Modifications & Adaptations for Successful Inclusion in Aquatics for Individuals with Visual Impairment

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Picture

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Related Research

Aquatics is used as physical fitness and recreational activity for all individuals. Swimming is a closed and continuous skill, meaning the environment is predictable and the individual has control of timing and pace of performance; the skill can be performed for varying timing and pace (Lieberman, Ponchillia, & Ponchillia, 2013). Aquatics, being in a predictable environment, allows the individual control of the intervals, which helps foster independence for individuals with disabilities. Aquatics has many benefits for individuals with disabilities such as; providing peer-group interactions, acceptance, and learning acceptable social behavior including sharing and waiting one’s turn (American Red Cross, 1977). There is an assortment of adapted aquatic manuals to help instruct aquatics along with how to teach a variety of individuals with disabilities how to swim. However, there is a deficiency in how to effectively include and adapt the aquatic environment for individuals with visual impairments (VIs). Spry (2010) states,

“If aquatic programming is not constructed to accommodate individual needs, the environment may not be safe for all swimmers. To ensure adapted swimmers reach their full potential cognitively, physically, and socially, instructors need to understand how the disability affects the individual in the aquatic environment…”

Lieberman states that aquatics is ranked the number one preferred physical activity for individuals with VIs (Livelsberger, 2012). Physical activity has many benefits for individuals with VIs, such as increased stamina, self-esteem, perceptions of one’s own competence, one’s sense of autonomy, and relationship skills (Lieberman et al., 2013). Unfortunately, there is a lack of opportunity for individuals with VI to be physically active. Everyone deserves formal and informal opportunities to fully develop physical skills and abilities (Tutt, Liberman, & Brasher, 2012).

 The lack of opportunities comes from lack of services and barriers related to social attitudes (Lieberman et al., 2013). According to Stuart, Lieberman, & Hand (2006), various delays that students who are visual impaired experience, within physical activity, are not associated with genetic limitations, but the result of discouraging behavior from teachers and facilitators .This obstructs the development of skills necessary for individuals with VI to be physically active independently later in life (Lieberman et al., 2013). Norris, Toole, and Columna (2018) states, “swimming opportunities for children with VI are often limited due to the lack of facilities, staffing, time, and concerns for safety.”

Individuals with Disabilities Education Act (IDEA) defines visual impairment as, “an impairment in vision that, even with correction, adversely affects a child’s educational performance. The term includes both partial sight and blindness” (IDEA, 2004). In 2017, among persons of all ages in the US, it was reported that 2.3% of individuals have a visual impairment (Cornell University, 2017).

It is important to recognize the severity of the VI and which category the impairment falls into so appropriate modifications and accommodations can be made. Stuart et al. (2006) defines the classifications as the following:

 “The B1 classification refers to individuals who are totally blind or have the ability to perceive light. The B2 classification, also called "travel vision", refers to those who have the ability to see forms to a visual acuity of 20/600 after best correction or a visual field of less than five degrees in the better eye, or both. The B3 classification refers to those who have a visual correction in the better eye or a visual field of less than 20 degrees and more than five degrees in the better eye, or both (that is, legal blindness).”

Although the terms “accommodation” and “modification” are often used interchangeably, their definitions are not completely synonymous. Connecticut State Department of Education defines accommodation as “adaptations that address the needs of the student by removing the effects of the disability but not altering the performance outcome.” Whereas, Connecticut State Department of Education defines modification as “adaptations that address the needs of the student by fundamentally altering the performance outcome.” Modification may also apply to changing equipment and tasks to increase opportunity for students to succeed (n.d). When thinking about modifying equipment, there are six ways to modify equipment: size, speed, surface, support, sound, and switch, or also known as the six S’s” (Block, 2016).

I interviewed Monica Lepore PhD, CAPE, and professor in the Department of Kinesiology at West Chester University in Pennsylvania. M. Lepore is recognized as an expert in aquatic and adapted physical education. One of her most well-known publications is a textbook on adapted aquatics. M. Lepore has also worked with Camp Abilities nationwide as an aquatics director for 25 years. Camp Abilities is an educational sports camp for children and teens who are blind, visually impaired, and deafblind. M. Lepore defines adapted aquatics as an instructional setting for individuals with disabilities to empower and teach skills to foster independence, working towards recreational aquatics. and is an education progress working towards goals (personal communication, February 24, 2020). M. Lepore defines recreational aquatics as people choose something in their leisure time that is worth their time and is health enhancing, using selection and self-determination, and does not require goals (personal communication, February 24, 2020). M. Lepore stated that individuals with visual impairment in the school districts in the United States received Expanded Core Curriculum (ECC). The field of education has instituted a curricular approach to ensure that children with visual impairments receive the education they need called the Expanded Core Curriculum. The nine components of the ECC include (a) compensatory or access skills, (b) career education, (c) independent living skills, (d) orientation and mobility (O&M) skills, (e) recreational and leisure skills, (f) self-determination skills, (g) social interaction skills, (h) use of assistive technology, and (i) sensory efficiency skills (Lieberman, Haegele, Columna, & Runyan, 2014). M. Lepore stated that adapted aquatics meets the ECC’s recreation and leisure skill requirements (personal communication, February 24, 2020). Recreational and leisure skills for students with visual impairments must be planned and deliberately taught, focusing on the development of lifelong, enjoyable activities (Sapp, W., & Hatlen, P, 2010).

Norris et al. (2018) states, “Aquatics is an important part of inclusion in physical activity lifestyle of all people.” The benefits in adapted aquatics can be categorized into the following: rehabilitation & fitness benefits, functional skills, and sensory stimulation (Fronk, 2001). There are many different aquatic programs for individuals with disabilities, such as Halliwick Method, Project Inspire, and Special Olympics (Spry, 2010). The Halliwick Method from the 1950s focuses on the scientific principles of hydrodynamics and body mechanics. The Halliwick Method has four phases: phase one concentrates on water adjustment, phase two is establishing rotational control also known as balance restoration, phase three concentrates on controlled movement and the swimmer trusting the buoyancy, phase four is establishing movement and facilitation in the water (Spry, 2010). Project INSPIRE from 1999 was created by Harrison, an undergraduate student from Texas Woman’s University as well as graduate students and fellow faculty from Texas Woman’s University. Project INSPIRE gives considerations and recommendations for swimmers based on individual disabilities. Project INSPIRE stresses the importance of understanding the swimmer’s sensory integration needs prior to building aquatic skills (Spry, 2010). Once the swimmer’s needs have been met, then the instructor can develop basic swimming skills. The Special Olympics aquatics method is a mixture of Halliwick Method & Project INSPIRE. Special Olympics consists of the phases in the Halliwick Method; as well as focusing on individual needs and outlines a wide spectrum of disabilities and how to accommodate these individuals as outlined in Project INSPIRE (Spry, 2010).

All the aquatics programs listed above are helpful for facilitating adapted aquatics, however, Norris’s workshop program is one of the only programs specifically designed for individuals with VI. Michael Norris, Karen Toole, and Luis Columna performed an aquatics workshop for parents with children with VI. This workshop allowed parents to learn and practice how to use an aquatic assessment as well as modify aquatics games for their children (Norris et al., 2018). The program consisted of four, one day workshops including orientation & mobility, motor development & physical activity, aquatic workshop, and team sports. The aquatic workshop consisted of two sessions a day, morning and afternoon. The morning sessions was just for the parents to learn information on the aquatic assessment and how to help their child adjust to a new environment. The afternoon session was for the parents to apply the skills and concepts they learned in the morning with their child in the pool (Norris et al., 2018). Norris et al. (2018) states, the best format for success is a 2:1 ratio (two volunteers: one parent/child). The volunteers should be certified water safety instructors, lifeguards, or former swim team members (Norris et al., 2018).

According to Norris et al. (2018), the following steps are required to implement an aquatics program for families of children with VIs:

Step 1: Identify the personnel

Step 2: Identify the educational and research goals

Step 3: Identify equipment and facilities

Step 4: Staff member training

Step 5: Recruitment of participants (children and parents)

Step 6: Initial assessments (parents, children, and teacher candidates)

Step 7: Workshop 1- Orientation and Mobility

Step 8: Post Program Assessment (parents, children, and teacher candidates)

Step 9: Staff Meetings (this is an ongoing process before and after each workshop)

The results of the study, during interviews showed that these workshops facilitated an enjoyable experience for both parents and their child. The parents acquire basic knowledge to assess their children’s aquatic ability, and parents also gained valuable skills in aquatics to help their children be more comfortable in an aquatic environment (Norris et al., 2018).

There are many different instructional strategies when teaching adapted aquatics. Lieberman et al. (2013), recommends a part to whole approach when instructing individuals with VIs. The part to whole approach is breaking down complex skills into small sections for enhancing the success of the learner. The instructor should also use detailed verbal explanations to describe skills or equipment to individuals with VIs. After explanations, the instructor should check for understanding by having the student give a description of the skill, task, equipment, or environment. Lieberman et al. (2013), also recommends tactile modeling and physical guidance when instructing an individual with VI. Tactile modeling involves allowing the student to feel the instructor executing a skill or movement that could be difficult to learn verbally. The instructor would state specifically where the student should feel for example, “feel how my legs are straight while I flutter kick.” Physical guidance is the “hand over hand” approach also known as physical brailling. The instructor would ask to physically guide the student through the skill such as, “may I touch your feet and show you how the flutter kick should feel?” The instructor can repeat tactile modeling and physical guidance as many times as necessary for the student to understand the movement or skill (Lieberman et al., 2013).

All individuals can benefit from being physically active, some benefits include: providing peer-group interactions, acceptance, and learning of acceptable social behavior. Everyone deserves opportunities to be physically active in a safe environment. Aquatics is a safe and predictable environment for many individuals with disabilities, especially for individuals with VIs. To ensure adapted swimmers reach their full potential, instructors need to understand how the disability affects the individual in the aquatic environment. Once the instructor understands how the disability affects the individual, they can make appropriate adaptations. Individuals with VIs can be just as successful in aquatics as their peers without a visual impairment, when provided with proper instructional strategies, aquatic environmental modifications, and adapted equipment. These adjustments can help foster independence for individuals with VIs.

Benefits

I interviewed Scott McNamara PhD, CAPE, and professor in the Kinesiology department at the University of Northern Iowa about the benefits of physical activity for individuals with VI. S. McNamara has experience operating Camp Abilities Michigan for individuals with VI for 5-6 years. McNamara has also helped facilitate Camp Abilities in Maryland, Texas, and Iowa. He has also conducted multiple research studies for individuals with VI (personal communication, December 6, 2019).

S. McNamara defines physical activity as “more than just movement, it is purposeful movement to aid in transitioning into lifetime activities” (personal communication, December 6, 2019). S. McNamara listed the following as benefits of being physically active: “health outcomes, lowering obesity rates, cardiovascular health, longevity, and social communications” (personal communication, December 6, 2019). For individuals with VI, they have additional benefits to being physically active. These benefits include balance, perceptual motor skills, sound locations, sensory integration (S. McNamara, personal communication, December 6, 2019).

S. McNamara stated that individuals with VI need more accessible options and a variety of options for being physically active. Individuals without a visual impairment have a variety of sports leagues, fitness centers, and neighborhood parks that are accessible and available to them (personal communication, December 6, 2019). Everyone regardless of ability, has perceived barriers and real barriers. Perceived barriers include fear of failure and potential risk. Whereas, real barriers are associated with safety and accessibility. Real barriers to engage in physical activity are enhanced for individuals with VI (S. McNamara, personal communication, December 6, 2019). The aquatic environment tends to be more accessible with less barriers for individuals with VI to engage in physical activity. Aquatics consists of open ended learning and helps build confidence and self-esteem (S. McNamara, personal communication, December 6, 2019).

Idea for Implications

There are many different ways to modify the aquatics environment for an individual with a visual impairment. Lepore et al. (2015) recommends: a beeper transmitter for the walls of the pool, contrasting colored mats for the bottom of the pool, bright colored tape on the stairs or steps leading into the pool, having the individual trail the side of the pool or lane rope for direction, and having the instructor wear bright athletic tights or sleeves to bring attention to body part actions underwater. Lieberman et al. (2013) recommends: Braille or larger print flip cards to keep track of laps swam, having the individual stand on carpet or mat squares during instructions to provide orientation and help define range of motion, using a tapper (as used in international competitions), and having the individual feel a tactile map of the aquatic environment. Rimmer et al., (2004) defines tactile maps as, “maps in which areas and routes are indicated by raised lines and surfaces, helping individuals with visual impairments orient themselves to the facility.”

Using these adaptations and modifications allows individuals with VI feel more comfortable and confident in the aquatic environment. Livelsberger (2012) stated, “Swimming provides an opportunity for individuals with visual impairment to be physically safe and successful with their non-visual impairment peers.” When making accommodations, the goal is that they do not make the individual with VI stand out from his or her peers. The instructor should assess the individual to learn their comfortability level in the aquatic environment, the level of their VI, and the level of their swimming skills before making any adaptations and modifications; as the instructor, it is important not to over adapt or modify. The instructor should also ask the individual what their goals are and what they hope to achieve in the aquatic environment before making any adaptations and modifications. Instructors need to be aware that the goals of the student may differ from that of the instructor (American Red Cross, 1977). Longmuir & Bar-Or (2000) states, “previous studies that found that more than 80% of children who are visually impaired perceived a limitation in their ability to engage in physical activity.”

Modifications and Adaptation

1. **Facility Modifications**
2. **Magnets on locker**
	* + Description: Swimmer is able to place a magnet on their locker in the locker room to be able to independently find their locker after their swim.
		+ Link:<https://www.walmart.com/ip/Officemate-OIC-Assorted-Heavy-Duty-Magnets-Circles-Assorted-Sizes-and-Colors-30-Tub-92501/45298774>
		+ Picture:
3. **Textured trail from locker room to pool**
	* + Description: Texture trail from the locker room door to the entry of the pool. This trail could be made with mats or pool equipment such as noodles for the swimmer to feel and follow to the appropriate entry point.
		+ Link:<https://www.americanfloormats.com/locker-room-pool-mats/?gclid=CjwKCAiAhc7yBRAdEiwAplGxX6roxO7hV82qWVZziUTXRbvbqha8RtuNMndXOk1iL1Zbr2f0vmNijRoC_CEQAvD_BwE>
		+ Picture:
4. **Raised numbers for pool depth**
	* + Description: Raised numbers that correspond to the depth of the pool, so swimmers can independently decide if they want to go into deep water.
		+ Link: <https://www.mypoolsigns.com/pool-depth-markers>
		+ Picture:
5. **Trailing wall or lane rope**
	* + Description: Swimmer trails the lane rope or the side of the pool to orient themselves to independently complete laps
		+ Link:<https://chicagolighthouse.org/sandys-view/swimming/>
		+ Picture:
6. **Orienteering through Environment**
7. **Tactile map of pool**
	* + Description: Map or model where areas and routes are indicated by raised lines and surfaces
		+ Link:<https://www.pathstoliteracy.org/blog/o-m-literacy-creating-tactile-map>
		+ Picture:
8. **Colored mats for steps leading into the pool**
	* + Description: Brightly colored mats or objects placed on the steps leading into the pool to aid swimmers in independence with depth perception on entering the pool.
		+ Link:<https://www.americanfloormats.com/locker-room-pool-mats/?gclid=CjwKCAiAhc7yBRAdEiwAplGxX6roxO7hV82qWVZziUTXRbvbqha8RtuNMndXOk1iL1Zbr2f0vmNijRoC_CEQAvD_BwE>
		+ Picture:
9. **Tot Dock**
	* + Description: Portable platforms that are easy to remove or place in the pool. Used to teach swimming and provide water safety stations for swimmers to orientate themselves.
		+ Link:<https://commercialpoolandspasupplies.com/accessibility-equipment/tot-docks>
		+ Picture:
10. **Adapted Aquatic Skills**
11. **Instructor in colored tights & sleeves**
	* + Description: Swim instructor in bright colored tights and sleeves to draw the swimmer’s attention to the instructor’s arms and legs.
		+ Link:[https://www.amazon.com/dp/B07Q474PSN/ref=cm\_sw\_r\_fm\_apa\_i\_-NwzEb48FC019?fbclid=IwAR0IR8LjiA7vsIV\_W3\_kg5Qwyrxc9GA0TDYst31qt0Z908r8ALU8d4Xzw8A](https://www.amazon.com/dp/B07Q474PSN/ref%3Dcm_sw_r_fm_apa_i_-NwzEb48FC019?fbclid=IwAR0IR8LjiA7vsIV_W3_kg5Qwyrxc9GA0TDYst31qt0Z908r8ALU8d4Xzw8A)
		+ Picture:
12. **Physical Guidance**
	* + Description: Hand over hand the instructor would physically guide the swimmer through the skill.
		+ Link: Oconnell, M., Lieberman, L. J., & Petersen, S. (2006). <https://files.eric.ed.gov/fulltext/EJ745982.pdf>
		+ Picture:
13. **Tactile Modeling**
	* + Description: The swimmer would feel the instructor’s body executing a skill or movement.
		+ Link: Oconnell, M., Lieberman, L. J., & Petersen, S. (2006). <https://files.eric.ed.gov/fulltext/EJ745982.pdf>
		+ Picture:
14. **Lifetime Recreational Aquatics**
15. **Large lap flip cards**
	* + Description: Large font size numbered cards on a metal ring for the swimmer to be able to keep track of their lap count.
		+ Link: <https://www.kiefer.com/kiefer-swim-lap-counter>
		+ Picture:
16. **Beeper for walls**
	* + Description: Sound transmitted device placed at the end of the lap lane to guide the swimmer to the wall and interpret their distance from the wall. Can also use a simple radio.
		+ Link: <https://www.maxiaids.com/mini-beeper>
		+ Picture:
17. **Tapper Stick**
	* + Description: A long pole or stick with a tennis ball attached to the end, that taps a swimmer on the head when they are coming to a wall. Can also use a pool noodle to tap the swimmer’s head.
		+ Link:<https://www.paralympic.org/news/how-do-visually-impaired-swimmers-know-where-their-opponents-are>
		+ Picture:
18. **Adapted Equipment**
* Magnets
* Texture Floor Mats
* Raised Numbers
* Lane Ropes
* Tactile Map
* Colored Mats
* Tot Dock
* Colored Tights and Sleeves
* Lap Flip Cards
* Beepers or Sound Device (radio)
* Tapper Stick or Pool Noodle

Resources

1. **Journal of Visual Impairment & Blindness**
* Description: *The Journal of Visual Impairment & Blindness* is the essential professional resource for information about visual impairment. The international peer-reviewed journal of record in the field, it delivers current research and best practice information, commentary from experts on critical topics, news, and events.
* Link: <https://journals.sagepub.com/home/jvb>
1. **Educating parents in aquatics activities for children with visual impairments. (Norris, M. L., Toole, K. M., & Columna, L., 2018).**
* Description: This article is a description of an aquatic workshop for parents who were presented within the context of the Fit Families program for children with VI. The workshop informed parents of aquatic opportunities and skills they could implement for their child in the water. This dual approach facilitated the development of their competency in the water and determined a starting point for future swimming instruction.
* Link:<https://journals-sagepub-com.libweb.uwlax.edu/doi/full/10.1177/0264619618784631>
1. **Swimming for children with visual impairments (Lepore, M., Haibach-Beach, P.S., Pierce, T., & Lieberman, L.J., 2018).**
* Description: Instruction and educational video on coaching and assisting a swimmer with a visual impairment. This video cover modification and adaptations to successfully and safely include a swimmer with visual impairment in the aquatic environment.
* Link:<https://www.youtube.com/watch?v=mVltPgzPP9A>
1. **Adapted aquatics programming a professional guide (Lepore, M., Gayle, G. W., & Stevens, S., 2007)**
* Description: The authors explore foundational issues of adapted aquatics, including models of collaboration, inclusion, planning, program development, facilities, equipment, and supplies. They lay out instructional strategies and detail how to build safe and effective programs. They also look at the specific needs of program participants and issues related to aquatic fitness and rehabilitation.They provide information on enhancing a program conducting competitive and recreational activities
* Link:<https://www.amazon.com/Adapted-Aquatics-Programming-Professional-Guide/dp/0736057307>

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