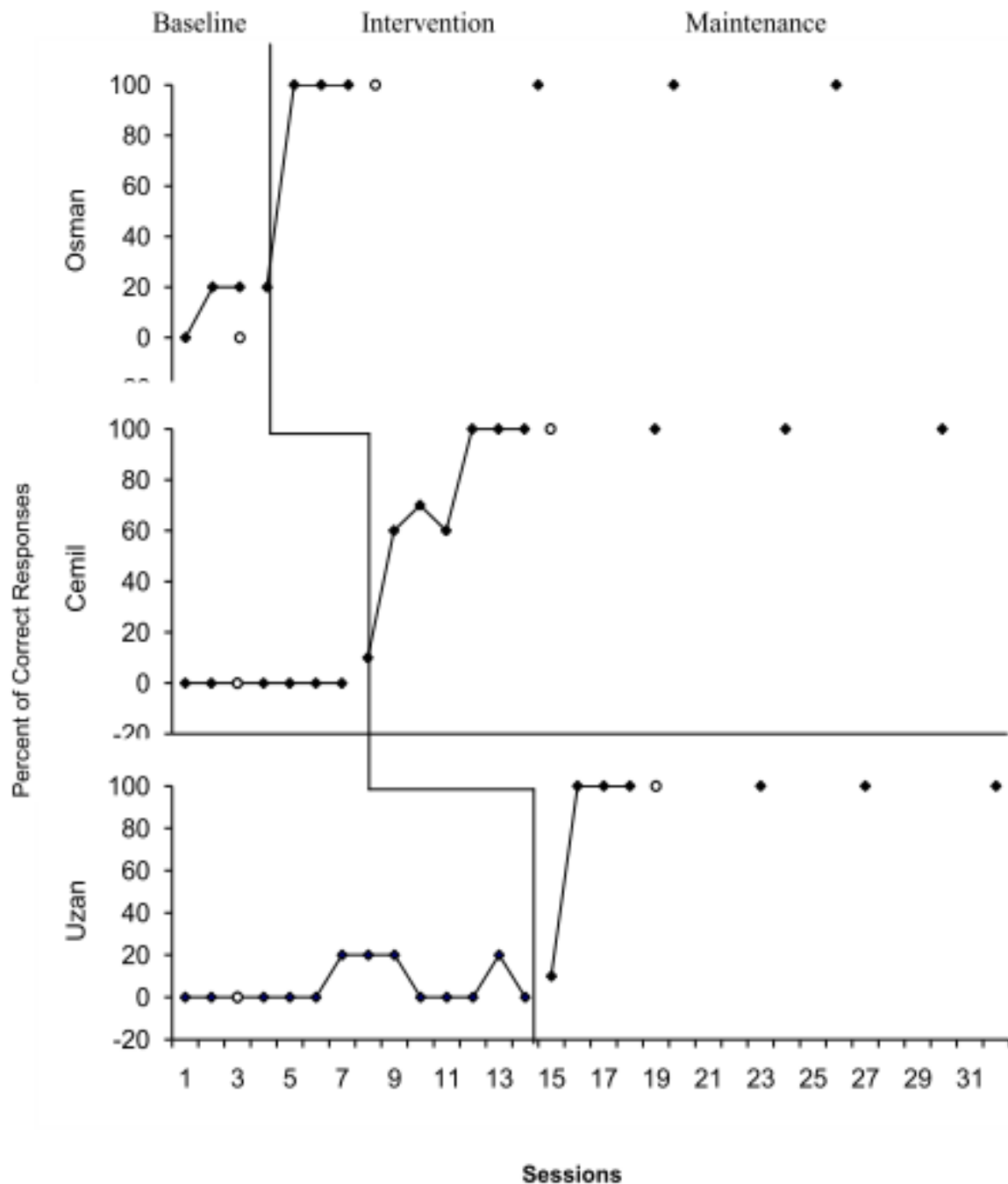
- Task Analyses for Lateral Rotation Skills;
 1. Subject lays back
 2. Subject places hands to lateral sides of body
 3. Subject holds from trainer’s hand
 4. Subject takes a deep breath and close mouth
 5. Subject rotates once with commend of trainer and lays back

Research Application-1

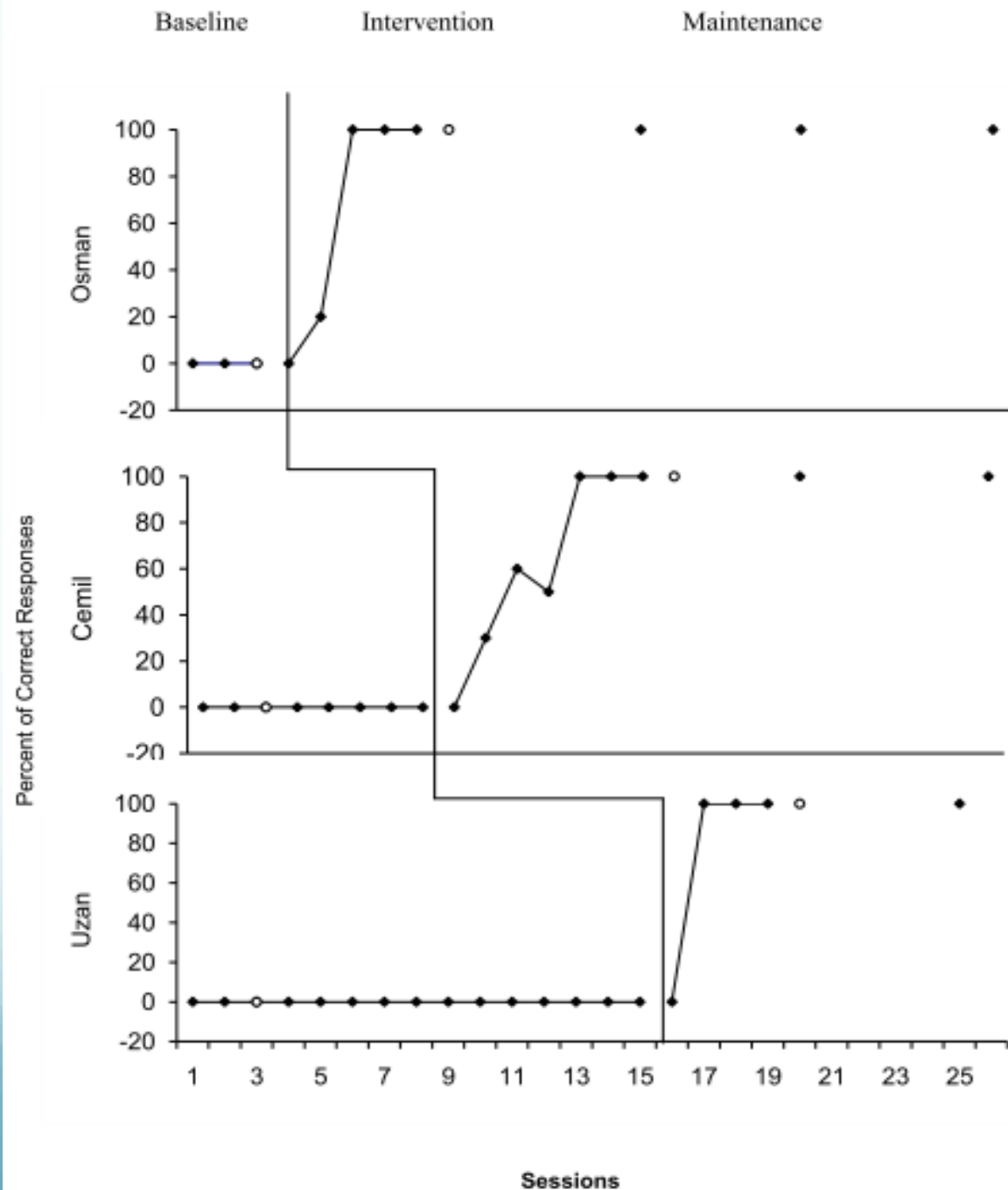
“The Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism”

Education and Training in Autism and Developmental Disabilities, 2010; 45 (1): 124-135.

- Results revealed that all subjects increased their correct rotation skill significantly during intervention.
- In addition, subjects maintained their successful skills during first, second and forth week of generalization phases.



- Results showed that constant time delay procedure was an effective way of increasing and maintaining Halliwick's method of swimming vertical rotation skill of children with autism.



- Results showed that constant time delay procedure was an effective way of increasing and maintaining Halliwick's method of swimming lateral rotation skill of children with autism.

Research Application-2

Education and Training in Autism and Developmental Disabilities, 2010, 45(3), 440–448

© Division on Autism and Developmental Disabilities

Effects of Most to Least Prompting on Teaching Simple Progression Swimming Skill for Children with Autism

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Mehmet Yanardağ
Anadolu University

Research Application-2

“Effects of Most to Least Prompting on Teaching Simple Progression Swimming Skill for Children with Autism”

Education and Training in Autism and Developmental Disabilities, 2010; 45 (3): 440-448.

- A single subject multiple baseline model across subjects with probe conditions was used.
- Subjects were three boys, 9 years old.
- Data were collected over a 10-week with session three times a week period using the single opportunity method as an intervention.

Research Application-2

“Effects of Most to Least Prompting on Teaching Simple Progression Swimming Skill for Children with Autism”

Education and Training in Autism and Developmental Disabilities, 2010; 45 (3): 440-448.

- Results revealed that all subjects increased their simple progression swimming skill significantly during intervention.
- In addition, subjects maintained their successful skills during first, second and forth week of generalization phases.

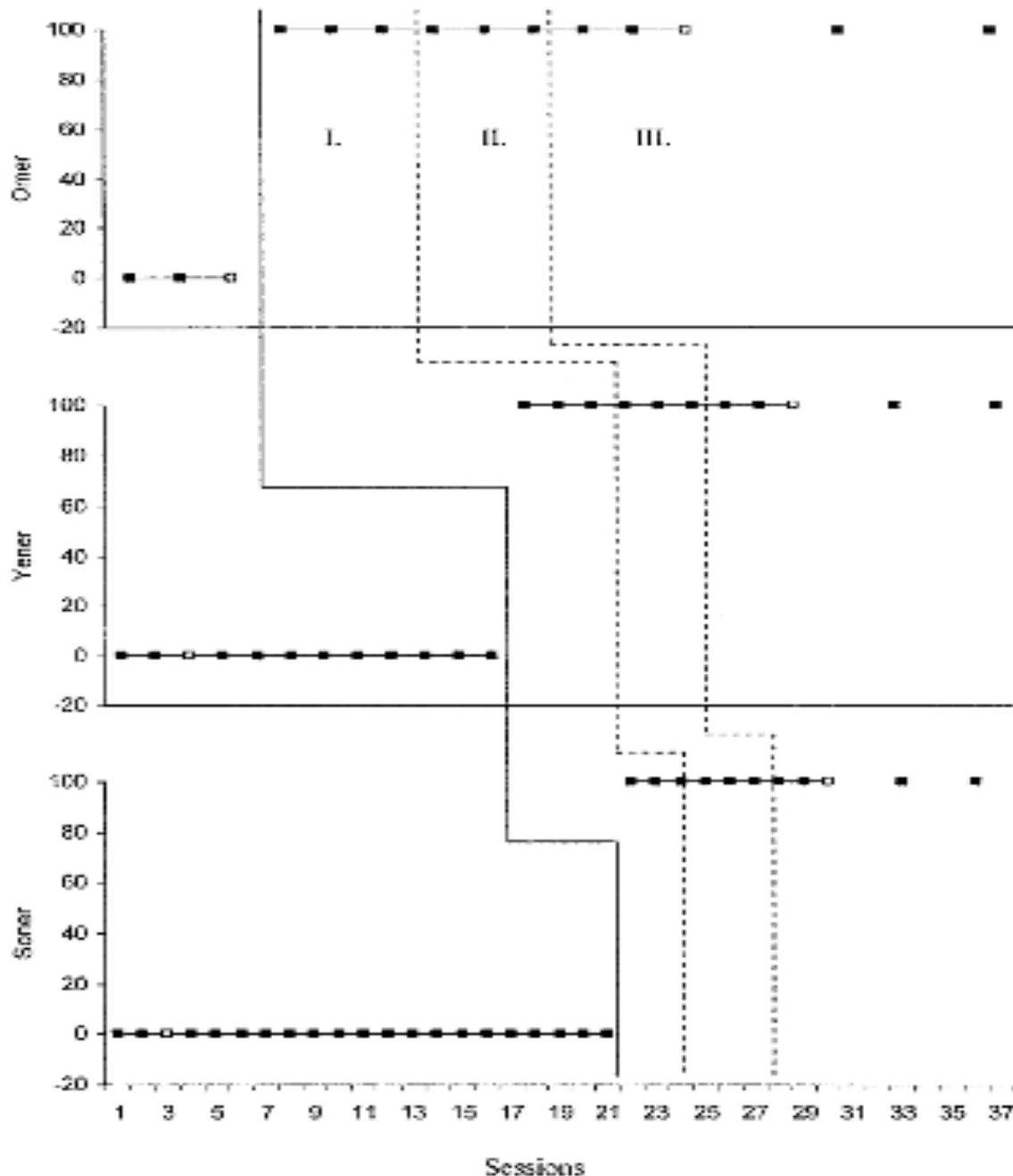
Research Application-2

Student	Prompt level	Number of Session
Ömer	Physical + Verbal	3
	Verbal + Gesture	3
	Verbal	3
Yener	Physical + Verbal	3
	Verbal + Gesture	3
	Verbal	3
Soner	Physical + Verbal	3
	Verbal + Gesture	3
	Verbal	3

A

B

Maintenance



- Results showed that most-to-least prompting was an effective way of increasing and maintaining simple progression swimming skill of children with autism.

Research Application-3

Pediatrics International (2004) **46**, 624–626

Patient Report

Effects of swimming training on physical fitness and water orientation in autism

ILKER YILMAZ,¹ MEHMET YANARDAĞ,² BÜNYAMIN BIRKAN³ AND GONCA BUMIN⁴

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Research Application-3

“Effects of Swimming Training on Physical Fitness and Water Orientation in Autism”

Pediatrics International, 2014; 46: 624-626.

- The purpose of this study was to determine the effects of water exercises and swimming on motor performance and physical fitness, and to observe the developmental of beginner swimming skills for a child with autism.
- Subjects was 9-years old.
- The swimming education program was conducted over 10-week, three times a week for 60 min each session.
- The assessment were performed before and after 10-week training.

Research Application-3

“Effects of Swimming Training on Physical Fitness and Water Orientation in Autism”

Pediatrics International, 2014; 46: 624-626.

- Some tests were used to determine physical fitness level;
 - *Six minutes walk test
 - *Balance test
 - *Flexibility tests
 - *Standing broad jump
 - *Shoulder flexion and knee extension strength
 - *Speed
 - *Thrust test

Research Application-3

“Effects of Swimming Training on Physical Fitness and Water Orientation in Autism”

Pediatrics International, 2014; 46: 624-626.

- Observational tool was used to record water orientation and beginner swim skills (Killian, 1984).

Research Application-3

“Effects of Swimming Training on Physical Fitness and Water Orientation in Autism”

Pediatrics International, 2014; 46: 624-626.

Fitness tests	Before	After
Peak VO2 (mL/kg/min)	20.33	20.69
Grip strength (kg)	9.4	12
Shoulder flexion strength (right) (kg)	10.1	13.2
Shoulder flexion strength (left) (kg)	8.3	11.2
Knee extension strength (right) (kg)	15.1	24.3
Knee extension strength (left) (kg)	12	15.1
Body lateral flexion (right) (cm)	10	14
Body lateral flexion (left) (cm)	9	12
Body hyperekstension (cm)	9	29
Sit and reach (cm)	-5	0
Balance – open eyes (right) (s)	12.9	46.19
Balance – open eyes (left) (s)	8.92	21.16
Balance – close eyes (right) (s)	12.72	16.59
Balance – close eyes (left) (s)	2.33	10.69
Agility (thrust) (point)	10	13
Standing broad jump (cm)	104	110
Running 22.86 m (s)	7.47	5.88

Research Application-3

“Effects of Swimming Training on Physical Fitness and Water Orientation in Autism”

Pediatrics International, 2014; 46: 624-626.

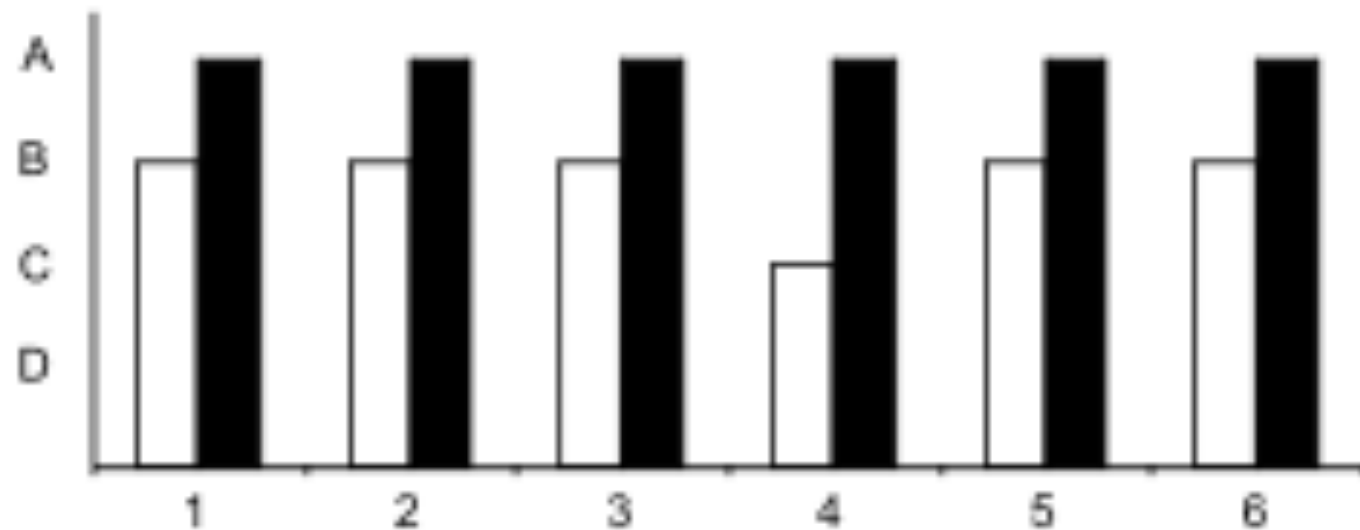


Fig. 1 Measuring water orientation. 1, Walks to pool; 2, touches water; 3, enters pool; 4, sits etc. in pool; 5, blows bubbles; 6, face submersion. A, spontaneous; B, voluntary; C, manipulation; D, objection.

Research Application-4

informa
healthcare

Disability & Rehabilitation, 2013; 35(1-2): 47-56
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RESEARCH PAPER

The effectiveness of video prompting on teaching aquatic play skills for children with autism

Mehmet Yanardag¹, Nurgul Akmanoglu¹ & Ilker Yilmaz²

¹Anadolu University, Research Institute for the Handicapped, Eskisehir, Turkey and ²Anadolu University, School of Physical Education and Sport, Eskisehir, Turkey

Research Application-4

“The Effectiveness of Video Prompting on Teaching Aquatic Play Skills for Children with Autism”

Disability & Rehabilitation, 2013; 35 (1-2): 47-56.

- A single subject multiple probe design across behaviors was used and replicated across subjects.
- Subjects were two boys and one girls, 5-7 years old.
- Data were collected over a 12-week with session three times a week period using the single opportunity method as an intervention.
- Three aquatic play skills were dependent variables in the study (Kangaroo, Cycling, Snake).

Research Application-4

“The Effectiveness of Video Prompting on Teaching Aquatic Play Skills for Children with Autism”

Disability & Rehabilitation, 2013; 35 (1-2): 47-56.

- Results showed that video prompting was effective in teaching aquatic play skills to children with autism.
- According to the social validity results, families of the children gave positive feedback about learned skills and movement capabilities of their children.

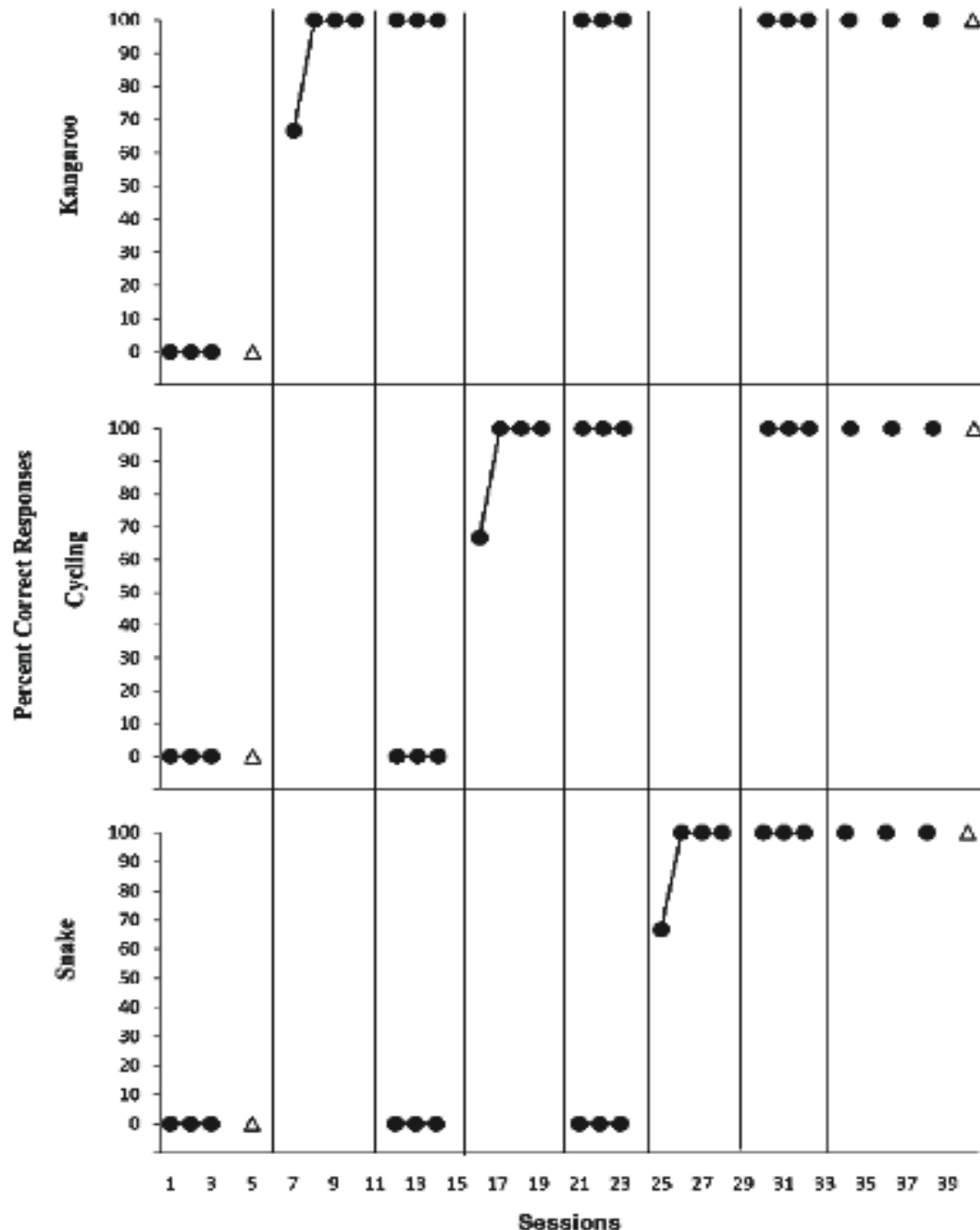
Research Application-4

“The Effectiveness of Video Prompting on Teaching Aquatic Play Skills for Children with Autism”

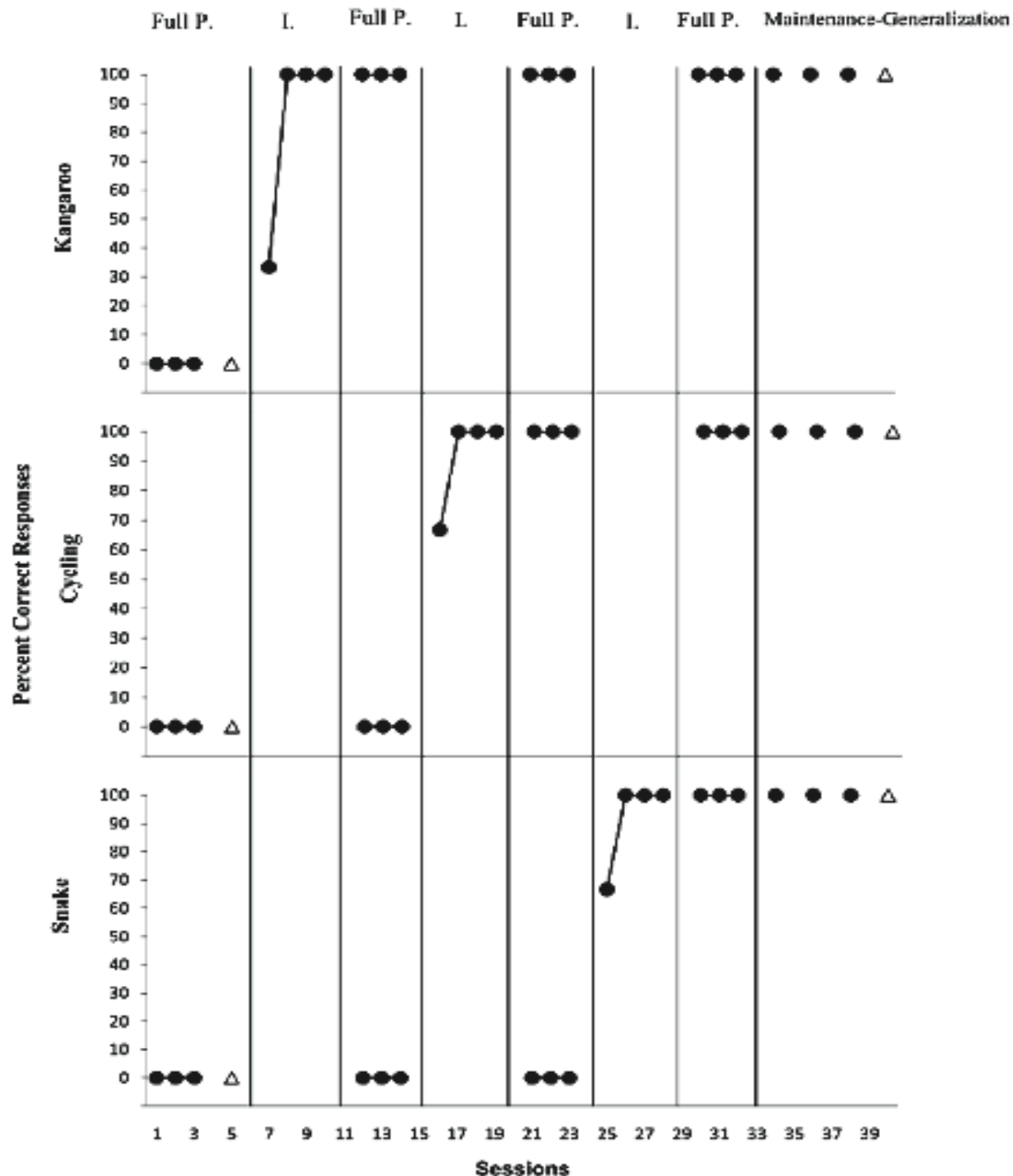
Disability & Rehabilitation, 2013; 35 (1-2): 47-56.

Skills	Steps in the task analyses
Kangaroo	1. Participant turns his/her body to instructor 2. Participant holds hands of the instructor 3. Participant jumps like a kangaroo inside of the pool with instructor
Cycling	1. Participant turns his back to instructor 2. Instructor holds waist of the participant and raise in the water 3. Participant moves his legs forward like pedalling a bicycle
Snake	1. Participant goes back of the instructor 2. Participant holds from instructor's shoulders with both hands 3. Participant follows instructor 20 meters within the water

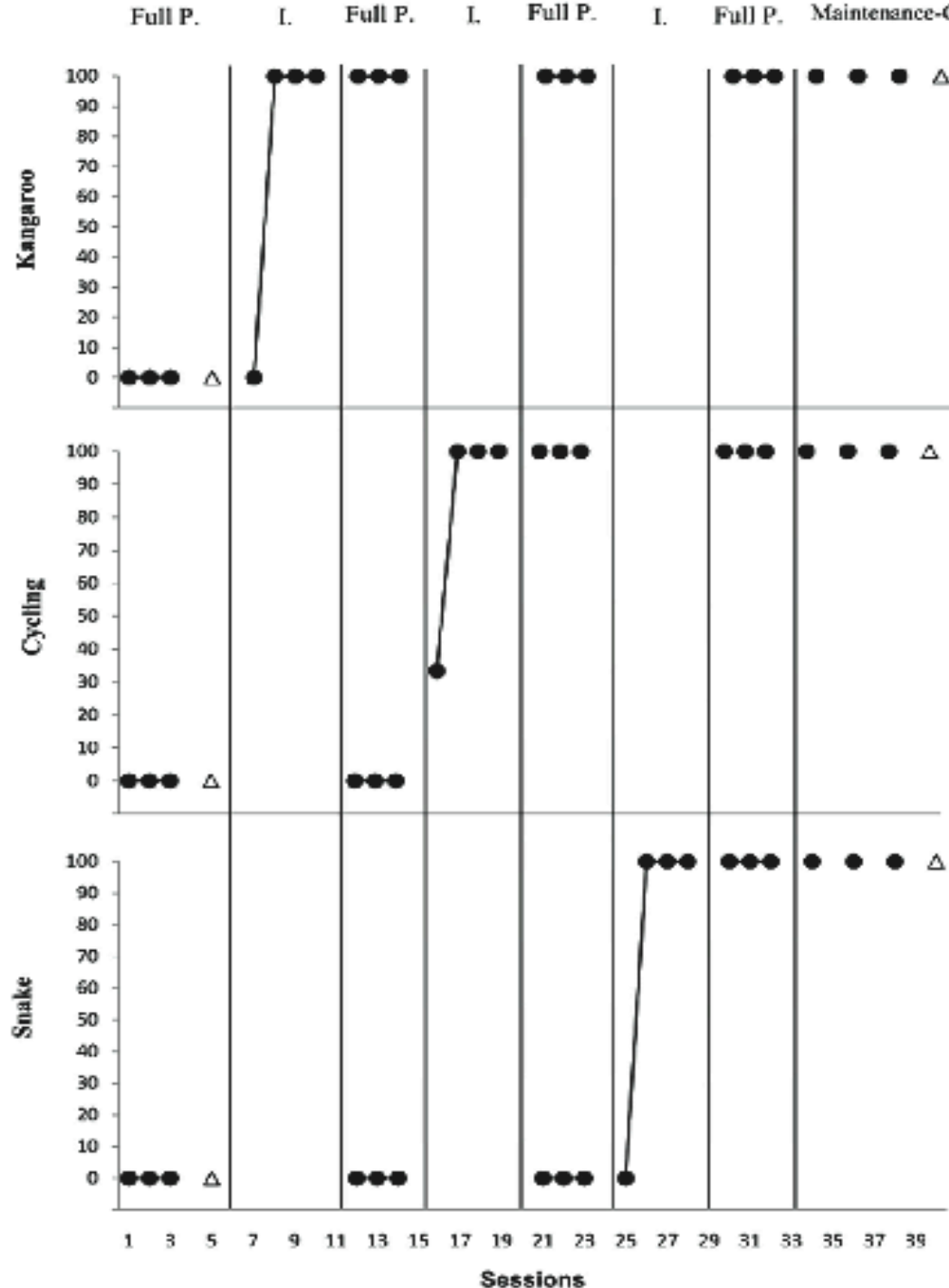
Full P. I. Full P. I. Full P. I. Full P. Maintenance-Generalization



At baseline, Berat displayed 0 % of the steps correctly in the first three sessions for Kangaroo, Cycling, and Snake play skills. When the video prompting was delivered in session 4, He displayed an immediate increase in the percentage of steps completed correctly. He reached the acquisition criterion of 100 % after four sessions in all play skills. 36 trials were conducted, Incorrect responses of 8.3 % in all intermittent probe sessions.



At baseline, Sacit displayed 0 % of the steps correctly in the first three sessions for Kangaroo, Cycling, and Snake play skills. When the video prompting was delivered in session 4, He displayed an immediate increase in the percentage of steps completed correctly. He reached the acquisition criterion of 100 % after four sessions in all play skills. 36 trials were conducted, Incorrect responses of 11.1 % in all intermittent probe sessions.



At baseline, Sumru displayed 0 % of the steps correctly in the first three sessions for Kangaroo, Cycling, and Snake play skills. When the video prompting was delivered in session 4, She displayed an immediate increase in the percentage of steps completed correctly. She reached the acquisition criterion of 100 % after four sessions in all play skills. 36 trials were conducted, Incorrect responses of 22.2 % in all intermittent probe sessions.

Thank you...

