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Instructional Aids: To Use or Not to Use? Applying a Developmental Interpretation

Some time ago, a person naïvely asked me how the YMCA and Red Cross learn-to-swim programs differed. I facetiously replied, “Well, one uses ‘bubbles’ and the other doesn’t.” For the uninitiated or younger readers who weren’t around when infant and preschool swimming was just getting underway, “bubbles” were egg-shaped pieces of molded Styrofoam with a cloth belt that fastens around the waist of a young child. They were forerunners to the many different kinds of flotation devices available today. They served as simple flotation devices to hold a child’s head above water while the child paddled along, usually in a near vertical position. Flotation proponents claimed that the use of bubbles promoted task-specific neuromuscular development by reinforcing alternating arm and leg patterns (a.k.a., “dog paddle”) that promoted faster acquisition of swim strokes. For group classes offered in the typical 3–4 foot (0.9–1.3 m) shallow end of a pool, “bubbles” allowed an instructor to encourage all the children to be paddling around practicing instead of waiting at the pool side for a turn with the teacher.

Traditionally, the YMCA encouraged the use of “bubbles” and other flotation devices during their preschool and other learn-to-swim classes. This practice likely was influenced by the Y’s longstanding affiliation with physical education faculty from Springfield College (MA) who proposed this process. In contrast, swim teachers trained as Water Safety Instructors (WSIs) through the American Red Cross (ARC) mostly rejected flotation use, despite no specific written strictures against it in the training materials. Apparently, the culture and “unwritten curriculum” within ARC learn-to-swim sent powerful messages that children needed to learn to float on their own without any assistance. I came up through the Red Cross program myself and I clearly recall spoken and unspoken messages rejecting flotation aids. I have frequently heard the additional concern that young children become dependent upon flotation devices such as “floaties,” “swim vests,” or even swimming suits with pockets into which Styrofoam tubes can be inserted. Despite this widespread criticism, I know of no research that has specifically tested the “dependence hypothesis.” Perhaps the Kjendlie and Mendritzki (2012) article in this very issue of *IJARE* comes closest to addressing the dependence issue when they observed that children who used flotation vests exclusively in their lessons did significantly fewer vertical movements and requested to use float devices much more during free play than peers who didn’t use flotation vests.

Across the years, the question of whether “to use” or “not to use” instructional aids, especially flotation devices, in learn-to-swim programs has continued to arise. Most recently, a colleague inquired about the pros and cons associated with children using goggles during learn to swim programs. It was obvious to me that my colleague did not favor the practice of allowing goggles but was serious about examining whatever literature might exist. As I thought about the goggle question, the issues surrounding the use of goggles appeared very similar to those already mentioned related to using “bubbles.” In very general terms, the question seems to

me to boil down to a benefit to risk ratio. In other words, does the use of any specific instructional aid provide greater positive benefits that aid learning than negative influences such as creating an attractive nuisance, or unnecessary dependence, or even detracting from short term or long term learning? The dilemma for most practitioners is how to decide what evidence exists about this benefit: risk ratio. I have a few thoughts about how practitioners may make informed, evidence-based decisions that are based on consistent learning principles rather than on more judgmental biases that may relate to the convenience of the instructor.

Consider Published Research and Theoretical Principles

I recommend that the first step in decision making is to explore whether there is any readily available scholarly information about the device or teaching practice. Few researchers have investigated how well most instructional aids promote aquatic learning. For the most part, aquatic practitioners learn about the efficacy of specific instructional aids from informal information (i.e., unpublished websites, employing no statistical testing) and anecdotal testimony disseminated through popular presentations and workshops.

Interested practitioners ought to search the existing literature for existing evidence, a process that has become exponentially easier over the past decade as more and more journals are available online in full-text versions. I can recommend practitioners start with the reference list from the Kjendlie and Mendritzki (2012) paper as one excellent source of research papers dealing with the impact of flotation aids on learning aquatic skills. Those papers, in turn, may refer you to yet other potential research papers.

Few formal publications and even fewer informal presentations related to the impact of instructional aids on aquatic learning draw upon any sound theoretical framework. Of course, pseudo-scientific theories and misinterpreted theories abound in aquatics. To naïve instructors, it is often difficult to discern sound theoretical principles from those that are unsound or unsupported by evidence. Of course, sound principles and theoretical frameworks generally are published in recognized peer-reviewed scholarly sources. Less well supported or suspect theories are more likely to appear on the internet or in popular press sources. I tell my students that one way to differentiate more reputable online sources is to pay attention to the suffix used in the URL. For example, I tend to be much more skeptical of sources that are commercial or proprietary as identified by a dot-com suffix than those associated by non-profit organizations which use a dot-org suffix.

Examining the role of theoretical frameworks and principles in promoting sound practices goes beyond my intended topic in this paper. I do strongly believe, however, that theories, concepts, and principles can provide a framework through which investigators can make inferences and generalize to other situations. For example, in a previous editorial (Langendorfer, 2008), I discussed Bernoulli's principle applied to hydrodynamics and swimming. To the degree that Bernoulli's principle can serve as a valuable explanation for how swimmers move efficiently through the water, it may also provide a means for designing instructional aids that help swimmers develop their "feel" for the water. Certainly, Bernoulli's principle

and the application of buoyancy concepts were applied so effectively to competitive swim suit design that certain types of suits and materials have been outlawed from use in competition because of the extreme advantage they provided.

Adopt a Developmental Perspective

One common explanation for not allowing the use of some instructional aids in swimming has been that they habituate bad habits. For example, because bubbles or “floaties” tend to hold the child in an upright vertical position in the water, the logic says that the child is practicing the wrong way to swim (which should be in a more horizontal position), thus creating a “bad habit.” Another argument against using goggles in learn to swim is that the child is not forced to open her eyes in the water, which may initially sting and that eventually everyone needs to know how to do this for safety in case they accidentally fall in the water without goggles. I argue these particular concerns are philosophically misplaced. I think they presume that there is one single “correct” way that any skill should be performed, that skill learning requires mainly error correction and expunging improper techniques, and that the way a correct habit of doing the skill is acquired is through constant repetition and reinforcement of the right way and avoidance or extinction of the wrong way. This very common and popular interpretation comes from a philosophical epistemology arising from stimulus-response psychological theory that is embraced in the psychomotor domain by the area of motor learning.

I support a very different philosophical orientation called the *developmental perspective*. It is much less well understood than the omnipresent *error correction model*. I feel observational evidence supports the superiority of a developmental approach because it aligns much more closely with how we actually learn and perform motor skills on a day-to-day and lifelong basis. For one, we hardly ever use a single “right” pattern to accomplish any movement task, but instead we constantly, but unconsciously, adapt how we move to the multiple situations in which we find ourselves. For example, although most people could describe a “right way” to do a front crawl stroke (refer to any swimming text), if they observe swimmers in various aquatic settings (e.g., a crowded pool, surf, playing water polo), it is likely none of those swimmers would be performing the front crawl the “right way” as described in the text. Why? I would suggest that since movement patterns such as swimming strokes are dynamic coordination patterns, a competent swimmer automatically adapts coordination patterns to more effectively or efficiently match the conditions. If we didn’t do that, our movements would be very stereotyped; we would look as if we were swimming robots or zombies.

The *developmental perspective* views acquiring aquatic skills from a similar dynamical perspective. Developmental proponents appreciate that swimmers gradually change the way they swim over time as the person’s individual qualities such as body size, mass, composition, and fitness interact with the requirements of the task goal and the water environment. In another recent editorial (Langendorfer, 2011), I proposed that we incorrectly assume that we possess “swimming ability” (in fact, that we ought not even use that term) because “ability” is defined as an enduring, non-changing behavioral trait. Instead, I proposed the use of the term “water competence” to reflect that our swimming coordination patterns change

constantly as well as in relatively predictable orders over time because of the natural interactions among individual characteristics, task goals, and environmental conditions (Langendorfer, 2011).

Employ Developmentally Appropriate Practice (DAP)

Putting a developmental perspective into practice involves a philosophical framework advocated by the National Association for the Education of Young Children (NAEYC) called *developmentally appropriate practice* (DAP; Copple & Bredekamp, 2009). NAEYC provides a large number of resources including position statements and texts in which they studiously avoid actually defining DAP. Fortunately, my colleague, Mary Ann Roberton (1993), offered a wonderfully elegant definition that describes DAP as “matching the capabilities and needs of the individual child (or any age person) to the demands of the task.” As a strong developmentalist, Roberton went on to note that the process of applying developmentally appropriate practice extends to any where along the lifespan developmental continuum. Because each person’s behaviors continually change and adapt to various tasks and situations, we all are “ready” to change in some way, regardless of where we are along the developmental continuum (Roberton, 1993).

Astute readers may be wondering at this point, “What does DAP have to do with deciding whether or not to use an instructional aid?” I propose that Roberton’s concept of *developmental readiness* and definition of DAP provides a unique perspective for judging whether and how an instructional aid fits the needs of each individual. For example, given the needs of a specific young child, an instructor might ask, “Is this particular child ready to take advantage of the extra buoyancy provided by a bubble?” If the answer is that the child already has figured out that she has sufficient natural buoyancy, then the float probably isn’t necessary and might actually get in the way of the child progressing toward a more horizontal body position. On the other hand, for a different young child who insists on clinging to the wall from fear of sinking, perhaps the float is exactly the answer to solving her individual readiness question.

Extrapolating from these examples, I propose that the answer to the question of whether to use instructional aids, including flotation devices (which, by the way, Laura Slane, a former Aquatic Specialty Consultant at the national level of the YMCA of the USA, called “Instructional Flotation Devices,” IFDs), is to use Mary Ann Roberton’s DAP definition: what is the developmental readiness (i.e., the individual’s capabilities and needs) of that individual, the specific task, and the context. Using this definition, instructors would be wise to avoid an “all or nothing” approach that either always uses or always prohibits use of specific instructional aids. I would opine that the concern about being consistent is misplaced. I recommend making it clear to parents and children that IFDs are for specific purposeful uses to accomplish particular goals. If instructional devices obviously are linked to discrete purposes and goals, few parents will challenge such a rationale. Importantly, the decision to use or not use instructional devices becomes much more principle- and evidence-based and likely more successful in practice. Isn’t that what we are seeking to accomplish in our learn-to-swim lessons to help our swimmers be more successful, both in the short-term and over the long-term? We can discover how

effective *developmentally appropriate practices* are when we keep that basic principle in mind. In the same vein, Mary Ann Roberton (1993) suggested following a philosophy that no curriculum or instructional practice ought to be fixed in stone or be considered sacred; rather, she suggested that each child and her successful learning is what we should hold sacred!

Steve Langendorfer, Editor
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