

BUILD STORIES AS A TEACHING TOOL FOR THE TEACHING OF SCIENCE IN EARLY CHILDHOOD EDUCATION

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Introduction

There are basically two opposing views when considering early childhood education (ECE): the care and educational stages. In the late eighties, Castillejo (1989) classified the evolution of these views as the different functions that historically had had this stage that ranges from 0 to 6 years, and found the following:

- Observational function.
- Preparatory function.
- Preventive function.
- Compensatory function.
- Integrating function.
- Specifically educational function.

So, seeing the historical evolution, it is not surprising that the idea of ECE (in governmental and academic circles) still remains to be viewed as a care stage more than an educational one. However, they are increasingly more studies from different disciplines (psychology, didactics, pedagogy, neurobiology, etc.) showing the ECE as an educational stage with its own identity, in which children build, among other knowledge, their first explanations of the world around them, using cognitive and affective instruments at their disposal for it.

It is clear that in these stages we can't speak of scientific or analytical reasoning as understood in adulthood, as they are influenced by other factors that are losing merit over the years, for example imagination and fantasy constitute the key elements of the so-called mythical mind (Egan, 1991).

With regard to the teaching and learning of science in ECE, it exists in the field of Science Education as a fundamental question: Are the sciences suitable for ECE? This question has been studied by several authors (Marin, 2005; Harlen, 2007), finding that the answer obviously depends on what you mean by science. If we understand science as a

careful, disciplined and logical pursuit of knowledge about the world around us, obtained after reviewing the best available evidence, always subject to refutation, corrections and improvements if they are more conclusive evidence

as indicated by James Randi, founder with Paul Kurtz and Carl Sagan of the Committee for the Scientific Investigation of Claims of the Paranormal, CSICOP in the United States, it is impossible to learn science in ECE; but if we understand it like the famous doctor and Mexican communicator Dr. Ruy Perez Tamayo,

a creative activity aimed at understanding the nature and whose product is knowledge discovery and exploration of the natural world from the reflection on the experience,

the answer is quite contrary.

Moreover, we should also take into account the various international institutions' appeals which have been made to promote the need for a scientific culture in the population. In this sense, the declaration made by UNESCO (1999) is remarkable, in which, among other things, said

...access to scientific knowledge by children is part of the right to education of all people [...]. The science education is essential for human fulfilment.

In addition Perales Palacios and Cañal de León (2000) highlight the fact that learning science is strongly linked to immersion in scientific culture.

Various authors (Giordan, 1993; Driver, Guesne and Tiberghien, 1999), believe that science should always derive from the scientific method itself. In the case of ECE, it is obvious that it should be readjusted and conditioned to the characteristics and possibilities of each child and focusing on what is the main essence: observation, induction, hypothesis formulation, experimentation, demonstration and conclusion.

This reasoning highlights the fact that the main action of the method, measurement of physical observables, must be replaced for obvious reasons, by exhaustive description and repeated experimentation. So when children watch the world they receive input (observation) by applying all the senses (not being a visual observation because they can smell, suck, touch...), and begin to build an idea of how this system works (induction). It is the adult who must take the conceptual conflict, encouraging them to carry out their ideas to explore the induction (hypotheses). This new approach will obligate the children to perform their experiences (experiments) and to trial their ideas (demonstration) and the results will modify their initial idea (conclusion). Thus, the work of science in ECE should consider three main areas, according to the work done by different authors (Ausubel, 1987; Bruner, 1988; Vygotsky 1988; Belloch, 1992):

- 1) Starting with concrete actions or objects and little abstract situations that are close to the students on the

theory of the zone of proximal development.

- 2) Apply or transfer knowledge to similar cases to highlight the potential of this method.
- 3) Using active stage and own methodologies regarding the social and emotional aspects.

Thus, once the science was conceived in ECE as an activity that promotes creativity from reflection, it cannot and should not be shown in isolation and compartmentalized, even in childhood, which takes full meaning the concept of “educational globalization”. Therefore when addressing teaching and learning of science in ECE, we should not constrain the methodologies used in other educational stages (which have so often failed), but must take into account the “good practices” that have always been at this stage and the experience of many teachers confirm its success: learning science in childhood requires its own methodologies used in this stage.

Moreover, if we consider the Spanish curriculum development of ECE, we find verbs such as “explore”, “enjoy”, “observe”, “develop curiosity”, “absorb”, “discover”... we can realize the need to show science as a method more than a compendium of knowledge.

Stories as a method of teaching science in early childhood education

Considering the above mentioned, there are a number of aspects that must be taken into account in order to introduce science in ECE in an effective way:

- 1) Curiosity.
- 2) The sensory perception.
- 3) Socialization
- 4) Emotions
- 5) Reasoning

In this way, the spoken story, tales... (that take us back to ancient times of human history in which the spoken culture was the only possible way of transmitting knowledge), are an ideal vehicle to help science education in childhood. Stories allow us to contribute to the slow process of assimilation of the basic concepts necessary to interpret natural phenomena in a “scientific” way, in its broadest aspect of meaning, that explanation taking as such has been the result of a previous process appearing in basic components of scientific thinking: a question arises against a natural phenomenon and uses reason and experiments to test it.

Therefore, the strength of the stories, not regarding the specific content (an object, a process, an animal ...) is born from the narrative structure itself, as it is a universal way to make sense of the world and human experience (hence the success with literature, theatre, cinema ... as “modern” storytelling ways). In this narrative structure, there are three key parts to be taken into account and should appear in any story whatever the level of complexity sought: *presentation - trouble - resolution*.

- *Presentation*: The story should present the characters (animate or inanimate) located in space and time, and in a particular situation.
- *Trouble*: History must bring the characters to confront a particular problem or conflict situation.
- *Resolution*: The story should contain all the features and events needed to resolve the conflicting situation presented.

It is therefore about creating a significant situation which introduces concepts and procedures from science, as an efficient method for finding answers to previous questions about certain natural phenomena.

In this sense, the stories can contribute to the construction of a complex cognitive construct as causality. Thus, by the account of natural phenomena, important aspects are worked not only from the physical point of view but also social, helping them to form an idea of the multitude of interrelationships present in any situation.

Issues to consider when building a “good” story

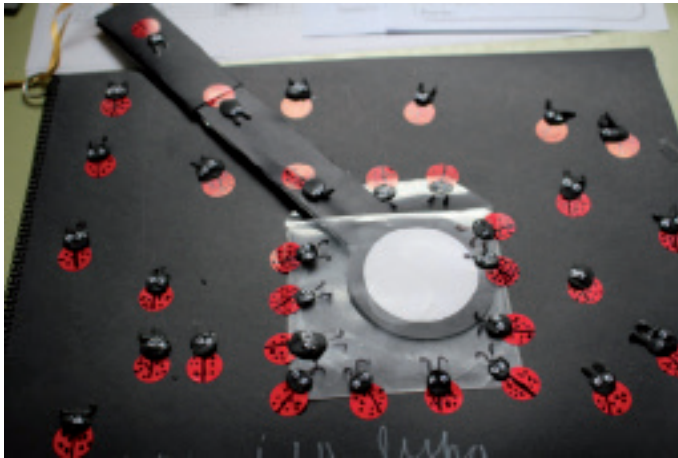
The stories for teaching science in ECE must overcome stereotypes and literary issues, as they must not be seen as a requirement of literary products as either drawing on these stages as discussed from the perspective of artistic technique. In fact, the story itself should be more a means than a product. However there are some aspects that should always be considered:

- a) You must properly select which problem or central conflict wants to be conveyed in the story. It is better that there is only one question to avoid confusion and missing connections.
- b) Much previous work must be carried out by the teacher to properly understand the causes of the problem and to gradually introduce into the story the information necessary and appropriate for the resolution of the conflict raised.
- c) Although not necessary, it often helps if the location and characters of the story are in a familiar place and time to the children.
- d) You must properly select the characters that appear, their interactions and the subject in the interests of children, which requires extensive previous work.

- e) Finally, we must build the story as a narrative structure presented above to reinforce the cognitive structures for conflict resolution and access to knowledge through science.

Often, the visual techniques can help us in introducing a certain concept. For example, Figure 1 shows a story created by five year-old children, which has used the effect of light-dark as an additional element to the story, giving added value to its simplicity.

This time the story was written on laminated sheets with dark colors and was bound by black cardboard to prevent easy reading. As an additional element, a magnifying glass with white card was built to allow reading of the story. Thus, the difference between light and dark, besides other objectives of natural character (where the insects live, what their needs are, etc.) was studied.



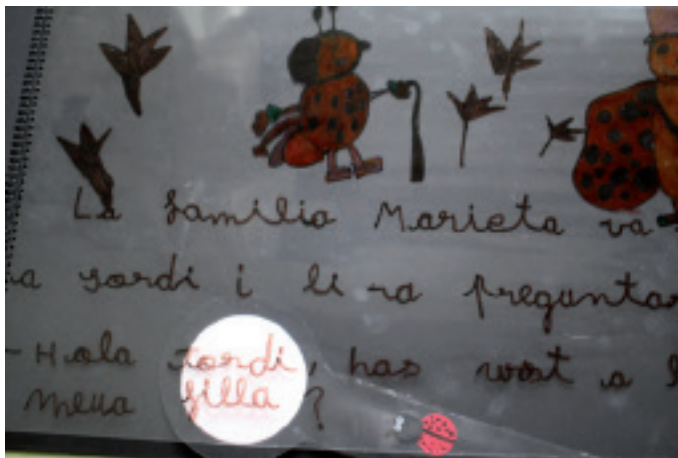


Figure 1. Sample of story “La Marieta i la lupa” (The ladybug and the magnifying glass) performed by the children of child 5 years of the school “Real Blanc” of Cocentaina (Spain).

Conclusion: any story begins with the first word

We must consider what can and cannot be done in ECE and, with respect to science education at this stage, there are many educational questions and obstacles (especially historical) that come from multiple directions and by different agents (teachers, society, education authorities ...). But in this situation, Einstein's phrase should be noted when he says that «if you want different results do not always do it the same». And a change in terms of the teaching and learning of science (and other areas) is more than desirable, in both ECE and "higher" educational levels.

Against this background, the ability to build and use the stories can be a good teaching method to use in these first steps of a child's scientific education.

Through the stories you can insert scientific concepts that can help the beginning of a "scientific" way of thinking, a conceptual literacy we call science. But not only does science in ECE classrooms help the children to interact with the environment and understand the wide variety of natural phenomena they are confronted with and deal with them appropriately (with or without our help as educational professionals) to build an explanation. With the use of stories we can help to show them a first explanation of these phenomena, as a start to a mental structure, which in the future will be the basis for understanding the scientific models that explain natural systems and processes.

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