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Acquisition of Aquatic Motor Skills Through Children's Motor Stories

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Abstract

An increasing interest in the renewal of traditional recreational content and the use of the aquatic environments as educational resources is supported by very few empirical, evidence-based studies that link the two. This quasi-experimental study analyzed the role of stories in influencing perceived motor competence and real motor skills in seventy-eight children ages between 4 and 5 years through the administration of two questionnaires on aquatic motor ability and aquatic motor competence. Differences were found in aquatic motor competence ($p < .01$) and aquatic motor ability ($p < .05$) for the experimental group, where higher means values were obtained after the intervention. We present this methodological proposal as a useful educational tool for early childhood stimulation with achievements that go beyond motor progress itself.

Keywords: perceived motor competence, real motor competence, motor stories, aquatic activities, early childhood education.

Introduction

Childhood and the aquatic environment share many common features for different reasons. Firstly, childhood is the period of development when children make their most important progress in terms of walking, talking and discovering themselves and other people. For its part, the aquatic environment, the first medium children come into contact with during their intrauterine life, has come to be considered a highly favorable influence on the optimization of the developmental milestones in childhood. Children's familiarity with and their natural attraction to this medium is ideal for their physical and mental development through motor coordination processes, muscular development and cognitive (Grosse, 2011), personal and social skills (Burac, 2015). In the last decade, there have been numerous studies about motor activities carried out in an aquatic environment (Banks & Reimann, 2012; Costa, Marinho, Rocha, Silva, Barbosa, Ferreira, & Martins, 2012), and its use as a medium for the development of children's motor skills. The educational potential of the aquatic environment lies in the fact that it not only reinforces and enriches these areas of development, but also stimulates others. This connection between motor and cognitive development takes on special importance in the pre-school and primary school stage (Moreno & Gutiérrez, 1998), when recreational tools are indicated as the main means for its stimulation.

The developmental stage of early childhood shows us the connection existing between theory and practice for solving different problems (Koç, 2012). This requires taking into account different levels of didactic interest, such as motor, physical, social and intellectual objectives. Thanks to the interconnection between these different areas of knowledge, play in the teaching-learning process becomes an excellent educational resource, and is the real motor of children's activities in this period.

Therefore, the aquatic environment can be seen as a means of exceptional educational development and action by broadening personal limits in terms of individual responsibility and independence provided by this scenario. To be exact, this potential lies in the opportunity to promote cognitive, affective, motor and aquatic kinesthetic-tactile skills involved in the challenges that lead to the development of autonomy and competence in a medium that is not usual but is, however, attractive.

In this sense, motor games in an aquatic environment take on a special interest for educators because it provides possibilities to explore the environment and its role as a mechanism of interaction with others. Recent programs (Potel, 2009) show improvement in the social and personal development of children, and especially their subjective appropriation. Awareness of children's interaction with the environment enables us to evaluate their abilities and competencies (Parker & Blanksby, 1997; Ponce de León, 2009), as well as researching, discovering, and experimenting with different objects. For this reason, it is necessary to develop basic competencies through new teaching methodologies using new recreational resources with emphasis on the importance of children's perception of confidence (Moran, Stallman, Kjendlie, Dahl, Blitvich, Petrass, & Shuji, 2012). It is in this period when the contrast between real and perceived competence appears, and through exploration and experimentation children will be able to discover the limits they are faced with.

In our concern for the acquisition of aquatic motor competence in children, aquatic motor ability is conceived as the real ability to solve any aquatic motor problem where structures developed during the teaching-learning process are required (Moreno, 2005); meanwhile, perceived aquatic motor competence refers to how the children see themselves with respect to the execution of the activity in this medium (Moreno & Ruíz, 2008). It should be possible to relate both variables positively, supported by the idea that the characteristics of this scenario prompt the search for multiple solutions to the problems posed during play, thereby favoring the real motor competence of the child (Fernández-Río & Velázquez, 2005), and therefore perceived competence. However, in the research reviewed to date, there are only data about the improvement in perceived competence, but not in real ability (Moreno-Murcia, Huéscar, Polo, López, Carbonell, & Meseguer, 2016). Both play and dramatization, key aspects in the aquatic motor story, constitute two mediums that act as a vehicle for movement through learning. During this stage, which is so significant for children, motor stories can become a very useful educational tool (Martínez & Moreno, 2011; Martínez, 2007), since apart from contributing to establishing new possibilities of motor development in children, they also encourage their creativity (Iglesia, 2008).

For this reason, and because children aged between 3 and 6 have shown a strong lack of confidence and fear of the aquatic medium, we are

concerned with promoting the use of teaching scenarios where greater trust and confidence are generated in the participants. The aim of this study was to evaluate perceived competence and aquatic motor ability in children aged between 4 and 5 through a program of motor stories. By using aquatic motor stories, children from the experimental group are expected to improve in both motor ability and perceived motor competence in comparison to the control group.

Method

Participants

Seventy-eight children ages between 4 and 5 years (M = 4.39, SD = .57) participated in this study. Females comprised 55.13% of the sample in contrast to 44.87% males while 51.29% of the sample were 4 year olds (4.0-4.9 years) and 48.71% were 5 year olds (5.0-5.9 years). We divided the sample randomly into two groups, an experimental group consisting of (n = 30; 60% were females; 40% were males) and a control group (n = 48; consisting of 52.09% females in contrast to 47.91% males.

Measures

Aquatic Motor Ability. The "aquatic motor ability" measure was adapted from the *Escala Pictórica de Competencia Acuática Percibida* (EPCAP) (Perceived Aquatic Competence Pictorial Scale) by Moreno and Ruíz (2008) which measured the level of aquatic motor ability children perceived. The six items were answered on a Likert scale with three options (presented as three comic images) where A corresponds to "*better*," B to "*average*," and C to "*worse*." Each of the alternatives was presented individually to the participants with the three (comic) images to help them understand the question. Holding a pencil, children had to indicate which images looked most like them. For the control of possible sources of error, the order of the items was presented randomly to each of the participants; also the order of the intra-element presentation (response options) was varied per item. Internal consistency for this item was .85.

Aquatic motor competence. Aquatic skills were measured using an experimental test (Moreno-Murcia, Huéscar, Polo, López, Carbonell, & Meseguer, 2016). The test instrument consisted of eight test items linked up like a circuit, each valued on a scale of 1 (*he/she does it incorrectly*) to 4 (*he/she does it correctly*). The test consists of diving head first through a ring that is floating in the water at about 0.5m from the edge, picking up a ring which is at a depth of 1.2 m from the surface, getting back to the surface and swimming on their back to reach a tube suspended a few centimeters above the water and placing the ring on it, then getting onto an airbed and walking on it to the end, jumping into the water to pick up one of the objects floating in front of it, which should be taken to a bucket by swimming on their front, when near the bucket they should throw the object inside. Good results were

obtained in the reliability tests and intraexplorer validity (Table 1). Because this was a single explorer test; inter-explorer test was not carried out.

Table 1. Reliability coefficient and intra-explorer validity of the experimentation test

Test items	Reliability R	F value	Validity p-valor
1. Dive head first	0.82	2.1	n.s.
2. Inmersion	0.91	1.1	n.s.
3. Swim on back	0.91	1.4	n.s.
4. Place ring	0.95	-	n.s.
5. Balance on airbed	0.83	-	n.s.
6. Jump from airbed; go for "treasure"	0.92	-	n.s.
7. Swim on front	0.93	-	n.s.
8. Place object in bucket	0.98	1.4	n.s.

Research Design and Procedures

This quasi-experimental study was carried out in the initiation stage of aquatic skills at a swimming pool in a large Spanish city with children aged from 4 to 5 years. The participants presented an approximate experience of between 2 and 4 months in aquatic initiation programs, with an average practice of two days a week in classes of 45 minutes duration. The control group and experimental group were determined using a randomization protocol. After asking center management and swimming course monitors for permission, children's fathers, mothers, or tutors were asked for a signed authorization to be able to carry out the intervention.

The study period was between the months of February and June, and 28 practical classes were held using two sessions a week each lasting for approximately 40 minutes. At the start of the intervention an evaluation session was held where the level of ability and aquatic motor competence was assessed. In the last class and on completion of the intervention, data were once again gathered about level of ability and aquatic motor competence. Both the control group and the experimental group pursued the same objectives and content (e.g., movements, manipulations, balance). The control group was given a traditional transmissive methodology, characterized by presenting teacher-led tasks which children had to reproduce, while the experimental group followed the aquatic motor story instructional method.

Aquatic Motor Story Intervention. In each class a motor story was enacted (an action played out and experienced collectively, which aims to contribute to motor, intellectual, affective and social development). The children listened to the story and became the active participants of the story by enacting what was told. To do so, in the first animation phase, the story was introduced and they were motivated to actively participate in it. In the second

main phase, while the story was being narrated, it was enacted by the participants, through different motor activities related to what was being narrated. In the final phase of the story (back to peace and quiet) where the narration led them to a more relaxed situation, the ending of the story was told, they gathered in a circle to reflect a little and analyze what had happened in the story, and questions were asked such as: "did you like the story?" "what did you most like about the story?" and "who wants to do another story the next lesson?" The narrator was involved in the story like any other participant, trying to maintain continuity and group dynamics as well as encouraging all participants' involvement and reducing inhibition to participate.

Data analysis

The research design was pre-post quasi-experimental design using an experimental group and a control group. The independent variables established for the study were based on the use of two instructional methods, aquatic motor stories for teaching aquatic motor skills as the experimental treatment and traditional transmissive command style instruction for the control group. The dependent variables were the results of the aquatic motor competence and aquatic motor ability instrument scores.

As a preliminary stage, a multivariate analysis of variance (MANOVA) was calculated with data collected in the pretest to analyze whether there were any significant statistical differences in the variables between the two groups before the intervention. Next, a t test for related samples was carried out with each group to check intra-group differences between pre-test and post-test. Finally, a MANOVA was applied to analyze the inter-group differences in the post-test. The different analyses were made using statistical software SPSS 21.0.

Results

Analyses

Preliminary analysis. First, MANOVA of the different variables was carried out in the pretest to analyze if the two groups were homogenous. There were statistically significant differences at a multivariate level (Wilks' Λ = .65, F (2, 75) = 19.44, $p < .05$), and subsequent ANOVAs reflected statistically significant differences in motor competence (F (1, 76) = 37.31, $p < .05$). The control group (M = 2.25, DT = .54) showed a higher score than the experimental group (M = 1.62, DT = .17).

Effects of the intervention. A t test for related samples was carried out to analyze the effects of the intervention on each group. Differences were found in aquatic motor competence ($p < .01$) and aquatic motor ability ($p < .05$) for the experimental group, where higher means values were obtained after the intervention (Table 2). In the control group, significant differences

were only found between the pre-test and the post-test in aquatic motor competence ($p < .01$), reflecting a higher average score in the second test.

Table 2. Pre-test and post-test results between experimental group and control group

		Experimental Group ($n = 30$)			Control Group ($n = 48$)		
		M	*DT*	*p*	*M*	*DT*	*p*
Aquatic motor competence	Pre	1.62	.17	.0001	2.25	.54	.0001
	Post	2.45	.26		2.41	.41	
Aquatic motor ability	Pre	2.08	.19	.026	1.96	.42	.159
	Post	2.16	.19		2.01	.27	

Inter-group post-test differences. A MANOVA was carried out to compare Post-test scores between the two groups. The results showed statistically significant differences on a multivariate level (Wilks' $\Lambda = .91$, $F(2,75) = 3.29$, $p < .05$). To be exact, the subsequent ANOVAS showed statistically significant differences in perceived aquatic motor ability (F (1.76) = 6.61, $p < .05$), with a higher score for the experimental group ($M = 2.16$, $DT = .19$) than for the control group ($M = 2.01$, $DT = .25$).

Discussion

Educators' contribution to forming independent and confident people is a responsibility that lies in the pursuit of autonomous competence and personal initiative in childhood. This study aimed to demonstrate the improvement in the real ability and in perceived aquatic competence in a group of children aged between 4 and 5 through the aquatic motor stories methodology. An improvement in the acquisition of aquatic motor skills in the experimental group was observed, and it could be affirmed that the aquatic motor stories used contributed to both real ability and perceived motor competence of the children who participated in the study.

This is a new outcome with respect to previous studies (Moreno-Murcia et al., 2016), since other studies based on the educational methodology of motor stories in an aquatic medium only indicate an improvement of perceived motor ability and not real ability after the intervention. The justification of this fact is found in the distance between the motivating potential of this methodology, a factor that would help increase perceived competence, and real execution by children, which with continued practice alone could improve children's real motor ability. This study, based on a larger sample than in the previous study and for a much longer intervention period, corroborates this hypothesis and indicates that effectively perceived competence could be significantly linked to assimilation of children's abilities through continued practice. If children are able to believe that they can solve any aquatic motor problem a priori, and instructors provide them with enough time and information for them to assimilate these activities, developed through

the constructive methodology of motor stories, we will be contributing to their achieving real ability.

Therefore, the results obtained in the study could be due to two factors: first, by employing activities in the aquatic medium and within the educational framework (Albarracín & Moreno-Murcia, 2011); and second the naturalness provided by this educational proposal (Méndez-Giménez & Fernández-Río, 2011). For this reason, we suggest that aquatic educators could take into account the use of motor stories in their daily sessions with learners (Martínez, 2007; Polo, López, Carbonell, Meseguer, & Moreno-Murcia, 2012), where they can be used as a tool for improving children's aquatic motor ability, and at the same time provide them with the opportunity to experience positive emotions and feelings while they interact with the medium. So, we believe that in the pre-school stage, including motor stories can help improve perceived and real motor ability, as well as the motivational aspects.

This study contributes to showing that children are able to build confidence in their own possibilities, through the educational potential of aquatic motor stories that involve the intrigue and mystery of solving all the events they project. Furthermore, this type of methodology helps us to significantly improve children's aquatic skills through "symbolic" learning (Martínez y Moreno, 2011).

Finally, it is important to highlight the possibility of developing this study over a longer period of time in future research, since increasing the duration of the experiment would make it possible be able to evaluate the evolution and involution of learners more accurately. This would allow us to demonstrate a new learning focus through constructivism (Light & Wallian, 2008) and symbolism (González, 2006) which the aquatic motor story provides, enabling us to improve fundamental aspects of the pre-school stage. Also, creating prevention programs based on these methodologies to encourage competence in children, together with the stimulation of parental models towards doing aquatic activities (Pharr, Irwin, & Irwin, 2014), could be the key to the treatment of certain obstacles that limit children's enjoyment of the aquatic medium, like amotivation or possible fears developed in children with respect to fear of drowning (Irwin, Pharr, & Irwin, 2015), thereby jointly improving participation in these activities.

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