

"Lithography as a printing technique and its impact on form and content in the field of contemporary ceramics"

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Research Background:

The ceramic industry is based on clay material, which is characterized by the property of plasticity, which is to retain any impact or pressure on its surface, and the evidence for this is that it retains the print of the old potter's finger on it to this day and also the presence of decorative models on it, which indicates that the potter is the first to use printing in the world, the ceramic surface design is the external appearance of the product and the technique used to obtain this appearance is an aesthetic input and an added value for the design of ceramic surfaces, and it was treated The ceramic surface in the beginning tended mostly to decoration or to give an aesthetic sense to the ceramic form, then surface treatments began to be characterized to express the nature of each era and evolved until it became an expression of the personality of the artist and his individuality, so the enrichment of the ceramic surface was always what occupies the potter artist since ancient times. (Hassan Rashid Abdelaziz, 2000)

The ceramic industry has evolved and was more affected by technology and the use of modern machines in its manufacture, which helped to develop the field of ceramic art, so the potter artist began to benefit from this scientific development in addition to the various technical fields to develop his techniques and to enrich his ceramic works, including the field of printing, which was benefited from most of its multiple images and techniques in the field of ceramics in line with porcelain and its nature, so artists used many different printing methods on ceramic surfaces to add meaning or to enrich the surface or To confirm a certain idea that the artist aims to (Hoda Ahmed Raja Hashem, 2013)

Which led to the development of ceramic techniques for ceramic surface treatments in the modern era in addition to the development of tools and implementation machines, and this resulted from great technological progress and the interaction between different sciences and benefit from the applications of modern scientific theories and these techniques decoration using (lithograph) and printing of various types (silk screen) and using ceramic printing machines by inkjet Ceramic inkjet printers The importance of research lies in familiarity with these modern techniques to keep pace with the tremendous technological development in the field of surface treatment, especially ceramic tiles, and how to benefit from the diversity of historical techniques in the different stages of production, and link them with printing techniques for the decoration and treatment of ceramic surfaces.

Search problem:

The research problem lies in the following questions:

-What is the possibility of benefiting from lithograph and silkscreen printing techniques in developing techniques that enrich the surface of ceramic tiles and add expressive values to it?

Research Objectives:

The research aims to:

1. Uncover the potential of lithograph as a printed image processing method to add expressive values to ceramic art.

2. Linking the method of pre-fire surface treatment (lithograph) and second post-fire treatments (silkscreen) in ceramic work.
3. Achieving educational dimensions - the aesthetic of lithography and silkscreen printing in the field of ceramics in the field of art education.
4. Introducing direct and indirect printing techniques on ceramic surfaces and knowing the use of printing methods to enrich the ceramic surface.
5. Spreading our culture and artistic heritage in the face of globalization through the use of printing techniques by future generations.

Research hypotheses:

From the above, the researcher assumes that:

- It is possible to use printing methods on the ceramic surface in order to enrich it.
- By studying historical printing techniques, it is possible to reach a link with modern techniques that achieve added value to the surfaces of ceramic tiles.

Importance of Research:

- Experimentation in the potential of lithograph and the printing of the various silkscreen that help innovation.
- Experimentation in enriching the ceramic form and deepening expressive and intellectual values through postmodern art trends.
- Helping the art student to find ways to make it easier for him to print on ceramic surfaces.
- The need for a comprehensive study to keep pace with the great development that has occurred in the treatment systems of ceramic surfaces, especially ceramic tiles.
- The lack of surface ceramic products to a renewed aesthetic value compatible with the development of surface treatments for ceramic tiles

Research Limitations:

- The study is limited to stereoscopic shapesw remotee dimensions (ceramic tiles).
- The applied research experience is limited to the use of polychloric clay material and ceramic surface treatment before burning with lithograph printing techniques and second post-burn treatments with silkscreen technology.
- The use of local ceramic materials in the technical treatment of ceramic tile surfaces and what is appropriate to the subject of research.
- Design and implementation of a group of innovative ceramic tiles based in their aesthetic and expressive dimensions on the impact of the relationship between developments and intellectual and technological variables and plastic formulations, taking advantage of the results extracted from the theoretical framework so that they are applicable in the field of contemporary ceramics.
- The research is limited to providing a training unit with many practical applications of the art of ceramic tile decoration for fourth-year students in the Department of Art Education, Faculty of Specific Education, Alexandria University, which aims to produce ceramic tiles based on lithograph printing and silk screen and how to benefit from it to open new and diverse artistic horizons for art education students.

- Study of modern techniques used in the treatment of ceramic tile surfaces in different stages of production and methods of applying glass coatings.

Search terms:

Lithograph:

It is lithography, also known as schematic printing (planographic) and this technique depends on a chemical property, which is the dissonance between fat and water, and the term Lithograph consists of two Greek words, Litho, which means (stone), and the word (Graphio), which means (writing), and the discovery of lithography dates back to the playwright and composer Alois Senefelder in 1797. (Paul Scott, 2002. p.27).

Research Methodology:

In the theoretical framework, the researcher follows the descriptive analytical approach.

In the applied framework, the researcher follows the experimental approach through a set of practical applications.

First: Theoretical Framework:

1. A historical and analytical study of ceramic tile decoration techniques, types and properties.
2. A study of the modern techniques used in the treatment of ceramic tile surfaces and how they affected the final shape.
3. The importance of printing in the field of ceramic surface enrichment.
4. Study of lithograph printing, silkscreen and ceramic art.

First: A brief history of ceramic tiles:

- **The emergence of the tile industry:**

The emergence of the tile industry dates back to the fourth millennium BC when tiles were used in home decoration in Egypt, where the tiles were dried and fired under the sun, and the glass paint was blue in color and made of copper compounds, as was found in Mesopotamia on ceramic tiles striped in white and blue, and later appeared multi-colored types of paint and in China there was a center for the manufacture of ceramics, especially porcelain stoneware White with Chinese glass, which was made in the Shang Dynasty, which ruled in the second millennium BC and through the ages evolved methods of production and decoration of ceramic tiles, for example, most of the methods of decoration were limited in Persia and in many countries the decoration of tiles reached a high degree, for example, Spain and Portugal were famous for the art of mosaics (Moroccan zellige) as well as the fame of floor tiles for the Renaissance in Italy, as well as drawing icons such as religious symbols For example, in the tiles of the Netherlands, as well as ceramic tiles in Germany, and in the meantime the tiles were made and decorated by hand, and ceramic tiles were used in most places on the walls, floors, ceilings, heating places, murals and in the external cladding of buildings.

(www.builddirect.com) By the fourth decade of the nineteenth century, production began to emerge in a way of pressing between metal arms, using dry clays, and this progress was the beginning of industrial production, and the great development in tile production technology has been observed in the last two decades, and Europe alone produces a quarter of global

production, and China is one of the most productive regions in the world. (www.tirinitytilesupply.com)

- **Definition of ceramic tiles:**

Ceramic tiles are pieces of clay that contain amorphous silica that goes through different productive treatment stages, until it reaches the form of an artistic tile, and was called in the past Balkashani, and was known as an Arab-Islamic art in the Abbasid era, and the history of Qashani began in Egypt before its spread in Mesopotamia to decorate the palaces of Assyria and Babylon.

- **Types of ceramic tiles:**

- **Unpolished ceramic tiles:**

Unglazed porcelain is made using dry clay powder, as this type of tile is known for its extreme hardness, it is ideal for commercial and local use, and this type of porcelain is made by pouring it into a mold, and then pressing and burning it, this type of porcelain does not need further treatment, its organized finish is produced by pressing the powder dyed by the embossed mold, and does not require a seal.

- **Glazed ceramic tiles:**

Glazed ceramic tiles are available in several forms, including matte, glossy and semi-polished, and tiles can be produced in glossy and embossed, matte glaze or solid color, and after glaze tiles do not often require sealing or processing.

- **Digitally printed ceramic tiles:**

One of the types of glazed porcelain is digitally printed porcelain, as modern methods are used, where natural materials are photographed; and then printed digitally on tiles to prepare a natural-looking image on tiles, in addition to that this type of porcelain does not need to be stamped.

- **Full body porcelain tile, colored, double loading:**

It is a type of tile uniform color from its surface to its base, and it is also meant by double loading that it is made by pressing two layers of clay together, and this type of tile is considered one of the best types for the uses of very crowded areas (<https://mawdoo3.com>)

- **Characteristics of ceramic tiles:**

Ceramic tiles are used in most places in walls, floors, ceilings, murals and in the exterior cladding of buildings, and ceramic tiles are characterized by many characteristics that show the extent of its importance, for example:

- **Mechanical properties:** Corrosion resistance (wild) - fracture resistance - water absorption resistance - slip resistance - dirt resistance.

- **Chemical properties:** Resistance to acids, alkalis and organic solvents - Oxidation resistance - Stain resistance (www.designboom.com)

- **Ceramic tile making techniques:**

The ceramic tiles in the past were formed and decorated by hand and the bricks were made by individual clay on the ground and then cut into shapes and then left to dry under the sun and later was the use of wooden molds to cause prominent decorative effects in the surface of the clay and these experiences have been transmitted orally from one generation to another where many of the designs, decorations and details of the craft have not known their way to documentation and in the modern tile industry has been trying to return to the effect Handicraft and artistic values The tile industry has evolved a lot in the fourth decade of the nineteenth century (1840) with the beginning of the emergence of the method of dry pressing

between the arms (piston) of metal, and thus this mechanical method replaced the manual manufacture of tiles using clays and is in a state of plasticity (www.designboom.com)

Second: Tile decoration methods:

- Unpainted clay tiles:

They are tiles that have not been applied to glass paint and the color of the tiles is due to the color of the natural clays used, which ranges from sandy yellow to dark red. (South well, b. c, 1972)

- Tiles with glass coatings:

Grind both white lead, flint and kaolin, forming transparent coatings that appear and decorate the painted tiles with glass paints using natural and manufactured colorants and made natural ceramic body colors and can also be applied to colored decorations The first glass coatings of copper compounds and by grinding many metal oxides we get multiple color tones.

- Free drawing on tiles:

The artist freely paints on the surface of the slab and draws floral motifs, geometric designs, birds, or animals.

- Sculptural tiles:

Where each piece is carved separately prominently in clay, and it is also possible to drill the outer line on the surface of the slab or draw the design itself prominently (negative - positive) and sometimes the drilling is on a wooden flat and then the slab is compressed and this method shows the third dimension of the slab. (South well, b. c, op.cit 1972)

- Scraping (Sgravito):

An ancient method of tile decoration, where the surface of the slab is covered with a layer of lining, and then the surface is scratched to make the design, and then a biscuit fire is fired and painted with glass paint.

- Tiles covered with metallic luster coatings:

Glass coatings with metallic luster are one of the special decoration methods, as they give bright colors such as red, green, yellow, and brown.

- Drawing with syringe:

The surface of the slab is painted by a clay suspension, creating prominent lines, and then colored paints are applied, and this technique was used with the tiles of the Art Nouveau era.

- Thermal transfers:

In this method, the surface of the copper plate is etched with the design and then covered with colors and the excess colors are removed, leaving the colors in the engraved places only, which are then applied to the surface of the tile and removed after transferring the colors to the surface of the slab, and this method is one of the highways and low cost as well (www.designboom.com)

Third: The importance of printing in the field of ceramic surface enrichment:

Printing on ceramic surfaces began with primitive ceramic ONY, where the primitive potter formed his vessels inside straw baskets that left their impact on the surface of ceramic vessels, due to the fact that clay has many properties, including its ability to record impressions quite accurately, even the artist's hand prints can leave their impact on the ceramic surface, making this art distinctive since ancient times, and potters may be the first to use printing in the world, potters used many Different printing methods on ceramic surfaces to add meaning or to enrich the surface or to confirm a certain idea aimed at the artist as printing played an important role in the field of ceramics industry there was compatibility between the two fields and perhaps this is due to the presence of many common qualities between them, the most important of which is the ability of both the field of ceramics and printing to repeat drawings, designs, colors and contactors, and this helped a lot in the field of ceramics manufacturing and benefited many of it Artists potters.

Fourth: Printing methods on ceramic surfaces:

Ceramic surface treatment varied throughout the ages and differed and evolved with the accompanying development of society, whether the development was technological or philosophical, the ceramic surface treatment was initially mostly heading to decoration or to give an aesthetic sense to the ceramic form and then began to be characterized by surface treatments to express the nature of each era, surface treatment varied over civilizations since before the Pharaonic civilization to the Coptic and then the Islamic era to the popular and evolved ceramic surface treatment until it became an expression of the personality of the artist The potter and his individuality was the enrichment of the ceramic surface always is what occupies the potter artist from ancient times, and the fact that this technique combines the art of printing and ceramics through which the culture and heritage of society can be spread and also that heritage can be preserved through the porcelain material that lasts and remains for thousands of years, ceramic surface treatments varied between pre-burn treatments and treatments after the first burn and treatments after the second burn and used glass coatings of all kinds, pouring and spraying, each in line with The thought and style of the potter artist This study believes that the development of ceramic surface treatment depends on two main aspects:

1. Scientific and technological developments (techniques, materials, equipment).
2. Expressive, aesthetic and functional values.

It turns out that each complements the other, if it were not for the fact that there is an idea that preoccupies the potter artist and wants to achieve it, he would not have started searching for new and benefiting from all modern developments, and from here the potter artist begins to use experimentation in order to achieve what he wants from the ideas.

Ceramic surface printing techniques did not stop at a certain limit. Many potters began to use photographic printing and editing techniques until they became suitable for use on ceramic surfaces.

The techniques of printing photographs on the ceramic surface varied between direct printing on the ceramic surface and indirect printing, and the researcher believes that the techniques of printing photographs on the ceramic surface can be divided as follows:

1- Alternative photo printing techniques:

"They are techniques more related to printing alternative photographs of silver on paper, which are old techniques associated with photographic laboratories, but there are still many artists who use them, in addition to that some of these techniques have been developed to be suitable for printing on ceramic surfaces, including the following techniques:

- Lithograph printing. (Which will be addressed by the researcher in the applied aspect)
- Blue printing.

2- Printing techniques used on ceramic surfaces:

They are printing techniques associated with printing on ceramic surfaces, whether commercial or artistic, and are constantly evolving, and through these techniques photographs or decorative designs are printed to treat the ceramic surface aesthetically, including the following techniques:

- Silk screen printing and decal. (Which will be addressed by the researcher in the applied aspect)
- Inkjet printing. (Huda Ahmad Raja Hashem, 2019, p. 59)

• Lithograph printing:

Lithograph printing is the main printing method in the world, and the term lithograph consists of two Greek words: "litho" meaning stone and "graphia" meaning writing. Aloise Sinfelder discovered the method of printing with lithograph in 1797, and Sinfelder calls the name of chemical printing on the printing of lithograph due to the method's dependence on the property of repulsion between fat and water, and printing is done in a lithographic way by drawing an image on limestone using lithographic carbon and then wet the surface of the stone and then ink with ink with a fatty base rejects areas moistened with water ink while the fatty places pick up ink The paper is placed and the printed image is taken from the drawn areas and helps This method is the possibility of copying many images (Heba Mohamed Ibrahim Shehata, 2006), lithograph printing is one of the best printing methods to obtain a quiet gradient of tonality and not to obtain color spaces.

When this method was transferred from Germany to France and England in about 1800 AD, the term for it was "doubling the designer's own works", but soon the name litho printing replaced it and many lithograph terms such as offset, chromolithography, and planography. (Paul Scott p.27, 2002).

When the lithography industry faced many difficulties and began to lose its popularity, from here lithography began to develop through the overlap of other techniques with it, so photography was the new partner for lithography and photographic lithography began to appear, and with the progress of photographic lithography, "images could be transferred photographically from works executed on molds of wood or metal to lithographic panels, and the evidence for this is the presence of a number of printed and ornate tiles under paint on

some ceramic pieces dating from end of the nineteenth century and produced all by the lithographic method.(Paul Scott, op.cit, p.27)

Lithograph was initially used only for paper printers in Europe and later for porcelain printing through image transmission media. Later, there were many media and methods of printing photographs on the ceramic surface, including sergraphic printing, ceramic decal printing, and other modern methods, and printing images over the clay surface in the lithograph method is one of the simple manual methods used to print images and designs on the ceramic surface.

Lithograph is lithography, also known as schematic printing, and this method relied on the use of Bavarian stone, because of its ability to absorb fat and water in equal proportions. Other alternatives to the use of stone for printing have emerged in 1830AD, zinc was used, and in 1890 AD the use of aluminum appeared in printing.

(Antony Griffiths, 1996, p. 101.), and some potters have used the basics based on the lithograph technique, but using printed images and using modern printers and printed newspaper papers and relied on the resulting dissonance between dark printed color spaces and ceramic inks and produced many images printed on ceramic surfaces.

I have made modifications in the field of porcelain printing, especially on textile paper, to suit ceramic printing, and I use duplex paper, which until recently has been used and consists of a thin textile layer and a thick back paper layer. This thick paper layer allowed the fixation of colors during printing and this thick layer was removed before being transferred to the pot, while the thin layer was removed after fixing the image on the pot by rubbing it before burning.

Advantages of photo printing techniques:

1. These techniques can be adapted to the artist's vision, by controlling all stages of image making.
2. These techniques can be used to print on different surfaces by modifying the basic compositions of each technology.
3. The fact that these technologies are not only related to printing on paper helped to get photographs out of the exhibition halls.
4. The possibility of printing photographs on three-dimensional surfaces and that full knowledge of the chemical processes of these techniques helps the artist to choose the most appropriate technique for his artistic project and how to install it more than one printing technique on the printing surface.
5. These techniques are also characterized by their lower cost than the use of technologies with silver emulsions. (Huda Ahmad Raja Hashem, 2019, p. 101)

- **Silkscreen printing and porcelain art:**

The art of ceramics has become a symbol and character that keeps pace with global development and is loaded with new trends and theories, and contemporary ceramics has relied on combining aesthetic values and new concepts derived from modern art, which are concerned with the style of typographic and design treatment of ceramic surfaces. (Shirin El-Sayed Al-Arnous, 2013) For thousands of years, manual depiction with inorganic linings and pigments over ceramic surfaces and then burning them to high temperatures was the only way to obtain a fixed image or decoration on the ceramic surface, and silkscreen printing first appeared in Japan and its invention is attributed to (Yotensai Miyasak) in the early eighteenth century (Paul Scott, op.cit, p. 27). Silkscreen printing was not used in the porcelain industry until

the early twentieth century and the use of silk screen was first industrialized with fabrics and using stencil cutting.

In 1939 in New York, Anthony (Velos) developed the silk screen, as he dispensed with stencils, so the screen was drawn directly through a wax pen, then the screen was washed with a gummy solution, and when the glue dries, a solvent is poured on the back of the screen and its face, melting the wax, resulting in open areas through which it can be printed, but with the advent of photography, this opened up multimedia for silkscreen printing.

Silkscreen printing on ceramic surfaces began in the fifties in the UK and was used for tile decoration. The first silkscreen tiles in England were attributed to the Carters (Paul Scott: Ibid, p. 28)

Silk printing depends on the rush of inks through the holes in the silk screen to the surface to be printed on. The silk screen consists of a wooden or metal frame tightened with a silk piece and uses the printing kick, which is a rubber ruler to push the color through the openings of the silk screen in addition to the design to be printed on the ceramic surface, and the quality of the image printed through the silk screen depends on the silk used and there have been many fabric materials used to prepare the sergraphic screen, including Synthetically synthesized tissues such as nylon, polyester monoester or polyfilament) or mineral tissues (Hassan Rashid Abdel Aziz, op. cit., p. 70)

Silkscreen printing depends on two techniques, namely direct printing, and indirect printing, and in indirect printing, the image is printed on paper through which the image is carried to the ceramic or pottery surface, which represents the technique of decal, which is the most common way to decorate ceramic products currently due to the ease of application manually or by machines and is often used in the decoration of round and irregular ceramic shapes, which are difficult to transfer color or print directly

As for direct printing, printing is direct on the clay, pottery or glazed surface using the silk screen, and there are simple ways to isolate the silk screen, such as using stencils as an insulator between the silk screen and the clay surface so that the design to be printed is cut using stencils and then placed under the screen and the color is pulled using the printing kick, and the idea of stencil printing depends on the presence of isolated areas on the surface of the silk screen. There are many methods of stencils, including paper stencils , glue-cut film stencils, photographic film, direct emulsion, rubber adhesive tape stencils, water-soluble film stencils, and many other methods of screen preparation" (Hassan Rashid Abdel Aziz, op. cit., p. 78).

Advantages of printing silkscreen:

1. This typographic method is characterized by the possibility of printing anywhere without being restricted to places specially equipped for the printing process.
2. The possibility of printing on various ceramic bodies such as flats, models and arched surfaces.
3. The possibility of giving a thick ink layer up to 10:30 microns.
4. The possibility of producing many editions with low cost.
5. Ability to print fine details and hafton grids to print four-color photographs (Sherine El-Sayed Al-Arnous, 2023)

Second: Applied Framework:

Objectives of the experiment:

The experiment aims to spread the culture of printing images and designs using lithograph technique and silkscreen printing and using it to decorate ceramic tile surfaces.

Technological goal: Keeping pace with the technological development in global ceramic products in order to add highly competitive value to our Egyptian products.

Aesthetic Objective: To emphasize the strength of the link between form and technique and the importance of both for the high aesthetic values of ceramic tile surfaces and to emphasize that ceramic surface design is of paramount importance beyond just common decorative formations.

Academic Objective: To provide Arabic references illustrating typographical methods in ceramic tile surface treatments.

Starting points of experience:

The experiment has two starting points, an intellectual and a technical one.

A- Intellectual Premises:

The intellectual premise of the researcher is based on three main axes.

- **Researcher's direction:** The researcher is interested in printing methods on ceramic surfaces, and trying to reveal the new, which raises the intellectual level to the level of innovation.
- **Theoretical study of the research:** The study that was theoretically treated in the theoretical framework, which revealed the importance of lithograph printing and silkscreen printing in the field of ceramic surface enrichment.
- **Experimentation:** It is considered one of the most important intellectual premises for ceramic works using printing techniques, because experimentation is an effective practice that develops creative ability, provides many plastic treatments or innovative solutions, and addresses the use of raw materials in unconventional ways.

B- Technical Premises:

The technical premise is related to the work of students ceramics through the embodiment of the ideas expressed by pre-conception of the appropriate material with the work in which students will embody their plastic ideas, and this is evident in the following:

First: Determine the conditions of the experiment and the selection of the sample:

The factors that make an experiment a scientific basis include:

1. Unifying the quality of the students who are being experimented, which represents one educational and cultural level to some extent and represents the normal level of boys and girls from the students of the Faculty of Specific Education in Alexandria, the fourth year, and the number of 60 students.
2. The experiment is conducted in a unified period of time on students, which is four interviews of four hours per week in both the pre- and post-applications.
3. The size of the ceramic slab is not less than 15 cm and not more than 30 cm.
4. The experiment is carried out on the surface of the clay using lithograph printing technique and on the ceramic surface using silk gauze.

Experiment Tools:

1. A questionnaire was designed to survey students about the preference and taste of ceramic techniques, and the opinion was settled on the final items after presenting them to the judges.
2. The student ceramic work evaluation card is designed after modifying its terms by the arbitrators and verifying the logical validity of the content of the card.

Steps to experiment:

(A) - The researcher relied in the application of the experiment on two scientific approaches, where she relied in the first part of the experiment on the descriptive analytical approach:

This is done through a questionnaire for students about the extent of preference and taste of ceramic tile forms, whose idea was based on an opinion poll based on the development of aesthetic taste through linguistic expression of plastic qualities or the language of art, as well as on the visual culture of students.

- The researcher applied the opinion poll to the students of the sample attached to a set of pictures of the forms of ceramic tiles.
- Each student was asked to choose from those works the work he prefers, tastes and the extent of his preference for him, and his book the reason for preference, and the works that he does not prefer and the reason for not preferring and this form was applied before and after the applied experience to students.
- By drawing conclusions from this form in the pre-application, the researcher was able to determine what the students responded to in the ceramic form and what did not respond to it, in terms of the subject and its idea, the method of implementation "style", the external form and its contents of plastic and technical values, and what are the reasons for not tasting these works from the students' point of view, which will be mentioned when the results are presented, analyzed and interpreted.

Tribal opinion poll results:

The statistical results of the opinion poll came through judging the opinions of students by setting scores for the extent of preference and taste, where the five-scale of the opinion poll was used, which came to estimate its scores as follows: (better very large = 5 degrees, better big = 4 degrees, better medium = 3 degrees, no better = 2 degrees, no better at all = 1 degree). By collecting grades and conducting statistical operations, it was found that: Most of the students' opinions, which are equal to 85% of the sample, came by not favoring and tasting the shapes of ceramic tiles.

From the section on writing the reasons for acceptance and rejection of these works in the opinion poll, the researcher limited the reasons for lack of preference and taste to the following:

1. The students' artistic and plastic culture does not qualify them to understand the aesthetic and plastic values of designing ceramic tile shapes.
2. Students lack the ability to taste the artistic language, solve symbols and understand the meanings of these forms, so he analyzes the ceramic form as much as he can for a set of symbols and puzzles that he may not be able to solve and taste.

By studying the reasons for the lack of preference and aesthetic taste for these ceramic forms, the researcher concluded that:

These reasons can be used and converted into a set of items that can be used in building a program for teaching ceramics for students of the Faculty of Specific Education in Alexandria, namely:

1. Explain and clarify the most important philosophical concepts, which include the concept of printing, its techniques and potential, and the impact of artistic and visual culture on tasting the forms of ceramic tiles.
2. Study the aesthetic and technical characteristics of ceramic tile shapes, which represented an obstacle in understanding and tasting those ceramic forms such as:
 - Clarifying some of the expressive and plastic values of such ceramic tiles in the light of the art of lithograph printing.
 - Shedding light on the values and plastic skills of these works, represented in (the relationship of the shape of ceramic tiles with intellectual development - achieving balance in the design of the shape of ceramic tiles - the effect of lines in achieving the external appearance of the ceramic tile shape in the light of the art of silk screen printing - the effect of the values of the color gradient of one color and the effects in highlighting the aesthetics of the ceramic form - the role of the material in highlighting the aesthetics of the work and taking into account its capabilities in modulation).

(b) – The second part of the experiment relied on the semi-experimental approach:

Where the findings of the research will be applied in the first part of the experiment (the results of the tribal opinion poll), of the characteristics and values (aesthetic - plastic - expressive) of ceramic works in the light of the concept of the art of printing photographs, which received an aesthetic preference from the sample students and benefit from them in building an educational unit for teaching ceramics at the Faculty of Specific Education.

First: The main objectives of the educational unit:

1. Revealing the impact of typographic techniques on the art of ceramics to develop artistic expression and aesthetic taste.
2. Revealing the aesthetic, artistic and plastic characteristics and values of ceramic tiles in the light of lithograph printing, which is preferred by the sample students, and benefiting from them in expressing contemporary ceramic tiles in the style of printing decoration.
3. Students at this stage in the field of ceramics should learn the following:
 - Students implement ceramic tiles and treat their surfaces with silk screen printing suitable to be of functional and aesthetic value, in line with their ideas and implementation techniques and the taste of the society for which these works are carried out and keep pace with modern development in the field of ceramics.
 - Students achieve aesthetic aspects and values in the treatment of ceramic tile surfaces from: printing photographs, printing artistic scenes from different civilizations and achieving a good relationship of linear treatments on the surface of clay and ceramic form.

Second: Subject, Materials and Tools:

By studying ceramic tiles, it was found that when implementing the student experience, they choose topics that affect the lives of students and express what surrounds them in the environment, so that they can express and be creative in choosing ideas and implementing them through two aspects:

The first aspect: the implementation of ceramic tiles that express scenes inspired by different civilizations using the lithograph technique.

The second aspect: the implementation of ceramic tiles (circle shape) that express photographs of the personalities of officials of administrative positions from faculty members at the Faculty of Specific Education, Alexandria University, in commemoration of the role of

the evacuated professors, deans and vice-deans of the effective faculty in raising the status of the college starting from the era of establishing the Faculty of Specific Education to date using indirect silk screen printing technology (Al-Dikal) and was applied to ceramic surfaces to be the nucleus for starting small projects.

The choice of the subject of the unit on the expression in the style of formation of the slide and the material of clay polykli is the appropriate material to form these topics from the point of view of the researcher, because of the ease of formation, and the availability of tools, in addition to their availability in the student environment and the advantage of the light color, which shows the printing on it.

Tools and materials (lithograph)

Gum arabic - linseed oil - ceramic dye or oxide - two tablespoons - a sheet of glass - two pieces of sponge - small utensils - a printing cylinder - a printed image - a clay surface in a state of glaciation.

Tools and materials (silkscreen)

Ceramic inks (colors on top of paint) – silk screen – manual printing table – yellow gelatin (cover coat) – ceramic printing transfer paper (decal) – printing compressor – toxaphene (ink and gelatin cleaner) – electric ovens – ceramic surface.

Third: Sample:

The researcher relied in the selection of the research sample on the random method of selection, and the sample represented 60 students from the fourth-year students (artistic project) Department of Technical Education at the Faculty of Specific Education in Alexandria, which is one of the regional colleges, which confirms that the research sample was appointed representative.

Fourth: The schedule of the experiment

The researcher agrees with "Van Dalen" when he mentioned that "the duration of the practical experience should be short because this shortens the inappropriate, large, derived and synthetic factors such as maturity and experience" (Deobelt van Dalen, 1969, p. 415) and therefore the educational unit to be applied takes four weeks, four hours per week.

Fifth: Design and application of the proposed educational unit:

The researcher used the matrix "Laura Chapman" in presenting the vital steps of the artwork, which the matrix crystallized in six steps:

1. Ability to form ideas.
2. The ability to adapt and crystallize ideas.
3. The ability to use raw materials.
4. Responsiveness to visual elements.
5. Analysis and interpretation.
6. Judging the work of art.

The matrix focused on visual culture, and linked the student and the artist and the role of art in society and the sources from which the student draws his ideas and the sources that he resorts to in his artistic expressions, and Chapman relied on the perception of aesthetic and innovative values in art and nature and taste.

Since this matrix serves the current research, the researcher has relied on it, and in the light of which the basic structure of the proposed educational unit was built in accordance with the topic presented to students in this research.

Pre-test application: (took four interviews)

Before applying the proposed educational unit, the researcher conducted a pre-application of the proposed topic in the educational unit.

- **First interview (four hours):**
- The theme of the educational unit was presented, which is: expression in the style of forming and decorating ceramic tiles in an innovative way, achieving the plastic and aesthetic values of ceramic tiles.
- **The researcher relied in his learning strategy on verbal explanation of the subject,** and excitement through questions, discussion and dialogue about the aesthetics of ceramic tiles, with the presentation of models of those works illustrated from more than one angle that were presented during the explanation to students through an educational CD that was presented in the faculty of means.
- **Second interview (four hours):**
 - The students began to form ideas and prepare designs and photographs.
 - Preparation of ceramic tile surfaces and implementation of polychlorotic clay material by slide forming.
- **Third and fourth interviews:**
 - Implementation of printing technique on ceramic surfaces.
 - Completion of the implementation, finishing and technical output of ceramic tiles.
 - Evaluation of the works is the result of the tribal experience by specialists in the field of ceramics, to determine the impact of the proposed educational unit.

Application of the proposed educational unit: (post-application):

Subject: Implementation of ceramic tiles in the style of forming by slide and decoration using the technique of printing lithograph on the clay surface and silk screen on the ceramic surface in an innovative style that achieves the values of formation and aesthetics inspired by the arts of different civilizations and photographs, the duration of the study of the subject takes four weeks by four hours per week (duration of each interview), The course of the study is as follows:

- **First Interview (Formation of Ideas):**
 - **Subject:** Creating innovative ideas for ceramic tiles that express scenes of different civilizations in the style of lithograph printing technique and another expressing photographs in the style of silkscreen printing technique.
 - **Interview time:** Four hours duration of the interview.
 - **Objective of the first interview:**
 - Raising students' thinking about the subject of the educational unit through discussion, dialogue and questions about the subject.
 - Preparing the initial designs of the project, taking into account the clarity of the design in black and its gradations.
- **Education Strategy:**
 - The researcher presents the topic of the lesson to the students and discusses them about it and raises their thinking through discussion and questions about the topic (expression in the style of formation in a slide way for printing techniques inspired by the arts of different civilizations.
 - The discussion and questions revolve around the role of visual and artistic culture in understanding and analyzing ceramic tiles, and questions about how to read the ceramic form and its plastic and aesthetic characteristics.
 - A range of means are displayed, from photographs of ceramic tiles and the presentation of an educational CD containing many forms of ceramic tiles varying in ideas, methods of implementation and sizes, and students discuss these works to clarify their expressive, plastic and aesthetic values to help students grow their thought and visual culture.

- Introducing the material used in the project (polychloric clay), the methods and techniques of printing on it, and the advantages and disadvantages of forming by the slice method.
- **Concepts of the unit in the first interview:**
 - **Linguistic meaning of the word Tile:**

The Latin word Tegula and its synonym in the French language Tuile means burnt tiles for rooftops, which are known as bricks, while the English synonym tile is more general to include any type of ground clay that is placed on the roofs of buildings, and man made ceramic tiles and ceramic tiles were found in the pyramids and the remains of the city of Babylon and in the ruins of Greek cities, and decorative ceramic tiles were made in the Far East and had a vogue. Large and varied decorative designs more than anywhere else in the world and during the period of Islamic rule flourished the manufacture of decorative tiles in Iran and in Europe did not use ornate tiles widely outside Spain until the second half of the twelfth century and mosaic tiles made in Spain and Portugal and magolica tiles from the Renaissance in Italy.

- **Calendar:**

Students discuss their experiences in designing innovative ceramic tiles for shapes inspired by the arts of different civilizations, in light of the foundations of contemporary ceramic form design.

- **The second interview: (adapting and crystallizing ideas and preparing the ceramic surface):**

- **Subject:** Start the implementation of ideas after adapting and crystallizing them on the surface of ceramic tiles.
- **Interview time:** Four hours of the interview.
- **Objective of the second interview:**
 - Developing the conceptual ability and performance skill to design and implement vocabulary designed on polyklene clay after spreading the slides to make ceramic tiles.
 - Introducing students to the plastic and aesthetic values of the shape of the tiles and how to spread the slide without air inside it and unify the thickness of the tile so that it dries properly.
- **Education Strategy:**
 - Explain and clarify how to start the implementation of the project by preparing the surfaces using metal and wooden forming tools to level the surface and smooth.
 - After adapting and crystallizing the ideas of the students, using the above explanation and clarification, each student began to implement the idea he designed for the subject of the educational unit, after explaining and clarifying how to transfer the design on ceramic tiles.
- **Concepts of unity in the second interview:**
 - **Clay slide forming:**

This method requires special knowledge and experience of the properties of the clay and especially the degree of its elasticity, which largely controls the choice of the right timing for straightening and welding" (Morgan Hall, 1972, p. 16). This method requires that the tile be in a leather condition so that the student can apply typographic techniques on its surface.

- **The third interview (the use of raw materials and surface treatment by lithograph printing):**

- The stage of printing scenes of cultural art on the surface of the soft clay tile involves the use of lithograph technique.

Interview time: Four hours of the interview.

• **Objective of the third interview:**

- Developing students' plastic skills and abilities through formation on polychloric clay.
- In this interview, the student must learn about some technical values of lithography printing on the clay surface and how to apply them well.

• **Education Strategy:**

- The researcher relied on guidance, dialogue and discussion with students about some methods, techniques and materials of lithograph printing during the implementation of the project.
- Finding plastic and technical solutions to address some technical problems that the student deduces with the help of the researcher and through educational means, such as the problem of transferring the design on the surface of the clay slab, as the lithograph technique is placed from the first time on the surface and cannot be moved or moved again so that the ink is not stained, and stand on the solution to the problem of the suitability of the clay material to transfer the designs on it.

• **Concepts of unity in the third interview:**

- **Technical Printing:**

It is the decoration of the printed surface to be printed with a certain decorative revelation and in many colors and different situations and to carry out dyeing operations in a color other than its original color according to the distribution of the units to be printed on the surface without color leakage to the rest of the surface and in places of unwanted in its prints, and with different types of printing and the multiplicity of its methods and different textures are multiple and also different printing materials, so it is possible to print on paper of all kinds and colors, as well as cotton cloth, silk, glass and metals and leather. (Shaima Ali Abu al-Fotouh al-Najjar, 2010, p. 29)

- **Drying process:**

The most important stages of ceramic work, where the piece of art must be completely dry before being placed for the first settlement and in order to ensure its safety and not to be shattered inside the ovens, and this stage is considered the most dangerous stage, where if they are not sure of the dryness of the body, it can be exposed to fracture or crack clear from the beginning of the ignition of the furnace, and therefore the drying process before exposing the pieces to settlement is one of the most important operations that require special care, as it is not correct to expose clay forms to air currents to speed up the Drying them, and it is not permissible to expose them to heat while they are still wet, as both methods expose large-sized shapes to damage, twisting and cracking.

(Al-Sayyid Muhammad Al-Sayed, Mohsen Muhammad Al-Ghandour, 2005, p. 117).

- **Fourth interview (silkscreen printing and evaluation of artwork):**

- **Subject:** The stage of printing photographs on the surfaces of ceramic tiles that have been coated with transparent glass paint using liberal screen printing and the good output of the printer in ceramic form includes the result of the experiment.

- **Interview time:** Four hours of the interview.

• **Objective of the fourth interview:**

- Teaching students how to print the design with silkscreen and transfer with decal paper on the ceramic shape and pay attention to fine details in the work.
- Introducing students to the importance of the overall external body of the shape, and what it is of distinct and specific manifestations of edges, angles, shape of surfaces and the balance of design on the shape.

• **Education Strategy:**

-The researcher relied on individual guidance for students, dialogue, discussion and presentation of illustrated models of ceramic works to illustrate the importance of finishing

and good output of ceramic work Theport B silk screen printing to clarify the importance of silkscreen printing and its materials, methods of printing, drying, and fire.

- **Concepts of unity in the fourth interview:**

- **Silk screen printing:**

Silkscreen printing or sergrafian derived from Latin (silk), and from Greek (writing) is an expression of one of the original printing methods seductivein the foot, and the principle of this method is to push ink from top to bottom through a porous surface defined shape called stencil (waxed paper) towards the material to be transferred drawing It is one of the first semi-organized printing methods adopted by ancient man to express himself, his purposes and motives. In this way, the primitive inhabitants of the Fiji islands were able to print their symbols and decorations on their clothes made of tree bark, using perforated and openwork banana leaves to make the necessary stencils, and with the progress of civilization, religious missionaries found in this method a means of printing numerous copies of religious images and teachings. (<https://www.marefa.org>)

- **Stages of fire:** After the completion of the drying process, the work passes through the next stage, which is the fire stage, which is the most important technological stage, where the raw materials consisting of it, especially pottery, are exposed to high thermal energy, so a chemical change occurs to it, so it turns from raw materials to a compound that has completely different qualities and properties from pottery ore, the fire process is a chemical process in which the mixture consisting of clays, water and other materials is converted into a compound that has different properties from the original mixture, When the works are placed inside the furnace and heated, the chemical water (water in the crystallization state) evaporates from the clay or body when the furnace reaches the point of redness (F. H. Norton, 1965, p. 60), and this occurs at a temperature of about (500-600) where the water comes out quickly (Alfred Lucas, 1945, p. 601).

- **Ovens:** One of the tools necessary to finish the work and give it the character of hardness and strength and not to decompose with water is the electric oven or other furnaces that run on fuel, gas or diesel (Adel Abdul Hafeez Haroun, 1997, p. 50).

- **Evaluation of ceramic works as a result of the dimensional experience:**

The work carried out (in the post-application) is evaluated according to the following steps:

- Preparing an evaluation card for ceramic tiles the result of the experiment, the researcher has taken into account that the card measures the main research objective, which is the impact of lithograph printing and silk screen in the development of artistic expression and aesthetic taste on the decoration of the surface of the ceramic tile, and the card also measures the technical and plastic aspects in the ceramic form.
- The opinion of specialists in the field of ceramics was used to amend the terms of the card (according to the opinions of seven arbitrators) until the evaluation card reached its final form.
- The ceramic tiles were evaluated for students by the arbitrators, and the researcher used the five-grade scale (achieved very large = 5 degrees, achieved in a large way = 4 degrees, achieved in an average = 3 degrees, achieved poorly = 2 degrees, achieved very weak = 1 degree) and the arbitrator put a mark (√) in front of the box chosen by him and achieved in the work.
- The scores of the seven judges for each ceramic shape were collected and the average scores were calculated to perform statistical operations to reach the results, which will be displayed in the results and interpreted.
- The researcher has codified the questionnaire to know its truthfulness and stability:

- **The sincerity of the questionnaire evaluates the applied experiment.**

- To find out the truthfulness of this questionnaire, the researcher used the sincerity of the content by presenting it to (7) arbitrators and the agreement rate was 88.8%.

- **The stability of the questionnaire evaluates the applied experience.**

- To know the stability of the resolution, the researcher used the Cronbach alpha coefficient, and its value was 0.873, which is a high value that confirms the stability of the resolution.

Thus, the questionnaire is characterized by honesty and stability, which enables it to evaluate the applied experiment and it is clear that the percentage obtained in the answers to the statements that have been tested (achieved very significantly) 70 by a percentage of 9.48% and the percentage obtained by the answers to the phrases (achieved significantly) 20 by a percentage of 1.81% and the percentage of scores obtained by the phrase (achieved in an average manner) 6 by a percentage of 2.43% and the percentage obtained by the answers to the statements (achieved poorly) 4 by a percentage of 1.62% and the percentage Percentage obtained by answer statements (achieved very poorly) --.

The total degree of the resolution is 100 and the percentage is 15.34%, and this indicates that the objectives of the experiment have been achieved through the mentioned items and their association with a high significance as factors affecting the tasting process of ceramic works.

Research Experience:

For students of the fourth year (technical project) Department of Art Education, Faculty of Specific Education - Alexandria University ,In the following, some of the students' works will be presented and analyzed as a result of the research experience to find out some of the plastic and aesthetic artistic values achieved by the proposed educational unit for research.

Side I :(lithograph printing)

A collection of ceramic designs and images printed in lithograph method on the clay surface (ceramic tiles)



Figure (1) Applying glue under and above the image Figure (2) Applying ink over the image Figure (3) Scattering water over the ink print.



Figure (4) Wipe excess water and ink Figure (5) Image appearance after wiping excess water and ink Figure (6) Remove the image over glass.



Figure (7) Placing the image on top of the clay shape Figure (8) Polishing behind the image with a spoon Figure (9) Transferring ceramic ink to the clay surface.



Figure (10)



Figure (11)



Figure (12)



Figure (13)



Figure (14)



Figure (15)



Figure (16)



Figure (17)



Figure (18)



Figure (19)



Figure (20)



Figure (21)



Figure (22)



Figure (23)



Figure (24)



Figure (25)



Figure (26)



Figure (27)



Figure (28)



Figure (29)



Figure (30)



Figure (31)



Figure (32)



Figure (33)



Figure (34)



Figure (35)



Figure (36)



Figure (37)



Figure (38)



Figure (39)



Figure (40)

Second side: (silk screen printing)

Inventory and perpetuation of an honor board for the distinguished professors, deans and vice-deans of the faculty, in commemoration of their effective role in raising the status of the faculty, starting from the era of establishing the Faculty of Specific Education, Alexandria University to date, with the technology of indirect silk screen printing (Aldekal), which is applied for the first time in the history of the faculty in the field of ceramics and was applied to ceramic surfaces to be the nucleus for starting small projects.



Figure (41)



Figure (42)



Figure (43)



Figure (44)



Figure (45)



Figure (46)

A group of photographs after the stage of separating the color into black and white using computer programs (Photoshop)



Figure (47)



Figure (48)



Figure (49)



Figure (50)



Figure (51)

The stage of applying ink and pulling using the press and drying it well and then applying the cover coat layer "yellow gelatin" over the final print.



Figure (52)

Figure (53)

Figure (54)

Figure (55)

Figure (56)

Figure (57)

The stage of transferring the layer of "yellow gelatin" in the final print on the ceramic surface with warm water



Figure (58)

Figure (59)

Figure (60)

Figure (61)

Figure (62)

The final shape after the fire process at a temperature of 700 ° C



Figure (63)



Figure (64)



Figure (65)



Figure (66)

Results:

The researcher was able to reach several results in light of achieving the objectives of the research and its assumptions, the most important of which were the following:

1. Spreading the culture and heritage of the community by printing pictures and drawings on the surfaces of ceramic products that remain and last.
2. Potters used woodblock printing and lino to decorate many of their ceramic works, but lino printing was the most popular among potters.
3. Photographs printed on ceramic surfaces have become widespread due to their ability to survive and not be subject to change over time.
4. The ceramic work of art was freed from most of the constraints of ancient mental logic, and there was a diversity in form, content, and methods of expression.

Research recommendations:

Through the results of the research and the findings of the researcher of the results of the analytical and experimental approach, so the researcher recommends the following:

1. It is preferable to leave the ceramic lithograph ink after preparation to ferment for 24 hours to give good results during operation.
2. It is preferable to use ceramic dyes instead of oxides when printing images in the lithograph method as they give better results and a more contrasting color after the fire.
3. Writings, dates or even pictures representing specific events of importance to a person, group, or even at the national level, such as historical, national, sports, or tourist events, can be printed.

References:

First: Arabic References: Books:

1. Alfred Lucas: "Materials and Industries of the Ancient Egyptians", translated by Zaki Iskandar, Mahmoud Zakaria Ghoneim, Egyptian Book House, 1945.
2. Al-Sayyid Muhammad Al-Sayed, Mohsen Muhammad Al-Ghandour: "Ceramics", Part Two, Faculty of Specific Education, Mansoura University, 2005.
3. Diobild van Dalen: "Research Methods in Education and Psychology", translated by Muhammad Nabil Nofal and others, Anglo-Egyptian Library, Cairo, 1969.
4. F. H. Norton: "Ceramics by the Potter Artist", translated by Saeed Hamid Al-Sadr, Dar Al-Nahda Al-Arabiya, 1965.

Second: Scientific Theses:

5. Hassan Rashid Abdel Aziz: "Requirements for the Technology and Design of Hotel Porcelain Decorations Using Typographic Methods", PhD Thesis, Faculty of Applied Arts, Helwan University, 2000.
6. Shaima Ali Aboul Fotouh Al-Najjar: "Using the Third Illusion Dimension in Digital Printing to Create Medical Envelopes in the Light of Quality Assurance and Accreditation Standards", Master Thesis, Mansoura University, 2010.
7. Sherine El-Sayed Al-Arnous, "Modern Techniques in the Treatment of Ceramic Tile Surfaces", Master Thesis, Faculty of Applied Arts, Helwan University, 2013.
8. Adel Abdel Hafeez Haroun: "Techniques of Combined Clay in Contemporary Ceramics as a Source for Enriching the Teaching of Ceramics", PhD Thesis, Faculty of Art Education, Helwan University, 1997.
9. Heba Mohamed Ibrahim Shehata: " Activating the Methods and Techniques Necessary for the Preparation of Flat and Stereoscopic Ceramic Shapes Designs", PhD Thesis, Faculty of Art Education, Helwan University, 2006.
10. Hoda Ahmed Raja Hashem: "The use of photogram printing in the enrichment of ceramic surface treatments in the field of art education", Master Thesis, Faculty of Art Education, Helwan University, 2013.
11. Hoda Ahmed Raja Hashem: "The Aesthetics of Photomontage and Photography as an Experimental Approach to Enriching Ceramic Surface Treatments ", PhD Thesis, Faculty of Art Education, Helwan University, 2019.

Third: Foreign References:

12. Antony Griffiths: "Prints and Print making", University of California Press, 1996.
13. Morgan Hall: "The potter's techniques manual", London, 1972.
14. Paul Scott: "Ceramics and Print", Second edition, A&C black publisher, 2002.
15. South well, b. c.; "making and decorating pottery tiles" Faber and Faber limited, London 1972.

Fourth: Internet References:

16. <https://www.marefa.org>
17. <https://mawdoo3.com>
18. www.tirinitytilesupply.com
19. www.builddirect.com
20. www.designboom.com