

MARBLING ON PAPER - AN ACTIVITY FOR TEACHING SCIENCE AND ARTS FOR PRIMARY STUDENTS

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Abstract: Paper marbling art is a type of process art meets chemistry: the floating oil paints on the surface of water. The floating paints are swirled into patterns and printed on paper. This is a great process for children to learn colors, patterns and a little chemistry. Moreover, it can be an environment to help contribute towards a child's emotional literacy and understanding, helps to increase the creation of child. It is that easy and a great project for kids and the product results are unique and spectacular.

Keywords: Creative activity, children, marbling painting, chemistry, primary students.

1. INTRODUCTION

In human life, science and art are inseparable vital parts. Science deals with facts and knowledge and modern civilization depends hardly on the scientist and inventor. Art plays an important part to convert those facts and knowledge from the area of perception to area of the emotion.

In fact, science is verifiable, applicable and repeatable. Art is based on things, ideas and feelings toward material. Integrating of art and science is not a new activity but always encouraged. Art and science make different ways of brain to run. In this way, different meanings between art and science are integrated to run other ways of brain. Through integrating them, people can express thoughts, show relationships and changes; feelings and perceptions; to make explanations and predictions.

Marbling art activity is a sample activity in integrating art and science. The process of marbling art activity consists of using art and science principles. The partnership of art and science is to use some properties of liquid materials and solid. Marbling is a visual art of decorating materials such as paper, fabric, glass and ceramic using colored dyes floated on a high density liquid.

In this article, the author only mentioned the art of making marbling activity on paper and introduces a common science phenomenon in life that is applied in art practice.

2. CONTENT

2.1. History of Marbling art

Marbling art appeared early in human history. In the 8th century, the discovery of the Japanese: floating oil on the water was to show the way to marbling activity. The

product of marbling art was started with using colored oils on water which is adjusted density and surface tension. After a few design of floating oils on water, they were transferred from the water to a piece of paper by adsorption concept.

Marbling art was very popular visual art for “the book cover” in Persia and Turkey. Europe took an interest in this art by the 15th century. Then the development of marbling art activity was to increase in the late 19th century. Marbling art activity was called as “Ebru” in Turkey. Ebru as the Turkish word means clouds. Moreover, Ebru or marbling art activity was described as water face painting.

In the 17th century, when European visitors to the Middle East had collected examples of marbling paper. Finally, the technique for making marbling paper came to Europe and became a popular handicraft in the 19th century after the British manufacturer Charles Woolnough published *The Art of Marbling* (1853). [1]

Nowadays, marbling art activity is commonly used as a craft in many countries around the world.

2.2. Scientific principles of marbling art and the relationship of marbling and science

Marbling art activity is to include scientific principles such as: surface tension, density, preparing solution, dyeing or coloring process, chemical bonds, adsorption, drying, hands-on practice, particulate nature of matter.

As we know that everything around us is made up of tiny particles known as molecules. Way two substances interact depends on the molecules that make up the substances. Therefore the molecular structure of water and oil determines the way that they interact with each other. Also, oil and water do not repel each other.

Marbling art on paper mainly based on the interaction between water and oil, the absorbency between the paper fibers and the oil. This is also a common physical phenomenon in everyday life: oil is lighter than water and always floats on water, oil cannot dissolve in water but can dissolve some colors. The reason is:

+ Oil and water have different molecular densities: oil and water cannot be mixed together because the molecules of each substance link in different ways. Water molecules are more closely linked. This means that if you compare the same amount of water and oil, the number of molecules in the water is more than oil. That explains why water always sinks and oil always floats upward.

+ Polarization: Another reason why water and oil cannot dissolve into each other is polarization. More precisely, the electronegativity of each element is different, in the molecule, the difference in electronegativity will determine whether the molecule is polarized or not (from 0.4 to 1.8).

Water is a polar molecule. It is made up of 2 hydrogen atoms and 1 oxygen atom, these 3 atoms are linked together not in a straight line but in a V-shape. The electrons in the molecule are more distributed in the position of oxygen with Hidro, so the position of Oxygen will be negative and vice versa, the two ends of hydrogen are positive.

The polar molecules dissolve only in polar solvents. Nonpolar molecules are only soluble in nonpolar solvents. Oil has a non-polar molecular structure. And so when you put oil in water, it just floats to the surface, not dissolves into water. Similarly, colored oils will also float on water. [5]

+ The paper soaks up the water and then dries, retains the color on the surface: paper is

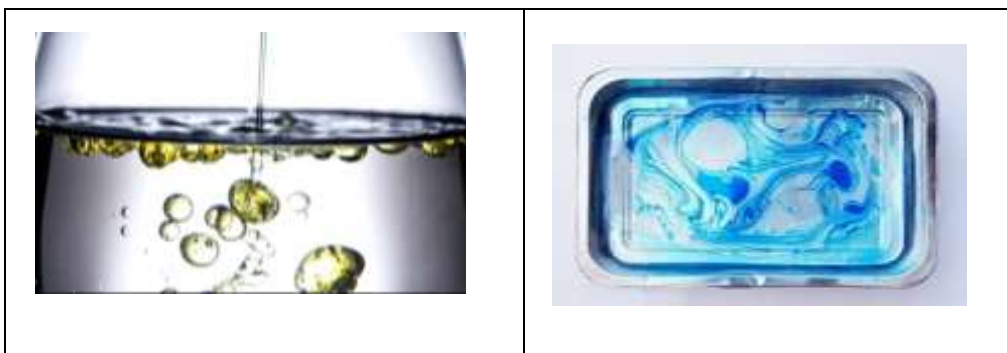


Figure 1. Oil and colored oils float on water - Image: done by author

a thin material made from a few hundred μm to a few centimeters thick fiber. Paper is usually made from vegetable origin and networked by hydrogen bonding force without adhesive. Typically paper is used in the form of thin layers but can also be used to shape large objects (papier-mâché). In principle, the paper is produced from wood pulp or paper pulp [5]. With such properties, the paper is easily wetted by solutions, the water can wet the paper surface but quickly dries, oil with color penetrates into the paper and retains color on the surface.

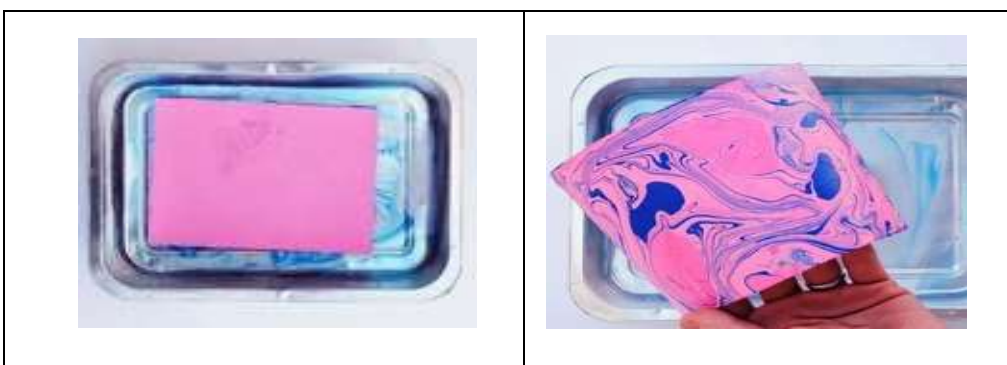


Figure 2. Paper retains the color from the water on the surface then dries - this is the way to make marbling on paper - Image: done by author

Based on these physical and chemical properties, people have created a type of art: *marbling painting*. This is a meeting between art and a simple scientific experiment between water and oil, but the effect is extremely interesting. More over, a common science phenomenon in life that is applied in art practice for primary students.

2.3. Marbling art activity in Viet Nam

The art of marbling has long been applied in many parts of the world and is quite popular among painters. However, books and documents of this art in Viet Nam are almost not available.

In some art universities in Vietnam, marbling art activities are included in the lesson for students to learn about the surface of art materials. In addition, some artist's workshops often have these activities to create marbling products for adults or students for the purpose of experience. In the world, this form is often applied to children to experience the fun, study in a number of after-hours art classes and the effect is quite positive for them. The application of this painting process for elementary school students in Viet Nam has not already been noticed.

3. FINDING AND DISCUSSION

In this research, the main finding concerning science and art that marbling activity can use associated with the contents of science and technology course for elementary schools.

3.1. Finding

- *First*, marbling art activity is interesting, nice, useful, easy to create products, positive, applicable, and visually effective in learning, indirectly contributive to environment in science and technology classes and raises the awareness of students to art and science. At the age of primary school, it is very interesting for children to create art products by themselves. The process of making marbling painting is not difficult. The freedom of colors and products quickly acquired will interest children and will bring some benefits to students of this age:

+ Students are liberated from the pattern to promote creativity in visual activity: they will be free to be creative with colors, color movements, color blends, pattern shapes on the water... They will learn and play, not be confined, not be afraid of they don't know how to draw. They can express their creativity through the form of making a simple marbling on paper, the result is a quickly product.

+ Students learn about a scientific principle, exploring materials, can answer the questions: why oil color floats on water, why colors on water can move, how can you influence the color on water, why can paper print patterns on the water as products of your purpose...? Thereby, they can understand that science and art always interact with each other, they learn more about an interesting physical phenomenon that helps them know how to apply their knowledge.

When children are exposed to materials of painting (pencil, crayon, watercolors, clay, paper, oil paint...), they will experience more tactile and physical and chemical properties of the material. The whole world is gradually opening up in the eyes of children through the arts.

- *The second* significant finding shows that: the benefits of stimulating the development of creative thinking are evident in the "way" to produce the product. For marbling

painting, the way to create products is also "open" for creativity and manipulation for students. Applying in accordance with the steps of the guide has been able to create countless shapes and patterns of products, helping them to imagine and relate to phenomena in reality.

This is a process for students to experience with a variety of emotions, the collision between colors, the colors spreading freely on the water, the changing shape of the patterns... When they drop the color floating on the water, the colors will create many different shapes: swirling water, hovering like clouds, forming geological surfaces, flowing water... this will make them have so many interesting associations.

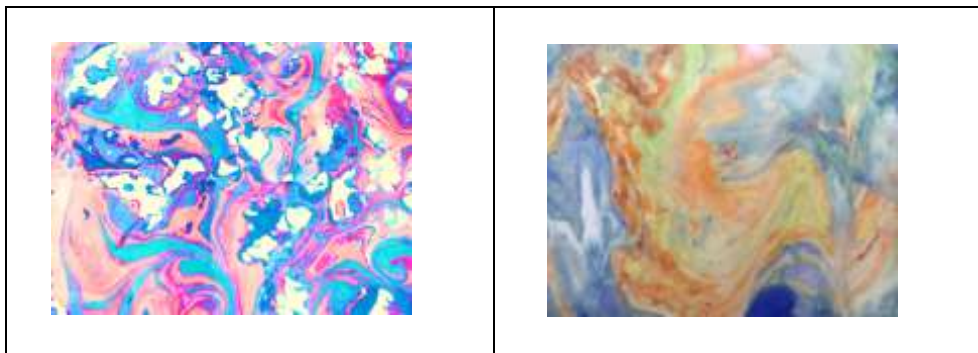


Figure 3. *Random pattern products - Image: done by author*



Figure 4. *Products according to intention - Image source: the Internet*

More over, marbling art can create a product within seconds to minutes, color stabilizers on the water surface can also be used to draw "slow" proactive shapes, unlike the "fast" approach is based on color fading, free, random mixing. Students can draw a specific object (such as a flower, heart shape, bird, similar shapes...).

Students may be able to identify the object they want, choose the right color and use some sharp sticks to draw on water. The movement of colors on the surface of the water will help the drawings create interesting effects. For this method, it requires students to be meticulous, careful, creativity and good shaping skills, apply to children with artistic talents.

- *Third*, based on the scientific principle of marbling painting, it is possible to apply other diverse materials such as: milk, acrylic color mixed with oil-based solvents, nail polish colors, oil paints, many kinds of tools... Each material with similar methods gives different effects and always makes children excited by the effects it brings.

Kamii and DeVries said: *"Exploring materials is very important because it is through exploration that children build a knowledge of the objects in the world around them"* (Kamii and DeVries, 1993) [2]. This is an effective way for children to explore freely based on the principle of marbling painting. This contributes to expand the thinking for children beyond the framework of learning and daily life.

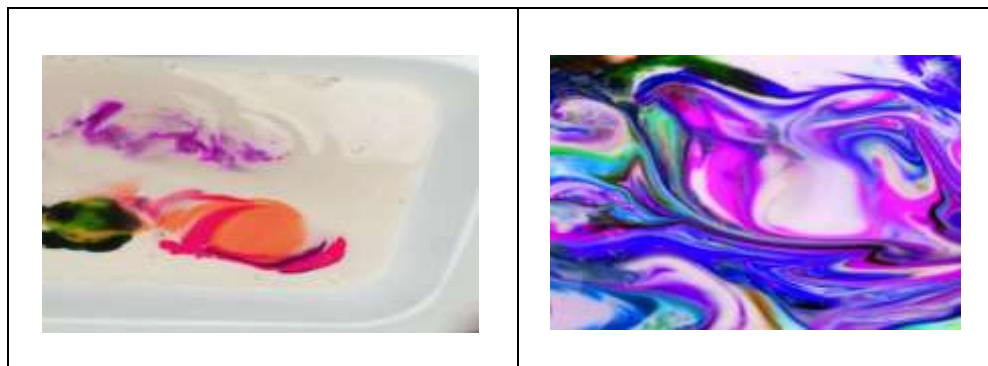


Figure 5. Marbling painting on milk - Image: done by author



Figure 6. Marbling painting on the surface of Fresh cream

Image: done by author



Figure 7. Marbling painting with cooking Oil and Food Color. - Image: done by author



Figure 8. Marbling painting with Nail Polis - Image: done by author



Figure 9. Marbling painting with some tools - Image source: the Internet

3.2. Discussion

Through some of the examples above, we see that: marbling painting method is only the formula, and the creation and modification of the formula depends on the children.

Through this activity, teachers realize that science and the arts can be used together, these two subjects intertwine and complement each other. Advice for teachers that: like

marbling painting, making the applicability of other arts in science and technology classes are useful.

Teachers' opinions about the contribution of science to art according to the content of the thesis are given. Teachers explain that marbling painting on paper is helpful to the environment and visual art, useful to students since it will increase their interest in art.

Klein said that: *"Making art also builds children's self-esteem by giving them opportunities to express what they are thinking and feeling"* (Klein, 1991). [3]

4. CONCLUSIONS

Art is an excellent environment for fostering and developing creative thinking for children, especially in elementary school age. Therefore, to nurture creativity in children is a long-term process and necessary for those creativity to be fostered and developed. Creating art in a variety of ways can promote a child's ability to analyze and solve problems in many ways. Like Schirmacher said: *"Young children feel a sense of emotional satisfaction when they are involved in making art. This satisfaction comes from the control children have over the materials they use and the autonomy they have in the decisions they make"* (Schirmacher, 1998). [4]

Or S. W. Russ and E. D. Schafer: *"The color of toys, drawing behaviors and colors and languages used in the environment can contribute to children's understanding and understanding of emotions"* - S. W. Russ and E. D. Schafer (2006). [6]

Children "play and learn, learn and play", they are always active, curious, eager to learn and to explore the world around them. While playing, children will learn to acquire initial concepts or pre-scientific knowledge, so creating an environment for educating children with practical activities to develop comprehensively on all areas: Intelligence - Ethics - Aesthetics - Physical strength. From there, help children improve personality, language, thinking, develop practical skills, communication, behavior...

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