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11. **Plastic's mark: A didactic**
12. **strategy about ecology based**
13. **on photography, printing and**
14. **projections**
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24.
25. **ABSTRACT**

26. *The predominance of plastic is without doubt a major problem in today's society.*
27. *In order to create environmental awareness, it is necessary to teach critical reflection*
28. *about its propagation to counteract its ecological consequences. This article*
29. *proposes a revision of the use of plastic in contemporary art as an aesthetic material*
30. *and as a creator of social and cultural knowledge in order to question its use*
31. *in current arts education.*
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34. *An arts-based educational project is presented that hopes to sensitize students in*
35. *the school of education about the predominance of plastic in today's society and*
36. *its mark on the environment. The main objective of this educational proposal is*
37. *to make students work with plastic from an aesthetic viewpoint and artistically*

KEYWORDS

art education
arts-based educational
research
contemporary art
sustainability
artistic experimentation

materialize their mark on the world using photography, engraving and projections. Through arts-based educational research, different student productions are analysed to create visual discourses that aesthetically express awareness of plastic's predominance.

INTRODUCTION

Climate change and predominance of plastic

Climate change modifies social and cultural references in society and disrupts the interdependence of man and nature. For the first time, our actions will form part of history on a geological scale with consequences that will last hundreds or thousands of years. Ecological awareness is becoming more present due to the growth of individualism and we should therefore rethink the world in which we live.

From the education system, we can encourage this critical reflection in order to go beyond a simple personal questioning. Acting in teacher training allows us to spread this awareness to the youth population as a whole, so that they grow up with the right ideological tools to transform the world.

Plastic has become an indefectible material for modern engineering and the production of mass-consumption goods. Its worldwide production has increased dramatically, going from 1.5 million tons in 1950 to 299 million tons in 2013 (Soto 2017: 46). This frenzied increase and the consequences due to the waste produced are considerable. The planet cannot eliminate them and they will cause irreparable damage to environmental structures.

The European Commission aims to have all plastic containers be recyclable or reusable by 2030. While governments consider long-term objectives and we continue to involuntarily consume plastic, it is necessary for each person to become involved so that our society evolves into a more sustainable world.

Facing this environmental emergency, we should act not only individually, but also collectively. Education is an ideal space to raise awareness about the ecological print that our occidental way of life is leaving on the planet.

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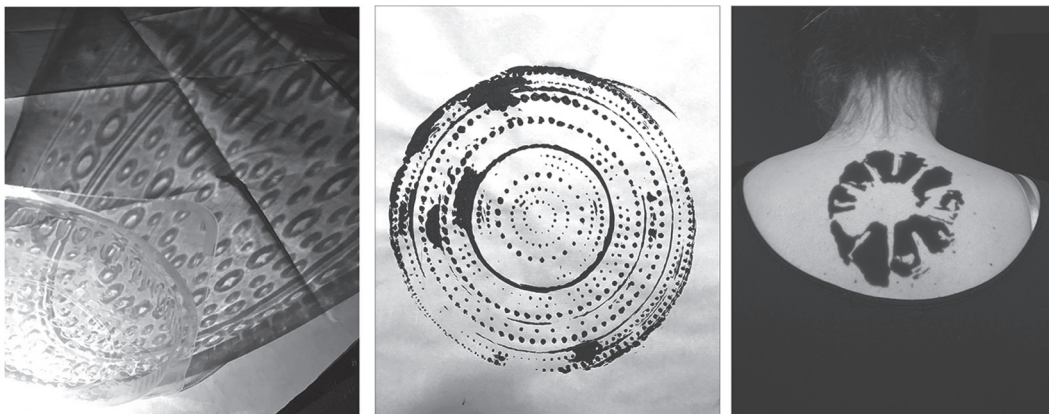


Figure 1: Authors, Plastic's Print I, 2020. Photograph essay composed of, left, Student 1, Textures and Developed Shapes, 2020. Photograph; centre, Student 2, Circular Print, 2020. Printing; right, Student 3, Shapes on Skin, 2020. Photograph.

ART EDUCATION AND ENVIRONMENTAL AWARENESS

Education enables the development of intellectual capacity, it also facilitates the creation of moral and affective awareness by establishing links between human beings and giving meaning to their experiences. It creates links between humans and gives meaning to their experiences (García 2001). Teaching is training students to take control of their lives, develop critical thinking and hence, take a stance on environmental issues as well. To reach the entire population, it is evident that measures must be taken to affect the base of the educational system, in other words, influence teacher training.

According to Samper (2011), art education is the ideal receptacle to work on values and develop critical thinking skills. Using this discipline to raise awareness creates aesthetic values and reconstructs sociocultural thought based on the imaginary. Art education fosters complex and plural thought. It recognizes and creates meaning based on what is known, transforms experiences and makes society evolve. Students should be critical before images and objects, knowing how to assess them and create personal unedited images using technical knowledge that is both symbolic and aesthetic.

It is therefore necessary to have students reflect on these ecological phenomena: the excessive use of plastic, its production, its everyday function and the impact of its waste on the environment. Artistic practice can generate new alternative narratives to promote social, cultural and environmental well-being with the purpose of creating social awareness.

PLASTIC IN ART AND ART EDUCATION

This article proposes a revision of the use of plastic in art, as an aesthetic material, a generator of social awareness and provoker of change. On the other hand, it considers the misuse in current art education, showing some projects that could be sources of inspiration to go beyond the use of plastic in crafts.

Subsequently, an art education project is presented that intends to make students in primary education at the school of education aware of the predominance of plastic in our society and its mark on the environment. The main objective of this project is to have students aesthetically interact with plastic and visually investigate it through photography and printing, learning both techniques, to later create visual metaphors about the contamination produced by plastic on themselves, projecting prints onto their bodies.

The results of this teaching practice were analysed and interpreted through arts-based educational research to reveal the aesthetics of plastic and the artistic transformations produced by the students. Conceptually, a poetic visual discourse is created that expresses awareness of the predominance of plastic.

HISTORY AND ARTISTIC REFERENCES

Plastic and its print on the arts

Artists express the desire and necessity to renew our relationship with the world, to explore its diversity, its limits and its relationships. They are a source of inspiration, anticipation, translation, alert, change and resilience to reveal our ecological print and establish a new relationship with the world. Its sensitive perspectives which are unconventional and inquisitive indirectly influence all the other components of society (politicians, scientists, businesspeople, etc.) worried about evolution before the new social, economic and environmental challenges.

Different artistic currents, such as ecological art, environmental art, social sculpture, land art and contextual or digital art have dealt with the topic of the ecological print. More globally, environmental problems, omnipresent in society today, have transformed the artistic field and perspectives are as diverse as the issues at hand.

In this article, we will concentrate on examining pieces of contemporary art that use plastic as a material and object to socially inform others about climatic change.

Tony Cragg (1971–present) is undoubtedly the precursor for the use of plastic in art. The British sculptor from the twentieth century created art with coloured pieces of recycled plastic. His work comes from fragmentation and the recovery of everyday objects, symbolizing contemporary society that produces, consumes, throws away and recycles through artwork that changes the perception of both the material and the object. Throughout his professional career, we can simultaneously see the evolution of plastic as a more and more flexible material with more varied textures. In his pieces, plastic symbolizes the delirium of industry, the alienation of mass-consumption, the chaos of waste and, in each of these, he reports a society trapped in its own creation.

Contemporary artists express the emergence of climatic change in their work to address the shock caused in our lives whilst using plastic as a support for this vindication. The artist Daniel Firman (1966–present) in his series *Gathering* (1999) creates human sculptures where man is a prisoner in his own everyday objects that he accumulates on top of himself like magnets. With his artwork, the artist transforms physical and moral situations in today's society that could be oppressive or confusing. David Altmejd (1974–present) goes even further with his project 'The Vibrating Man' (2019). He creates faces consumed by plastic materials and chemicals that appear to be destroying themselves, relating the body to the decline of the planet and its impact on human beings.

Enrica Borghi (1966–present) is without a doubt the most versatile in her use of plastic. *Fashion* created in the 2000's created clothing from non-biodegradable materials such as candy wrappers, plastic bags and drink bottles. Her work refers to the feminine and domestic universe associating it to ecological print. Borghi works with plastic from other perspectives such as in her project *Light Installation* which uses it as a source of light and transparency in urban scenographic sets and in nature, relating the element with the human habitat. Joana Vasconcelos (1971–present) unites the same concepts while Georges-Pascal Ricordeau (1963–present) recreates objects or composes paintings through braids and juxtaposing used plastic chromatically to reveal its artistic aesthetic.

Claire Morgan (1980–present) and Pascale Marthine Tayou (1967–present) have a similar visual approach to plastic, creating light sculptures and geometric shapes, often suspended using waste from society's consumption: plastic bags, bottles, etc. Conceptually, each conserves its specificity. Morgan speaks of the interaction between human beings and their environment and their fragile balance with nature while Marthine Tayou, a Cameroonian artist, reports social and economic conditions in postcolonial Africa, *The Trash Continent* of the occidental world.

Alejandro Durán (1974–present), a Mexican artist, creates in situ installations where the plastic waste is found. In his project, *Washed Up*, water bottles are structured following organic shapes in nature. His work is like that of land art, with ecological connotations; his objective is not only to create art but also

1. to clean an area of its waste. Judith and Richard Lang work with the same
 2. deliberateness to later translate their pieces into an exhibitive space.

3. If we approach the audio-visual world, we can also find artists that use
 4. their artwork to report the print plastic leaves on our planet. Mandy Barker
 5. (1964–present) and Daniel Canogar (1964–present) are two examples of this.
 6. Barker goes on expeditions with scientists to document and visually investigate
 7. the impact of plastic on the oceans. Her photographs are visual interpretations
 8. of what occurs in the sea. She says that her main objective is to stimulate an
 9. emotional response from the viewer using a contradiction between the initial
 10. aesthetic attraction and the following conscience message. On the other hand,
 11. Canogar works from the perspective of projected installation or video crea-
 12. tion. The central axis of his work is the critique of the use and throw away
 13. culture, of the rapid and intentional obsolescence of consumption goods and
 14. the consequent uncontrolled creation of trash.

15. The artists shown in Figure 2 are just a few examples of the ecological
 16. awareness present in today's visual art world. Raising environmental aware-
 17. ness is booming and more artists are involved in demanding that we care for
 18. our planet. Plastic is undeniably the recurrent material in these visual protests.
 19. It can take on many shapes, colours and textures. Its flexibility allows for
 20. multiple creations on a technical level. Many artists investigate its shape and
 21. representation in order to expose its excessive usage and the mistreatment of
 22. the planet, using the material or its transformation. Their artwork impacts the
 23. viewer and creates awareness; therefore, they are our references in the field of
 24. art education.



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50. *Figure 2: Authors, Plastic's Print II, 2020. Photograph essay composed of, from left to right and top to*
 51. *bottom, five Literal Visual Citations (Borghini 2000; Morgan 2008; Cragg 1979; Durán 2013; Lang and*
 52. *Judith 2012).*

PLASTIC AND ITS USE IN ART EDUCATION

The use of plastic in art education has little to do with what artists do formally, artistically or conceptually. Under the umbrella of ecology and the good practice of recycling, art education in pre-school and primary education has been inundated with caps, milk cartons, yogurt cups, water bottles, and many other plastic wrappings to create crafts both collectively and individually for different events. Today, the internet is full of proposals to create objects from plastic and with the help of the three R's (reduce, reuse, recycle), teachers are comfortable using plastic containers to make crafts. However, not only is the use of plastic in question, which is being undermined but also learning value. In these activities, students are repeating an established model, a scheme that allows them to create the desired object without any type of personal modification except that of copying. There is no creative process and an important part of art learning is lost, thus becoming a simple mechanical action which develops fine motor skills. Art stops being an aesthetic element and becomes a basic assembly material that allows for the construction of certain objects: a jar, a box, a pencil case, etc. Thus, not only is the intrinsic value of the material is lost, but also the ecological awareness that it could have.

According to Hernán:

Creating environmental awareness involves developing critical sensibility and ability to perceive the natural and material medium that surrounds us so that we can be alert and react to attitudes, objects, situations and events that contribute to improving or damaging our quality of life.

(1993: 27)

Art education and art in general allows for direct linkage to the subject in a tactile way, to know the potential of the material, apply techniques and know means of expression. It is the only subject that allows us to understand what surrounds us from a formal perspective: colour, shape, texture, space and proportion cannot be studied using another subject. It is a discipline that gives one critical thinking skills through artistic reflection, creating awareness about the ecological print of plastic from a sensitive and visual perspective.

According to Marín Viadel (2003) arts education is not about reproducing artworks or creating decorative objects. Children have a personal style and expression with their own value. For Acaso (2014), crafts are generally associated with art education because they form a part of the imaginary collective that has been created based on this extremely infantilized discipline. Art education is not children painting murals on the first day of spring. It is important to remember that art education comes in many formats and is for any age, both inside and outside the classroom; it is a conductor of knowledge, not only expression. Analysis and production of products and artistic expression are activities related to the production of critical knowledge.

The Educational Psychologist Francesco Tonucci, also known as Frato (2007), clearly expressed in one of his drawings this mistake representing children that go excitedly to school, each imagining what they are going to create with some clothespins. When they go home, everyone is disappointed with the same pencil case.

The lack of qualified art teachers has for decades generated automated learning based on the creation of pre-established objects that does not develop

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1. creative thought in children, demonstrating the lack of necessary training to
 2. help constructive creativity and imagination emerge in childhood.

3. However, there are some model initiatives that should be promoted in
 4. order to reclaim more creative teaching opposing craft proposals by inexpe-
 5. rienced teachers. In the field of ephemeral architecture, interesting proposals
 6. derived from the unconventional use of plastic in schools have been made,
 7. which can serve as sources of inspiration in order to stop creating projects
 8. based on recycling and the proliferation of objects with little visual, aesthetic
 9. and artistic qualities in the classroom. Paraphrasing Casanova (2018), if we
 10. link human manipulation to respect for the resources and problems of the
 11. planet, we will have the opportunity to enrich these proposals both socially
 12. and pedagogically.

13. *Head in the Clouds* (2013) is a proposal from Klimoski Chang Architectural
 14. Studio to raise awareness about the excessive consumption of water bottles.
 15. It is a monumental structure composed of water bottles filled with differ-
 16. ent amounts of distinct coloured water to filter light in different ways. The
 17. architect Arun Kumar used plastic caps to create sculptures of actual land-
 18. scapes in Denmark. In Granada, on International Recycling Day, the CUAC
 19. Architectural studio got students from the architectural school to construct
 20. a labyrinth of more than 45,000 empty cartons. The Basurama collective is
 21. undoubtedly the group with the most educational and environmental involve-
 22. ment in Spain, and focuses on creative processes. As stated on their webpage
 23. <http://basurama.org/>:

24.
 25. We hope to study inherent phenomena related to the mass production
 26. of real and virtual trash in consumer society, contributing new visions
 27. that act as generators of thought and attitude. Detecting weaknesses in
 28. these consumer and generative processes not only questions how we
 29. exploit resources, but also questions our way of thinking, working and
 30. perceiving reality.

31. (Basurama 2020: n.pag.)

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 33. Their proposals not only involve citizens with urban installations that impact
 34. and transform public spaces, but also children with participatory interventions
 35. at school.

36. Based on these educational premises, it is evident that plastic is not a mere
 37. material to create crafts. Furthermore, art, audio-visual art and architecture
 38. can bring up proposals that not only use this material to generate projects
 39. with artistic qualities, but also promote ecological awareness. In our didactic
 40. proposal, we have tried to move away from educational clichés about plastic
 41. in order to deal with it sensitively, aesthetically, artistically and simultaneously
 42. question students about its ecological value.

43. **ARTS-BASED EDUCATIONAL RESEARCH ABOUT PLASTIC'S PRINT**

44. ***An educational project for teacher training***

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 47. The educational project presented in this article was done with first-year
 48. students in the Primary Education Degree at the School of Education in the
 49. course entitled *Teaching and Learning Art and Visual Arts*. It dealt with three
 50. educational dynamics based on photography, printing and projection. The
 51. objectives of the teaching experience are as follows: (1) the development of
 52. students' aesthetic perception based on every day elements such as plastic

containers and (2) visual reflection about the ecological mark of plastic on the environment.

Beforehand, the students were asked to collect transparent plastic elements to use as raw material for the activities. The first action was focused on photography. The students were asked to observe selected elements with a flashlight in darkness in order to remove focus from the surroundings and focus on the effects of the light on the material nature of the object. The source of light not only allowed for better investigation with respect to the texture of the plastic, but also generated transforming shadows, creating new volumes and projected objects with similar or different shapes. Plastic's transparency also permitted students to play with the shadows and reflections and create original images. In this first phase of photographic observation, students seize the object and discover unsuspected facets of a simple plastic container that they would have never seen from its everyday use.

The second action was based on printing with the help of a paintbrush and black acrylic paint. Students had to create an inventory of prints of different objects, paint them and print them onto a white sheet of paper in a process that allowed for the discovery of another image from the same object. After the photographic observation of volumes and transparencies created by light, with this intervention, a mark is discovered, a two-dimensional drawing that has little to do with the object itself. It is no longer a matter of visual transformation, but of revealing a print. The experience resulted in a register of original shapes that were archived by the students.

The last activity was focused on the interaction of the plastic image and the student's body. The proposal is based on the work of Zhang Huan, *Family Tree* (2001) composed of nine photographs representing his face being covered little by little with text until his face is saturated. Each student selected the most meaningful prints, formally and symbolically, from his or her inventory. Later, the prints were projected onto the bodies of the participants in class. Students chose parts of their bodies where tattoos normally appear: the nape of the neck, the shoulder, the ankle, etc. The action metaphorized the indelible print that plastic leaves on us, remaining printed on the skin of the students for an entire class.

Research methodology

In agreement with Thomas Barone and Elliot Eisner, arts-based educational research is a type of investigation that improves our understanding of human activities through artistic means (2006: 95). The artistic language used allows for a sensitive investigation about the studied aesthetic qualities.

For Marín Viadel

Excellent art education can consist of an object or visual image (or series) dealing with drawings, maps, graphics, sculptures, comic albums, performances, furniture, classrooms and buildings, interactive multimedia, and generally, any imminently visual material. This type of research, which is characteristic of *Educational Art Research* or *Visual Arts Based Educational Research* produces, in its approach, developmental processes and reasoning, as in its final conclusion, in the command of verbal language.

(2005: 268)

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1. Based on these premises, we investigate the results of the didactic proposals
 2. through photographic instruments of investigation based on arts to reveal the
 3. aesthetic aspect of the obtained images and create visual stories about the
 4. distinct educational actions.

5. According to Marín Viadel (2005: 250) research is more sensitive to sensory
 6. qualities of the phenomena and the educational situations it studies.

7. Because of the aforementioned, three types of instruments are used
 8. primarily to deal with visual data of this educational experience: a sample
 9. series to register the proposals of all the students, visual media to create a
 10. unique image of the data combined and the photo essay or visual pair to
 11. emphasize the most significant aspects.

13. RESULTS

14. For each of the artistic actions produced by the students, a different methodo-
 15. logical instrument was used in line with the student's production.

16. Firstly, photographs of the plastic objects using shadows and transpar-
 17. encies were analysed all together; after a selection of the most repetitive
 18. responses with respect to shape and texture, photo essays and visual pairs
 19. were organized with the most characteristic aesthetic qualities of the produc-
 20. tions. Figure 3 presents some of these results in a composition of three visual
 21. pairs that show distinct perspectives of the observation of the objects, mate-
 22. rials found and shadows projected creating metaphorical volumes of the
 23. objects.

24. Later, the prints produced from the different containers were studied by
 25. the students as inventory. As in the first analysis, a visualization of all the
 26. exercises combined was made and the most specific pieces were chosen and
 27. represented in a sample series detailing the different shapes found during the
 28. printing process. The second step was to overlap the sample series to create
 29. visual average of the ten prints created by each student to generate a group
 30. image just as in the work of Idris Khan (1978–present) based on photographic
 31. series by the Becher's. In this investigative process, similarities and differences
 32. among the printed shapes are revealed along with the most predominate
 33. shapes used. Figure 4 shows the productions obtained from the inventory of
 34. the prints of each student and the resulting visual average from the superposi-
 35. tion of the samples.

36. The last analysis focused on the photographs of the projections of the
 37. printed inventory on the students as a kind of tattoo. With the visualization
 38. of all the results, the students' preferences with respect to the location of the
 39. projection on the body was studied (hand, ankle, nape of the neck, etc.). In
 40. the same way, the prints selected by the students were examined (whether
 41. they were circular, defined, etc.). The most meaningful images were selected
 42. to create a photo essay that summarized the actions and revealed the poetic
 43. nature of the created metaphors. Figure 5 shows some of these results.

44. The combined visual interpretations of the investigation demonstrate
 45. the artistic quality of the responses from the students and the eye-opening
 46. aesthetic beauty of plastic outside its everyday context, as in the metaphor of
 47. the print left on us by this ecological disaster.

50. CONCLUSIONS

51. Despite all the current environmental actions, ecology is still a pending prob-
 52. lem in society. In order to resolve this issue, it is necessary to include it as

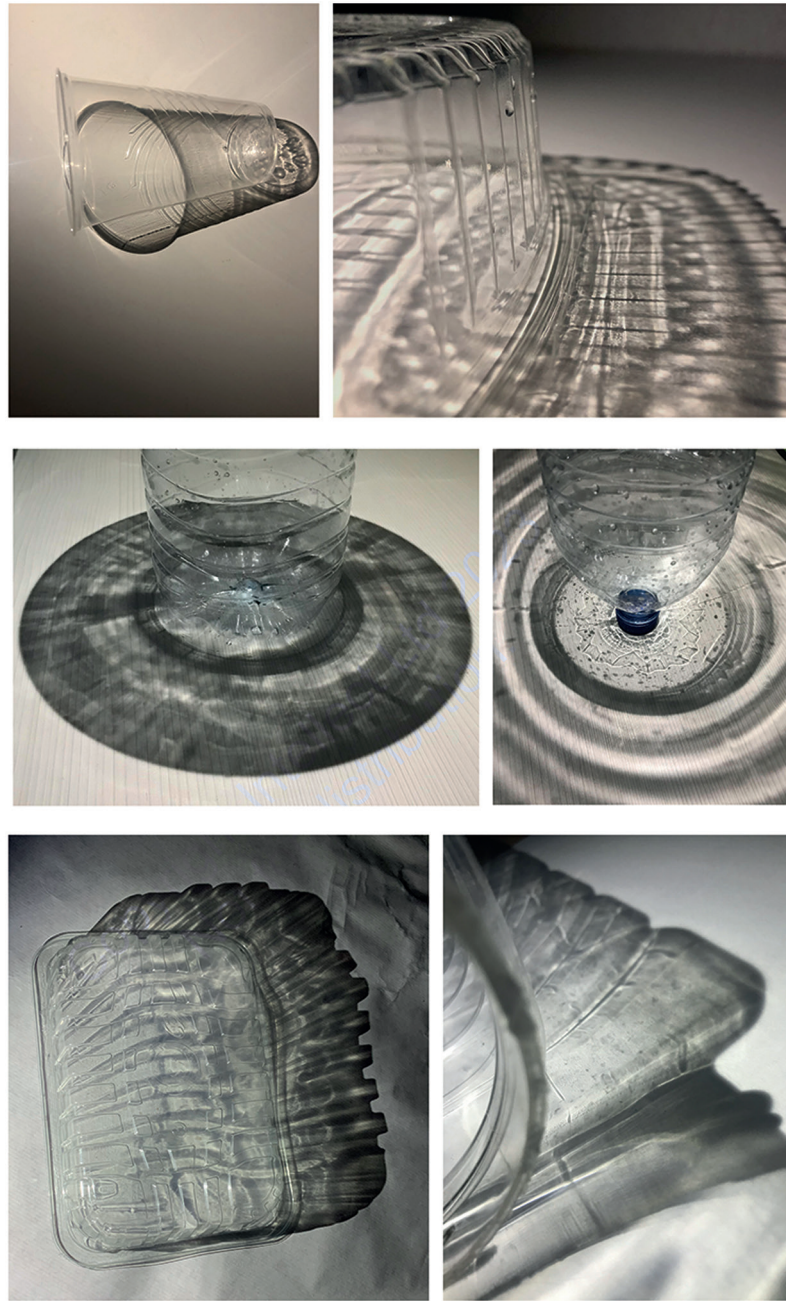


Figure 3: Authors, Plastic's Print III, 2020. Photograph essay composed of three visual pairs of photographs by the students.

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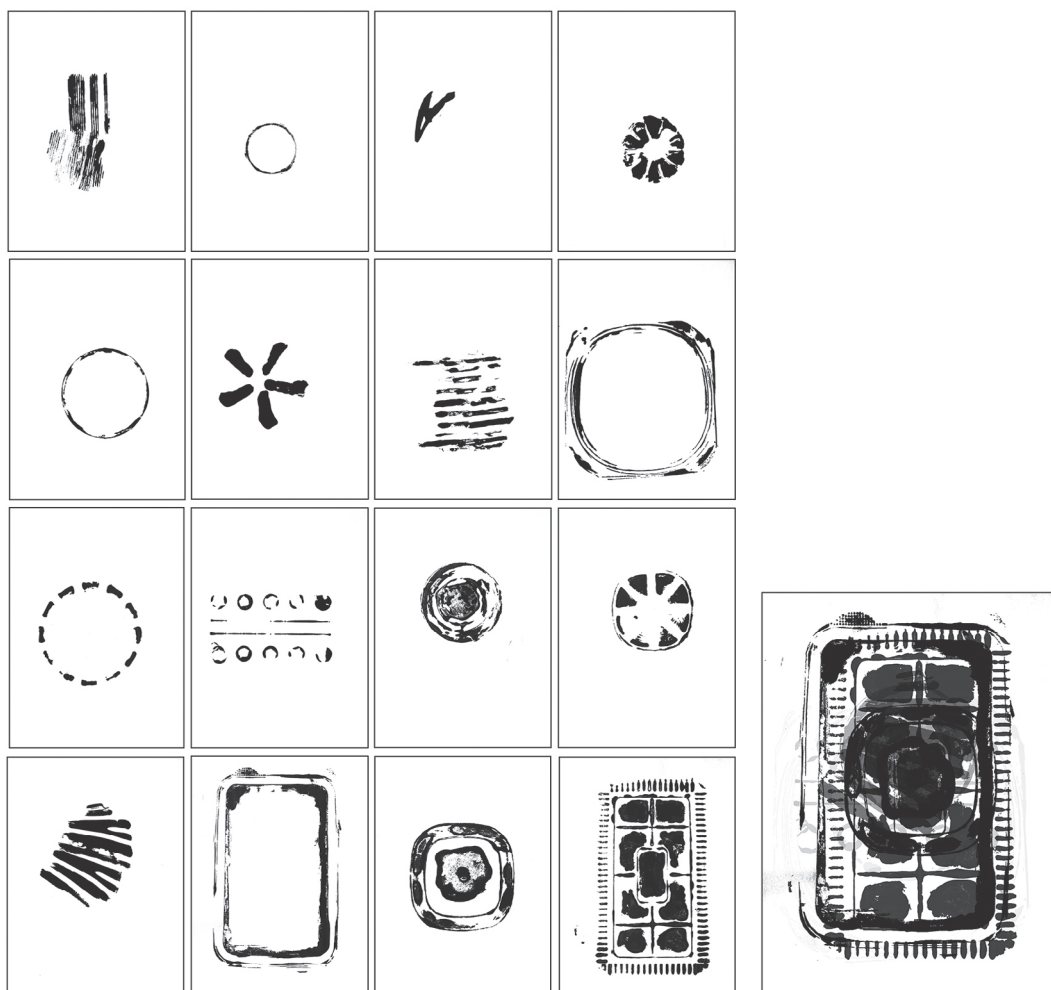


Figure 4: Authors, Plastic's Print IV, 2020. Photograph essay composed of a sample series and a visual average based on students' productions.

cross-disciplinary content in all the tiers of education. The thoughtful changes made by society are very gradual and although short-term measures are starting to be taken, it is necessary to take a general step in society from infancy. It is therefore essential to act in teacher training.

Contemporary art is always a precursor to societal change and we are giving signals that society should operate based on ecological critiques and the creation of environmental awareness through that which is visual and aesthetic.

Currently, art education mistakenly uses plastic objects for crafts. Many authors have demonstrated the misuse of these in the creation of decorative objects that do not promote creativity or originality by students. Above all, they do not promote awareness about the ecological print that plastic is leaving on our planet.



Figure 5: Authors, Plastic's Print V, 2020. Photograph essay composed of productions by the students.

Using teacher training, different actions can be proposed that involve students and promote ecological awareness by using plastic as an aesthetic material and generator of visual metaphors, as demonstrated in the results of this arts-based educational investigation.

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