

The acquisition of aquatic skills in preschool children: deep vs shallow water swimming lessons

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INTRUDUCTION

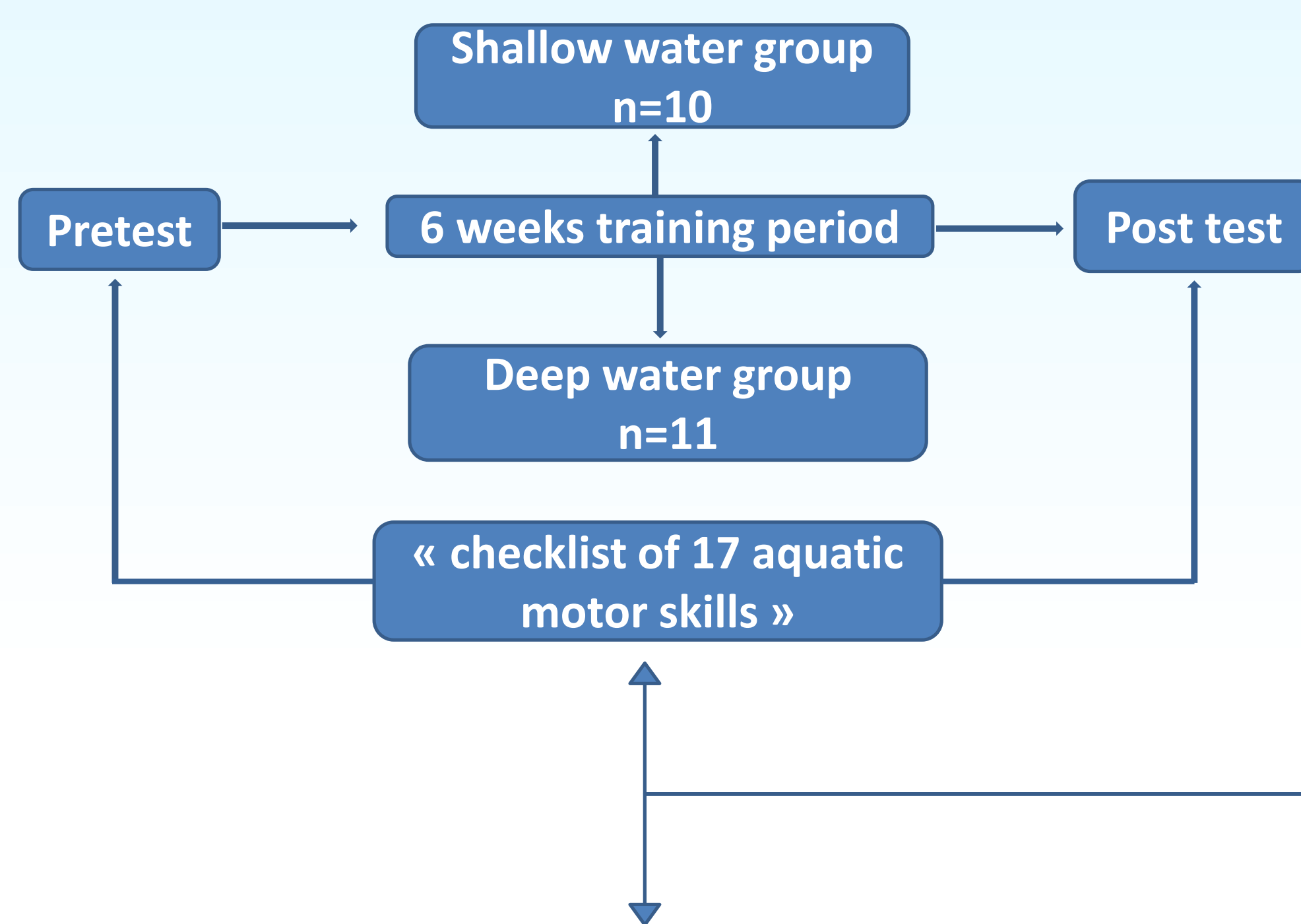
- There are several variables involved in the swimming teaching-learning process, most of them related to the particular characteristics of the water environment. One of the key factors seems to be the variation of water's depth. To our knowledge, any rigorous studies have already investigated with a controlled program how deep and shallow water may influence the development of preschooler's aquatic skills.

METHODS

Population

- 21 elementary school-aged children of both genders (4.70 ± 0.51 yr)

Aquatic readiness assessment



Each one of these skills was divided into increasing levels of complexity (three, four or five levels, depending on the categorical skill) as suggested by Langendorfer and Bruya (1995).

Swimming practice

Month	Week																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Sk1- water entry	↑	↑	↑	↑	↑	↑	↑	↑	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sk2- water orientation and adjustment at vertical position	↑	↑	↑	↑	↑	↑	↑	↑	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Sk3- breath control - immersion of the face and eye opening	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk4- horizontal buoyancy	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk5- body position at ventral gliding	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk6- body position at dorsal gliding	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk7- body position at longitudinal rotation in gliding	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk8- body position at front and back somersaults	-	-	-	-	-	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk9- leg kick with breath control at ventral body position, with flutter boards	-	-	-	-	-	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk10- leg kick with breath control at dorsal body position with flutter boards and without any flutter device	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk11- leg kick with breath control at dorsal body position with flutter boards	-	-	-	-	-	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk12- leg kick with breath control at dorsal body position with flutter boards and without any flutter device	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk13- feet-first entry	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk14- head-first entry	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk15*- Autonomous in deep pool (legs and arms displacement)	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk16*- vertical buoyancy at deep water	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sk17*- deep water immersion	-	-	-	-	-	-	-	-	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

Legend: -, Aquatic skill not developed; ↑, Aquatic skill highly developed; ↗, Aquatic skill moderately developed; ↔, Aquatic skill not directly development but consider pre-requisite.

RESULTS

- The results demonstrated that shallow water group managed to acquire a higher degree of aquatic competence particularly in five basic aquatic skills Sk3, Sk4, Sk5 Sk6 and Sk10 ($p < .05$).
- The discriminant function revealed a significant association between both groups and four included factors (aquatic skills) ($p < .001$), accounting for 88% between group variability.
- The discriminant analysis showed that the Sk5 (body position at ventral gliding) was the main relevant predictor ($r=0.535$), consistent with the data reported by Costa et al. (2012).

Skill	Levels of complexity	T0 (baseline)				T1 (six months practice)			
		Shallow Water (n=11)	Deep Water (n=10)	P-value	Cohen's d	Shallow Water (n=11)	Deep Water (n=10)	P-value	Cohen's d
Sk1	1 to 3	1.091±.302	1.100±.316	.947	.029	3.000±0.000	2.900±.316	.306	.448
Sk2	1 to 3	1.273±.467	1.000±.000	.081	.827	3.000±0.000	0.000±.000	-	-
Sk3	1 to 5	1.000±.000	1.000±.000	-	-	4.189±.879	3.100±.137	.042*	1.73
Sk4	1 to 4	1.000±.000	1.000±.000	-	-	2.636±.120	1.500±.850	.018*	1.87
Sk5	1 to 4	1.000±.000	1.000±.000	-	-	2.727±.647	1.200±.422	.000*	2.79
Sk6	1 to 4	1.000±.000	1.000±.000	-	-	2.090±.831	1.100±.316	.002*	1.57
Sk7	1 to 3	1.000±.000	1.000±.000	-	-	1.455±.522	1.300±.483	.491	.308
Sk8	1 to 4	1.000±.000	1.000±.000	-	-	1.000±.000	1.000±.000	-	-
Sk9	1 to 4	1.000±.000	1.000±.000	-	-	2.455±.522	2.100±.316	.079	.823
Sk10	1 to 4	1.000±.000	1.000±.000	-	-	2.000±.632	1.400±.516	.029*	1.04
Sk11	1 to 4	1.000±.000	1.000±.000	-	-	2.091±.701	1.700±.675	.209	.568
Sk12	1 to 4	1.000±.000	1.000±.000	-	-	1.818±.874	1.200±.422	.057	.900
Sk13	1 to 3	1.000±.000	1.000±.000	-	-	2.364±.505	1.800±.789	.064	.851
Sk14	1 to 3	1.000±.000	1.000±.000	-	-	1.727±.467	1.300±.675	.105	.736
Sk15	1 to 3	1.000±.000	1.000±.000	-	-	1.364±.505	1.500±.527	.552	.264
Sk16	1 to 5	1.000±.000	1.000±.000	-	-	1.364±.505	1.700±.483	.126	.680
Sk17	1 to 4	1.000±.000	1.000±.000	-	-	1.182±.405	1.300±.483	.549	.265

Discussion & conclusion

Aquatic skills at the children beginner's level should be learnt in a shallow water swimming pool.

The stepwise discriminant analysis revealed a significant association between both session types and four included aquatic skills for six months of practice.

The body position at ventral gliding seems to be the main significant predictor.

Deep water programs should be carefully planned to stimulate certain skills (i.e. body gliding) that seems to be differently exercised in both pool environments.

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