

## Integrated Disciplines: Understanding the Role of Art in Science Education in a Preschool

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**Abstract:** The Reggio Emilia approach has brought a special vision about preschool curricula. The current study focuses specifically on art and science education within the framework of Reggio Emilian emergent curriculum. What makes this special vision of art unique is “creativity” as well as “discovery” embedded in it and the innovative, varied ways art lets preschoolers represent their ideas related to the natural world. The current study, which is based on author’s insights gained in a Reggio Emilia-inspired preschool at a Midwestern research university in the United States of America, provides some suggestions and examples to help teachers make art and natural sciences work together in harmony in their Reggio Emilia-inspired projects. It shows what kinds of scientific skills, tools and techniques one preschool utilizes to help its preschoolers pursue their scientific inquiries and work on science projects in which arts embedded. Five elements, which are derived from the author’s in-class participatory observations, display the ways teachers are able to help the preschoolers grow in their ability to practice scientific inquiry doing science projects and representing their ideas through their art.

**Key words:** Reggio Emilia Philosophy; Early Childhood Education; Preschool; Art; Science; Curriculum; Project Approach.

### INTRODUCTION

People have often asked the question “What is the role of art in early childhood education?”, which is also the main question of this study. One of the answers has been provided by the Reggio Emilia approach. Before discussing the role of art in early childhood education from the perspective of Reggio Emilia, it is essential to state a brief description of the Reggio Emilia approach. The Reggio Emilia teachers propose the idea that preschoolers co-construct their knowledge through personal relationship with their peers and adults<sup>[11]</sup>. Accordingly, the idea of community of learning is very strong in Reggio Emilia preschools. Moreover, Principles of the Reggio Emilia approach, an Italian pedagogy, can be summarized as follows:

- The child is beautiful, intelligent, strong, and ambitious<sup>[10]</sup>.
- The teacher is listener, observer, learner, partner, nurturer, and provocateur<sup>[11]</sup>.
- The education philosophy is based on strong relationships among children, teachers, parents and the community<sup>[12]</sup>.
- The new idea of curriculum called *progettazione* emphasizes importance of the project approach<sup>[12]</sup>.
- Rich documentation of children’s work and progress<sup>[6]</sup>.

- The environment is well-planned and enriched with intelligent materials<sup>[5]</sup>.

The role of art in early childhood education is examined specifically in relation to the natural sciences in the current study. The Reggio Emilia approach has brought a special vision about art, as one of the languages that children use to express themselves<sup>[10]</sup>. The Reggio Emilia project in Italy does not claim to 'teach art' but rather uses arts to support children's thinking and expression in all areas of knowledge creation. The metaphor of “100 Languages of Children” used by Malaguzzi refers to the various ways children use to express themselves. The idea of the current American education system that art and natural sciences are separate in early childhood education does not happen in Reggio Emilia preschools. The focus of the current study is on the use of art as a language of children when doing project work connected to science inquiries, as inspired by the Reggio Emilia approach and practiced by a preschool.

**Research Methodology:** The current study was based on author’s insights gained through working as a participant researcher at an American preschool, inspired by the Reggio Emilia approach. The preschool was a laboratory school located in a Midwestern

research university in the United States of America. The preschool classroom of interest was consisted of 18 preschoolers aged three to five, 10 teachers, and a program director. The author conducted in-class observations, interviews with teachers and the program director, and document analysis for her previous research. Based on her insights gained in the Reggio Emilia-inspired preschool over years, the author generated five elements of how teachers can help the preschoolers grow in their ability to practice scientific inquiry using the project approach and represent their ideas through their art. It is essential to state that those elements are the seeds of creating a Reggio Emilia-inspired project work in which art and natural sciences are interconnected. Teachers and students can create their own, unique artistic science projects considering all of those elements and their own culture.

**Representing Ideas Related to Science via Art:** As the use of art materials lets preschoolers represent their ideas related to the natural sciences in innovative, varied ways, that new vision of art is examined in the current study. Some suggestions for preschool teachers are stated in relation to the natural sciences. The suggestions for teachers are enriched with examples so that preschool teachers can reexamine their education and be inspired by the Reggio Emilia approach.

Gandini<sup>[4]</sup> indicates that what is done with art materials and media in an atelier, a workshop, is not regarded as art per se, but an inseparable part of the Reggio curriculum. An atelier, where children deal with visual arts, helps children master different symbolic languages, such as painting, drawing, and working in clay. What makes this new vision of art unique is “creativity,” “discovery” embedded in it and whole cognitive/symbolic expression involved in the process of learning. Lella Gandini<sup>[7]</sup> says:

Drawing, painting (and the use of all languages) are experiences and explorations of life, of the senses, and of meanings. They are an expression of urgency, desires, reassurance, research, hypotheses, readjustments, constructions, and inventions... They offer interpretations and intelligence about the events that take place around us. (p. 9).

The projects developed by Reggio Emilia preschools show that preschoolers use many of the basic scientific skills, such as observing and classifying (see Table 1) in their art projects in the current study as well as use many of visual arts, such as painting and clay in their science projects. Accordingly, calling those projects “artistic science” projects would not be inappropriate.

**Table 1:** Science process skills that were used by preschoolers

<b>Science Process Skills</b>
1. Observing
2. Predicting
3. Measuring/Counting
4. Comparing/Contrasting
5. Categorizing/Sorting/Classifying
6. Collecting Data/Recording Data
7. Communicating

Reggio Emilia teachers’ understanding of art and the way natural sciences are embedded in art have enlightened educators about how to create a climate in which children can produce unique projects related to the natural world. Those projects reflect a connection to the natural sciences as well as to art. It can be stated that art is rooted deeply in science projects of preschoolers. The following five elements (see Table 2), which were created by the author in response to inspiration from the Reggio Emilia approach and based on the insights gained in a Reggio Emilia-inspired preschool classroom, can help preschool teachers make art and natural sciences work together in harmony in Reggio Emilia-inspired projects. Those elements are not necessarily in any order but can be followed in different orders and in a spiral way.

**Table 2:** Five Elements in Artistic Science Projects

<b>Five Elements in Artistic Science</b>
1. Think about the connection between art & science
2. Create art & science rich environments
3. Guide children to use their knowledge and imagination
4. Guide children to test their theories/ideas
5. Guide children to express their ideas

**Five Elements in Artistic Science:** 1. *Think About the Connection Between Art and Science.* There are things teachers need to remember before conducting artistic science projects in their classrooms. One of them is the development of symbolic representation. In early ages of children, development of symbolic representation is critical to children’s intellectual development. Davidson<sup>[3]</sup> refers to Piaget’s cognitive development theory and defines symbolic representation as “using an action, objects, visual symbol, or word to represent something else” (p. 292). Art is necessary to facilitate children’s intellectual development, because along with the development of symbolic representation, children tend to express their thoughts and communicate with others in sophisticated and creative ways, such as with creating three-dimensional sculpture projects.

Artistic science creates a platform where children's ideas and theories related to natural sciences can develop, be enriched and actualized, and become visualized. "For young children, science is discovery"<sup>[1]</sup> and artistic science projects can provide children many opportunities to discover, explore the natural world, develop complex thinking skills, imagine, and then work to bring this imagination into the world in a creative way. It should be noted that the aim of those projects is not produce "beautiful art" products but express and explore ideas related to natural sciences. The following pictures demonstrate examples of artistic science works created in the Reggio Emilia-inspired preschool at a Midwestern research university in the United States:

In Figure 1, Picture 1 demonstrates exploring the wind by searching books and pictures and painting the wind pictures; Picture 2 is a work of exploring the wind by blowing through the straw painting to construct ideas about the direction and power of the wind; Picture 3 is another work of exploring various weather events (e.g., lightening) on the light table; and finally Picture 4 demonstrates sponge painting of different weather episodes (e.g., sunny day).

2. *Create an Appropriate Environment Where Children Can Be Engaged with Art and Natural Sciences.* Children come with their natural inquiry about the natural world they live in. Teachers provide a welcoming environment enriched with sufficient materials, tools, and space which is essential for children to work on their inquiries and to create artistic science projects. Similar to an art studio, in Reggio Emilia preschools in Italy, the art teachers provide children a variety of tools and materials and display past projects and works of children<sup>[4]</sup>. In the art studio or atelier (see Figure 2) in the Reggio Emilia-inspired preschool where the current study was conducted the children find opportunities to work on natural sciences related projects and express their ideas and theories in a way arts involved.

As Gandini<sup>[4]</sup> indicated, the importance of these art studios or ateliers does not rely only on the creation of art, but on the children's use of the tools and materials related to art. This is considered an integral part of the inseparable cognitive work of symbolic expression in the learning process. In Reggio Emilia-inspired preschools, it is seen that natural sciences are embedded meaningfully in children's artistic science projects both in terms of using basic science skills and learning scientific ideas related to the natural world.

3. *Guide Children to Use Their Creativity & Imagination.* Reggio Emilian teachers let children engage with materials and tools, give them time to

work, and guide them to pursue their interests. Imagination permits children to give credence to alternative realities, differences, pluralism, and heterogeneity<sup>[8]</sup>. As a result, children can open their minds to alternatives, and become more aware of other possibilities in the world. Each project for children, which is the product of their imagination, is clearly a process of making sense of the world in which they live.

While children are working on projects, teachers are documenting everything from beginning to end. The documentation of these projects would be the moment or the series of moments from that imaginative process providing visitors or parents an opportunity to witness at least the last part of the process.

The Reggio Emilia-inspired projects are mostly based on the interests of the children. As suggested by Verwys<sup>[15]</sup>, it is essential to set aside our preconceived schemas and tuck curricular worries into back of our minds so "children could be protagonists in their learning" (p.100). Starting from preschoolers' interests allows teachers to create a curriculum which is responsive to preschoolers' diverse backgrounds. Projects developed by children reflect how children's ideas develop and become restructured through the theorizing process and expressed in creative ways. The theorizing process might include the basic science skills for young children, such as observing, asking questions, classifying, predicting, manipulating, and testing. These projects, which are empirically based, reflect the harmony of ideas from natural sciences and the expression of those ideas through art.

4. *Guide Children to Test Their Ideas.* Wien, Keating, Coates and Bigelow<sup>[16]</sup> state, "a move that does not work well is not seen as an error, but rather as a step toward what will work: teaching is self-correcting" (p.84). In the current study, teachers help preschoolers critique their ideas in various ways, such as hands-on activities, site-visiting, or resource-checking. The current study showed that in Reggio Emilia-inspired classrooms, teachers do not specifically aim to teach children scientific facts or art facts. Their main goal is for children to follow their interests and inquiries meaningfully using critical thinking skills. As Barret<sup>[2]</sup> suggests, teachers usually create an environment where children can discuss their own art and demonstrate critical thinking about art and make connection to the world. Similarly, Reggio Emilia projects are basically reflecting children's critical thinking and inquiries about the world.

Teachers' documentation of children's work is so informative in terms of showing "creativity" and "discovery" in the projects that Reggio kids produced.

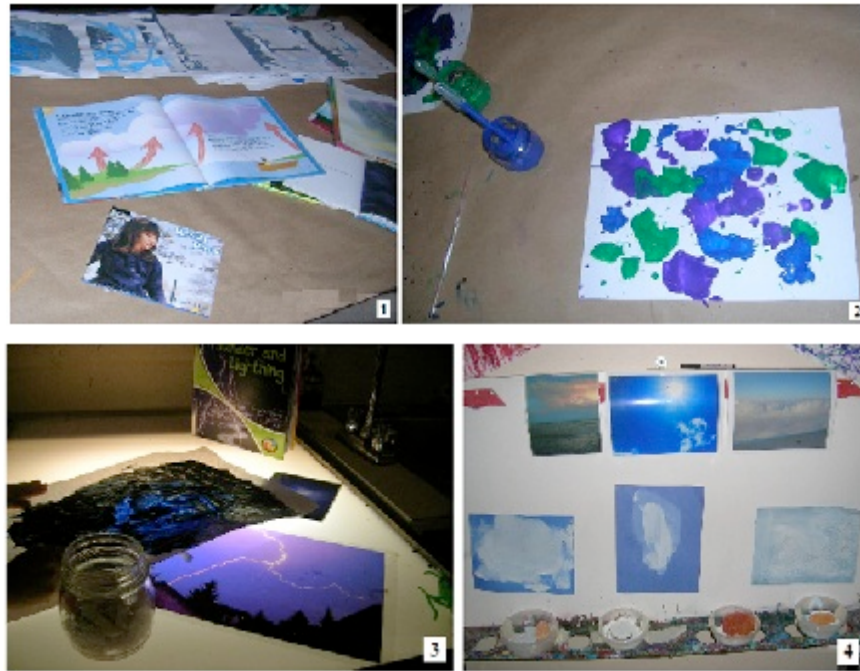


Fig. 1: Pictures from the Weather Project



Fig. 2: A Reggio Emilia-inspired preschool atelier

Their creativity skills and discoveries are guided with their inquiries and questions, which become the seeds of long term projects. As Kirkwood<sup>[9]</sup> states, teachers focus on “what’s in children’s heads” and let children pursue their own questions. From the current study, the following list displays some questions from the project “Insects and Worms”, asked by Reggio kids aged from 3 to 5:

Inquiring about insects and worms: Questions for “Bob the bug guy”

1. Do worms have muscles?
2. What do worms eat?
3. How do you tell if the worms are girls or boys?
4. Do worms have eyes or legs?

5. Do worms ever get to have fur like wheeler?
6. How could we make ants live in our ant farm?
7. What do ants eat? Bees? Butterflies?
8. Why do bugs have big eyes and hamsters have tiny eyes?
9. Why are caterpillars fuzzy? Are they the same as worms?
10. Do worms live in a house?

Asking questions lay at the heart of the Reggio Emilia-inspired projects. Those questions might show how strong children’s imagination can be and this imagination become a base for a big artistic science projects. Interests may start with such kind of questions, and then follow with a deep search, like hands-on testing, book reading and site visiting. Projects come to alive slowly, with more testing, investigation, and thinking.

5. *Guide Children to Express Their Ideas.* Reggio Emilia teachers usually focus on process of learning instead of product. Learning should be a joy, not a job to children. The system should not force children to memorize knowledge; instead it should let children to construct their own knowledge through discovery and creativity. For example, the shadows project, in which preschoolers worked on several concepts related to shadows, such as light and colors, shows both discoveries of scientific facts as well as usage of creative ways of expressing what they think and feel.

Through the shadow project, which lasted a few weeks, the preschoolers used various creative ways of expression, such as playing, painting and dancing with the light, and reflecting images through the light (see Figure 3). The process of project gave children many opportunities to experience basic science skills, such as observing and testing, and to reflect their ideas through art, which is symbolic way of expression.



*Teacher: We were just here by the overhead, we were noticing something. I put my hand up against the screen, it was very little, my shadow was very little.*

*Preschooler: Yes, she was.*

*Teacher: What happened when I was far away, Mark?*

*Preschooler: Bigger.*

*Teacher: My hand got bigger, my shadow got bigger.*

*We were kind of noticing that.*

*Preschoolers: Mine too, mine too, mine too.*

**Fig. 3:** Exploring color shadows: Color shadows projected onto the large shadow screen

**Conclusion:** Reggio Emilia teachers believe that there are many ways for children to express themselves and communicate their ideas. Malaguzzi<sup>[10]</sup> called this as “100 languages of children.” The current study showed that the projects in the Reggio Emilia-inspired preschool provide children an opportunity to enrich and represent their thinking in multiple ways, such as sculpture, writing, and painting. In short, the current study showed that art is the great way for children to accomplish that.

Moreover, in the current study, Reggio Emilia-inspired projects present how children express themselves in a creative way *science* and *art* are interconnected. Sassalos<sup>[13]</sup> states, “Children utilize the

process of making art and utilization of art materials to make sense of their world” (p. 7). This suggests that, as Maxine Greene<sup>[8]</sup> indicated, art is one of the windows that open to the alternatives, differences, similarities, and pluralism in the world. In the current Reggio Emilia-inspired preschool classroom, it was seen that art lets preschoolers represent their ideas related to the natural world in innovative, varied ways where “creativity” as well as “discovery” embedded.

In short, those projects, called “artistic science” projects, provide children opportunity to pursue their scientific inquiries in which arts embedded, and work on both art and science disciplines simultaneously. As Tarr<sup>[14]</sup> stated, the word “embedded” –not art as a separate center, a subject or activity to be completed–implies “‘rooted deeply’-fixed firmly into the earth of the lived curriculum and children’s and teachers’ lives together” (p.20). Accordingly, the projects developed in the Reggio Emilia-inspired preschool prove that artistic science projects are not only aesthetically beautiful but also full of science information and usage of science process skills, and communicative in terms of children’s reflections and in-depth thinking.

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