

*Perspective Piece*

## The Relevance of Water Education in Children: Perspectives from the Americas

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Water-related challenges and environmental issues persist globally, including in Latin America, the Caribbean, and United States. An imperative step to improve the water management issues faced by many countries is to educate children on this important topic. Even though water conservation is not found in the basic (formal) education curricula of most the Americas (including the United States), the topic has been present in many parts of this region, and the efforts made are worthy of admiration, with decades of hard work. Moreover, the regional experience (which was recently documented in the book “*Water education in children: the experience from 11 countries in Latin America and the Caribbean*”) indicates that, to reach an acceptable level of efficiency, children’s education programs focused on water must be flexible, according to the reality of the region and the socioeconomic level of the students, and should not include solutions that do not involve children, for example, water supply infrastructure. Similarly, methods that are not recommended when trying to educate children about water conservation are those based on negative emotions (e.g. “if we don’t save water, we’ll face a catastrophe”); so techniques based on positive emotions work better. Another common mistake is to use material that a certain age group will not be able to process because their

brains haven’t yet developed, for example, their *scientific reasoning* (e.g. getting them involved in water quality projects during early ages); in fact, neuroscience is a crucial part of an effective water education program. Finally, a regional pattern is the lack of indicators or evaluations on the effects of the different educational methods applied on family water consumption, even in the United States (the most advanced country on the subject).

Government entities have played an important role in children’s education applied to this important topic in the region (e.g. “*USGS water science school*” in the United States). Furthermore, what has given better results is intra- and inter-institutional collaboration, such as ministries of education, culture, water resources, and the environment, etc., collaborating with NGOs, municipalities, universities, and schools, without excluding the private sector. In other words, joint work to care for water can contribute to citizen involvement beyond the school’s classroom.

Another important fact is that children’s education programs on water care should have continuity and promote a protagonist role of children in solving the problem (e.g. *Children defenders of water* in Colombia, *Little plumber teams* in Cuba, *The super inspector of water in Mexico*, *Water watchers* in Peru). Similarly, it is also important to train teachers, who are the ones directly in charge of educating children on different

environmental issues, including water care, a topic in which Chile has taken the lead.

Most of the countries in the region focus more on the care of water as a consumer (quantity), ignoring the quality of the resource (pollution, except for examples on river clean-up campaigns in Bolivia and the United States), most likely because the main visible problem is the scarcity of the vital element in the countries involved. Among the most used educational methods in the region are multi-institutional programs, classroom planning, after school activities, workshops/projects, sporting events, family fairs, annual events, exhibitions in museums, songs, storybooks and poems, guides for teachers, fictional characters that represent a drop of water, videos, drawing contests, photographs and scientific projects, water care campaigns, river clean-up and/or monitoring campaigns, marches for water, cooperative games, and didactic games, among others. Remarkable examples of the above are represented by projects *Drinking water gives you life, becoming aware gives you water* in Bolivia and *Let's take care of water today to live tomorrow* in Peru, among other projects that seek to make children understand how crucial water is for their own future, while having fun. Similarly, annual events such as the *World Water Day* is celebrated in almost all countries of the region, but Argentina also celebrates its *National water and education week*, increasing even more the relevance of water in children, as the event includes games. Moreover, the Chilean storybook *Water for everyone* represented important material for preschool educators to show young children how important water is and to discuss how they can save it at home. Impressive material was also generated through the *Zero water waste photography contest* in Cuba or the *Rain on wet photography contest* in Mexico. The list is endless, and the regional efforts to make children save water are admirable.

In conclusion (besides the protagonist role), the *game* has been the methodology that encourages, challenges, and mobilizes children to develop actions towards the conservation and care of water, i.e. the more entertaining the material (or activity), the more they learn and the more they apply it in their daily lives. Similarly, successful results have also been obtained through the participation of older children in data collection (e.g. daily precipitation,

as is the case of the “*Network of voluntary rain observers*” in Cuba) for real scientific studies, where minors acquire participatory interest and, as a consequence, value the resource.

Additionally, successful methodologies have been based on the use of cell phones, the internet, and social networks (especially during the recent pandemic, a situation that has been addressed quite well in countries such as Costa Rica), through free platforms. Many government agencies offer water stewardship education platforms, which teachers rely on to educate children in schools.

Finally, our most important message is that the ultimate goal of educating children is to create a new generation that cares for water, without forgetting that children bring the “water culture” to their homes, transmitting it to their parents (adults). Countries in the Americas have set a clear example to be followed not only by the rest of the region, but by the entire planet. As climate change and overconsumption reduce the water storage of a significant portion of the world's continental territory, the valuation and care of the resource is crucial for a sustainable future, because without water, there is no life.

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## References

- García-Chevesich, P. R. Val, G. Martínez, A. Alvarez, O. Luna, P. Maya, R. Pizarro y M. Pizarro-Granada (Eds.). 2021. *Educación infantil sobre el cuidado del agua: la experiencia de 11 países de las américas y el Caribe*. Grupo de Trabajo Educación y Cultura del Agua para América Latina y el Caribe (Unesco), y Cátedra Unesco Hidrología de Superficie. Universidad de Talca, Talca, Chile. 184 p.