



Developing a Teaching Unit Based on Analysis of Natural Forms to Enhance Design Skills in Third-Year Art Education Students at Ain Shams University

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Abstract

Objective: To reveal the possibility of a teaching unit inspired by nature based on the analysis of form through the Geometric grid to prepare design Artworks.

Research hypothesis: There is a positive relationship between teaching the teaching unit that is inspired by nature based on the analysis of the form through the Geometric grid and the preparation of design Artworks.

Research methodology: It employs the experimental method "semi-experimental design" where the teaching unit plays the role of the independent variable, whereas the design Artworks is the dependent variable.

Research sample: It consists of 13 students from the third grade, Art Education Department, Faculty of Education for Specific Studies, Ain Shams University.

The most important results: The teaching unit, acting as an independent variable, has brought about a positive transformation in the behavior of the students in the research sample. This is evident in their newfound ability to recognize natural elements and execute processes aimed at creating Geometric Grid within design artworks.

Keywords – inspired, analysis, preparation, Faculty

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First: Research Background:

Nature serves as a fundamental gateway for designers and students to explore the principles of design. It offers a rich avenue for studying design foundations through the direct observation and analysis of natural elements. Designers often turn to nature, marveling at its beauty and splendor, and investigating its phenomena and origins to understand what makes it so captivating. They draw from nature the principles and laws that govern its form, shedding light on its myriad formations to highlight its inherent beauty. This includes its units, compositions, and colors. Nature encompasses various systems of formal relationships, each governed by mathematical and geometrical principles that influence their growth and external appearance.

Nature has always been the primary instructor for artists, from the Stone Age to modern times. The ways artists interact with nature have evolved based on their vision, culture, and the amount of artistic inspiration they draw from it, which varies with the surrounding environment. In ancient times, this interaction was limited to what was visible and tangible. Today, technological advancements have unveiled countless natural wonders created by God, offering new stimuli and challenges for an artist's imagination. Over time, as artists uncover more of nature's secrets, their approach to incorporating these elements into their work evolves, reflecting a deeper and ever-changing relationship with the natural world.

Nature is a fertile source that provides the artist and designer with infinite formal systems and relationships of boundless richness and diversity.

The relationship between formal relationship systems and design is close, where formal relationship systems are realized when the elements in the design interact homogeneously, and all the elements combine to serve a particular purpose. It is the basis of good design in art and is considered a good inspiration for the designer, student, and artist (Porter, A.W. 1975).

Nature is the main source of designs of planned formal relationship systems. There are specific goals behind these designs, including survival. And adapt to various environmental factors, and the systems of pre-planned formal relationships are a rich source for designers, and for art students in general, and even many of the systems of pre-planned formal relationships that we see around us in plants and animals are suitable for direct use in some works of art.

Examples of pre-planned formal relationship systems include leopard skin dotted formal relationship systems, tiger skin stripes as well as brightly colored peacock feathers, butterflies and parrots.

The process of preparing systems of pre-planned formal relations involves careful study of the placement of shapes, lines, colours, texture and values so that an artistic design with a coherent entity can be obtained, and the artist or designer usually tries to experiment with several alternatives, before finding the best method for preparing the planned artistic design (Gatto, J.A. and other, 1978).

The systems of formal relations were realized in the works of many artists who added dimensions that were credited with obeying their works with contemporary concepts such as Esher, Vessaraly, Abd al-Rahman al-Nashar, Mustafa al-Razzaz and others.

Formal relationships in nature have a function in nature and in design, in nature natural creatures help to survive and adapt to the environment, such as striped zebras, and birds and animals help to draw attention to the people of his species and the example of the peacock just by looking at its bright feathers we recognize it.

In the design, the systems of formal relations have two functions for the designer, the first helps to organize and form a space unit and embody it in an image of aesthetic value, and the second achieves visual richness for the artwork, and also allows the artist and designer a wide scope for the development of the visual outcome through its disclosure of the systems of formal relations of secrets, structures and laws governing the system vocabulary such as the regularity of plant fibers, beehives and cobwebs.

The researcher sees through the field of work in the Faculty of Specific Education, Ain Shams University, the urgent need for students to the need to work as a teaching unit in the field of nature because it is the first teacher and the first source for the student artist to activate his visual output.

Paul Klee , P.) once said:

"Take your students to nature, and in the midst of nature, let them contemplate the flowers, learn how a bud is formed, how trees grow, how a butterfly makes its way to life from within its dark cocoon, this will provide them with the richness and vitality of ideas, as they will eventually have the qualities of Mother Nature" (Lazzaro, G. 1965).

There is no doubt that the wonderful natural world surrounding us provides endless sources of support and possibilities that allow us to learn to see, and therefore it requires that we open our eyes to the sources of the beauty of formal relations systems in nature, through their contemplation, where we can see them found in large tree groups, or cloud-filled skies, or towering mountains, and in addition to the above, many attractive formal relationship systems can be found, in some natural elements, or as in this Search of animals, plants, insects, birds, fish - snails.

Second: Research Problem:

The problem of the research lies in trying to develop the ability of students to produce design paintings by preparing a teaching unit based on shape analysis through the geometric network, and students represent a sample of the third year at the Faculty of Specific Education - Department of Art Education.

Third: The importance of research:

Shedding more light on the importance of nature as one of the main important sources to enrich the educational process and activate the student's visual outcome.

Fourth: Research Objective:

Reveal the possibility of the teaching unit inspired by nature based on shape analysis through the geometric Grid to prepare design panels.

Fifth: Imposing Research:

The research assumes a positive relationship between teaching the teaching unit inspired by nature based on shape analysis through geometric Grid and the preparation of design panels.

Sixth: Research Methodology and Tools:

This research follows the experimental approach "preliminary design (with one set with dimensional measurement), in which positive changes are made to the technical behavior of the research sample (dependent variable) through the independent variable (teaching unit), and to measure the results associated with the dependent variable, a scale was prepared by the researcher consisting of five questions (formulating shapes for an innovative method, the ability to analyze areas, forming compatible color groups, achieving superposition through color.

Seventh: Research Sample:

The research sample was selected from the third year in the Department of Art Education - Faculty of Specific Education - Ain Shams University, and the number of 24 individuals. Which the researcher teaches design to them.

Eighth: Time limits of the teaching unit:

The application of this teaching unit took 12 interviews (12 weeks) at a rate of three months, and this is explained in the time item in the preparation of each lesson of the unit.

Ninth: Research Tools:

A measure to judge the availability of five characteristics in the design panels (prepared by the researcher) see appendices.

Tenth: Related Studies:

1. Combrich, E.H. 1979 :

This study dealt with the sense of environment and order in nature, and also pointed to the difference between vision Seeing, Looking and attention that the artist and the student rely on in his contemplation of nature and this benefits the research because it benefits the student's visual outcome.

2- Study of Hussein Ali Muhammad 1983:

This study aims to identify the structural foundations of the plant through a microscope. And extracting a set of engineering systems and investing them in a set of technical designs. In his research, he studied five plants with some degree of engineering systems. This study is consistent with the current study in dealing with some natural elements and identifying the structural foundations of their components, but in this research with the naked eye.

3- Study of Magda Abbas 1980:

This study dealt with the importance of nature and its place in the arts, ancient and modern, and its various methods, and conducted an experimental study showing the prevailing trends towards teaching nature and how to present it to students in a way that helps enrich the educational process.

4- Study of Muhammad Hafez Al-Khouli 1982:

It aims to extract a set of engineering systems contained in the outer surface of a selection of spiny and succulent plants by analyzing the elements to reveal the vision of the engineering system in them.

Through researcher-designed vision networks that result from:

- Squares events, which results in a square grid.
- The events of an equilateral triangle based on an angle 60 which gives a triangular lattice.
- The hexagonal shape, which gives a hexagonal lattice.

This study will help current research into the type of networks that students use in their design of the plant art unit.

5- Study of Bevlín, M.E. 1980:

This study aims at the importance of design through nature and how the foundations and elements of design work in nature and in art, and stated that the system of comprehensive formal relations gives pleasure when the vocabulary varies and when the systems overlap create new unpredictable units. The researcher benefits from the fact that the study of systems of formal relations in natural elements reveals many of the foundations and elements of design and when they interact achieve the unity of the artistic work and that the multiplicity of systems and overlap creates formal relationships can not be predicted.

6- Study of Ahmed Abdel Karim 1985:

The researcher presented an analysis of the rhythmic systems of a number of Islamic geometric anthologies and presented a number of factors that may increase the realization of social systems. This study has benefited the researcher in understanding rhythmic systems.

7- Study of Muhammad Hafez Al-Khouli 1986:

This study aims to benefit from the analytical systems of one plant element in teaching the foundations of design from the horizontal and vertical viewing angles of the outer line system, the sequential system and the surface detail system.

All previous studies have benefited the researcher in understanding a number of foundations that can be followed in analyzing the shape through geometric lattices in elements of nature. It also contributed to shedding light on the structural foundations on which many systems are based and which can be recognized in nature.

The studies are in their entirety in the field dealt with by the researcher and research, especially the study and analysis of the shape of the natural elements through the geometric Grid.

Eleventh: Search Terms:

In light of the research variables, the researcher sheds light on the terms mentioned in the title of the research in the order as follows:

1- Teaching Unit:

A teaching unit is a sequential series of lessons aimed at achieving a specific general technical goal and each lesson contains a set of procedural objectives to be achieved. Each lesson at the end of it has achieved part of the overall objective until the lessons of unity are completed.

2- Design:

Design is one of the main areas of artistic activity, as it is difficult to find any work of art without design, and it is one of the artistic foundations of contemporary life, as it includes architecture, furniture and other basic products in daily life, and design is that complete process of planning and creating a form in a functionally satisfactory way, as it brings pleasure to the soul and also satisfies the human need utilitarianly and aesthetically at the same time (Fath al-Bab Abd al-Halim, Ahmad Hafez Rashdan, 1984).

Design is an art that depends in its composition on the elements of formation such as line, shape and color and does not stand on the limit of aesthetic relations between them, but the artist employs these relationships to achieve goals that meet the functional and aesthetic needs of man, and it is intended to reorganize and arrange the elements based on some plastic variables such as different repetitions or by adding or deleting parts of the unit.

3- Geometric Grid

Geometric Reticula:

"It is a geometric system with vertical, horizontal and oblique axes of equal environmental dimensions" that controls the distribution of simple vocabulary for the formulation of composite designs, these constituent grids emanating from the base of Platonic triangles and creating a square grid and creating a triangular lattice as one of the geometric foundations" (Ahmed Abdel Karim, 1990)

Engineering networks are one of the measurement tools, so they can be relied upon to reach many design formulas based in their unity and balance on aesthetic geometric proportion.

Geometric lattices, as an engineering system, have the potential to achieve the spread of one or more formative singles in the form of tight iterations within a calculated proportional framework.

Through the process of repeating one or more plastic items on this geometric system, the general form of the design is determined, as a result of the repetition of multiple forms of plastic vocabulary in nature.

"The simple and composite geometric retina plays an instrumental role in the construction of designs, as the artist has used them in a variety of forms of art to achieve aesthetic systems to produce visual and emotional effects (Germain1 Fawzi Semaan, 2003).

Some interpretations of the concept of Grid in design:

- **Interpretation of Miiller-Brockmann**

The network system is an integral part of digital design today, when building any digital production, designers use the network to create contents for blank shapes that can be dynamically filled with content in an individual way, the way network systems are now applied is basically no different from how print makers used them centuries ago but one can say that there is a greater need for them today With the explosion of digital content, digital design products must fit into different screen sizes to show the content. This short history may have helped illustrate how designers over the centuries have used geometric composition techniques to create beautiful and balanced designs in print and on the web (Miiller-Brockmann, Josef, 1981).

Interpretation of Miiller-Brockmann

Anyone willing to endure the necessary design problems will find that, with the help of a reticulum system, he is better prepared to find a solution to his design problems that are functional, logical and more aesthetically satisfying.

- **Interpretation of Kroege, Michael**

"The idea of the network is that it gives you a system of order and it still gives you a lot of variety, but the network never changes, the inside (inside the retinal cells) always changes, and that brings things to life.

Interpretation of Rosalind ICrauss

In her main essay "Retinas", art historian Rose Clause Krause claimed that the function of the retina was to "show modernity to modern art", and with the "discovery" of the retina, Krauss, Cubism, de Steele, Monder Jan, Mayevich, and others, they landed in a place that was beyond the reach of all that was before, which means that they are in the present and that everything else is the past (Rosalind ICrauss, 1985).

- **Interpretation of Valorie Michelle Brinson**

Grid construction aims to help graphic designers by providing consistent and connected textures, however, the use of grid construction is rapidly declining, and many designers have expressed concern about the usual planning systems produced by traditional network design, and many artists have completely ignored the network because the network is an organizational means, by establishing a systematic way to create the concept of dynamic (kinetic) network construction, solutions for alternative non-traditional grids have been created, to push designers to pay attention to the concept of design construction (Valorie Michelle Brinson, 1990).

- **Interpretation of Gregg Berryman**

"Grid construction" allows content to be channeled within the network within the framework of specific network measurements, so the structure of the pre-network structure helps to feel the coherence of the visual design, as the network system saves time and helps to coherence and consistency of work as a whole (Gregg Berryman, 1990).

- **Interpretation of Alan Swann**

The lattice is the geometric division of distance into well-defined columns, distances and margins (Alan Swann, 1989).

(a) The function of engineering grids in design:

- Geometric Grid is an engineering system that works to organize all the inputs to them from the systems of formal relationships, or their vocabulary, and works to formulate these systems, or vocabulary, in an aesthetic form in which the design foundations of balance and rhythm are available resulting from the good distribution and repetition of the components of the artwork of symmetry and diversity.
- Reticulates emphasize the space inside enclosed spaces.
- Geometric lattices provide a kind of organic unity between the elements of the design composition, because of the connection, homogeneity and proportionality of the shapes.
- Engineering lattices provide formative flexibility in all directions within the artwork, while adhering to their engineering structural system.

(b) Square grid: square grid

It is a geometric system based on regular repeats of the square that results from dividing the circumference of the circle into four equal projections, then connecting the points to each other or by drawing two perpendicular diagonals to the circle and then connecting this point to some and producing the square, and repeating Vertical and horizontal lines perpendicular to parallel and at equal environmental distances create a square grid and may be oblique if its lines intersect at an angle of 90, 45.

4- Design Board:

Lesson one

Subject	Choosing an element from nature			
Domain	design			
Time	Lecture (3 hours) in the first and second week			
Age Group	Third Year (18-20 Years)			
Teaching aids	Materials & Tools	Basic concepts		Goals
- Pictures of some of the artists' works	- Sketch pencil	- Rhythm		- Reworks design elements
- Photos of some models of nature as an example of design inspiration	- Ruler	- Line		- Be able to analyze initial forms.
- Identify some terms in local and foreign expression.	- Aristotle's Triangle			- Maintain texture
Strategy used	Lesson Progress			

It means reorganizing and arranging elements based on some formative variables such as different repetitions or by adding or deleting parts of those elements.

Brainstorming

- At the beginning of the lecture, the researcher throws some interesting questions to motivate students to the topic of the current lesson through brainstorming.
- A general explanation is made of what design is and what are the basic concepts and elements of design.
- Then what calligraphy is explained as an element of design, by displaying the works of some artists.
- The types of baselines and how to formulate them are presented and explained from the perspective of Rhythm.
- Each student is required to draw five elements from nature and try to start applying a compatible color in the analyzed shapes in the nature elements, regarding to color theory.

It occurs whenever the student issues a desired behavior, and the reinforcement will be material and moral
What difficulties did the student face while doing the lesson and how to overcome them

Strengthening

Correction

Lesson Two

Twelfth: The procedural aspect of the research:

The procedural aspect of the research deals with the steps followed by the researcher to reach the design of the teaching unit among a sample of students of the Department of Art Education at the Faculty of Specific Education, Ain Shams University, which is entitled a teaching unit based on the analysis of the shape (an element of nature) through the Geometric grid, and the researcher followed the following steps:

A- An element of nature is selected (plant - animal - insects - birds - fish - snails).

B- The shape of the natural element is analyzed through the process of abstraction into organic or geometric Grid.

C- Finding color solutions for the design-analyzed element by re-creating compatible color combinations.

D- Choose a shot of 5×5 cm from inside the design-analyzed element.

E- Building a square geometric grid in an area of 50×60 cm, provided that the area of the smallest cell is 2×2 cm and the largest cell is 10×10 cm, and superposition, transparency, zoom, zoom and juxtaposition can be used.

F- Placing the shot 5×5 cm taken from the natural analyzed element, taking into account the gradation of the shots in the repetition process and clarifying the overlay through color.

Through the previous context, we can arrive at the lessons of the teaching unit, which depends on the analysis of selected elements of nature through the geometric network.

The general objective of the teaching unit:

Producing a set of designs based on what has been extracted from the elements of nature through the geometric network.

Thirteenth: Teaching Unit:

(1) Philosophy of the teaching unit: The philosophy of the teaching unit means clarifying the main ideas that guide the teaching unit and determine its paths to achieve the goal for which the teaching unit was established, which crystallized in the basic problem, which is the preparation of design panels for the study sample.

The philosophy of the teaching unit includes reliance on the design course for the third year of art education (Faculty of Specific Education - Ain Shams University), and the use of the engineering network, and the philosophy of the teaching unit depends on the ability to form ideas, the ability to adapt and crystallize these ideas, the ability to use materials, and the ability to respond well to visual effects.

Subject	Draw and analyze an element from nature		
Domain	design		
Time	Lecture (3 hours) in the third and fourth week		
Age Group	Third Year (18-20 Years)		
Teaching aids	Materials & Tools	Basic concepts	Goals
Photographs of works by artists who used design elements in their design solutions.	<ul style="list-style-type: none"> - Sketch - Pencil - Brush - Gouache color - Aristotle's Triangle 	<ul style="list-style-type: none"> - Rhythm - line - Shape 	<ul style="list-style-type: none"> - To be aware of the relationships between the line element and the Shape - To be able to analyze shapes. - To have design solutions from the elements of line and Shape
Strategy used		Lesson Progress	
Innovative thinking		<ul style="list-style-type: none"> - At the beginning of the lecture, the researcher asks some questions about the topic of the previous lesson. - How to manipulate space within artwork is explained - Start choosing the nature elements to be analyzed, - Start analyzing the nature element and choose the most compatible colors that can represent the element in decorative view. - Every student makes two solutions to the chosen nature element. - Every student tries to make two successful compatible color solution for each analyzed element. 	
It occurs whenever the student issues a desired behavior, and the reinforcement will be material and moral			Strengthening
What difficulties did the student face while doing the lesson and how to overcome them			Correction

(2) Objectives of the teaching unit: Among the objectives of the teaching unit is the ability to analyze spaces, reformulate shapes innovatively, the ability to form compatible color groups, the ability to achieve overlay through color, the ability to achieve transparency through color, and considering the foundations of design.



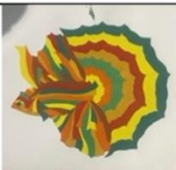










(3) The content of the teaching unit: The teaching unit contains nine lessons, which are presented below so that the presentation of these lessons is accompanied by samples of the results reached by the research sample.

Lesson Three

Subject	Constructing the Geometric Grid		
Domain	design		
Time	Lecture (3 hours) in the Fifth, sixth week		
Age Group	Third Year (18-20 Years)		
Teaching aids	Materials & Tools	Basic concepts	Goals
<ul style="list-style-type: none"> - Images of the work of artists who have used texture in their artwork. - Realistic texture models and how to turn them into design models. - Identify some terms in Arabic and foreign color 	<ul style="list-style-type: none"> - Sketch - Pencil - brush - gouache color - Ruler - Aristotle's Triangle 	<ul style="list-style-type: none"> - Rhythm - Texture - color 	<ul style="list-style-type: none"> - Find out what texture is. - Be able to analyze texture. - To consider the appropriate texture in the shape
Strategy used		Lesson Progress	
Brainstorming		<ul style="list-style-type: none"> - At the beginning of the lecture, the researcher throws some interesting questions to motivate students to the topic of the current lesson through brainstorming. - Follow-up explanation of what design is and what are the basic concepts and elements of design. - Every student brings his solutions of the analyzed nature element. - Discuss their solutions. - Make them know about the geometric grid, and how to construct a successful geometric grid, and what is the different types of the geometric grids. - Every student tries to construct a geometric grid by using the Graph papers. - Every student has to choose the most beautiful square cadre from his analyzed nature element, to replace it in the geometric grid unit. And finish that by the next lecture. 	
It occurs whenever the student issues a desired behavior, and the reinforcement will be material and moral			Strengthening
What difficulties did the student face while doing the lesson and how to overcome them			Correction

Lesson Four

Subject	Final Design stage		
Domain	design		
Time	Lecture (3 hours) in the Seventh, Eighth, Ninth and Tenth weeks		
Age Group	Third Year (18-20 Years)		
Teaching aids	Materials & Tools	Basic concepts	Goals
Photographs of works by artists who used to blend the four design elements (point, line, Shape, and texture)	<ul style="list-style-type: none"> - Gouache color - Canson paper 300gm - brush 	<ul style="list-style-type: none"> - Rhythm - Line - Color - Texture 	<ul style="list-style-type: none"> - Recreates shapes in an innovative way. - Be able to analyze areas
Strategy used		Lesson Progress	
Innovative thinking		<ul style="list-style-type: none"> - At the beginning of the lecture, the researcher asks some questions about the topic of the previous lesson. And see what the students have accomplished from the previous lecture until the current lecture. - Every student have to continue replacing the chosen square cadre in the units of the geometry grid, then start to put the coloring plan. - Then they start coloring the design of the geometric grid, in the Canson 300gm 40X60cm. - After Finishing the design, student discuss what is the difficulties they faced while the whole process of the design. 	
It occurs whenever the student issues a desired behavior, and the reinforcement will be material and moral			Strengthening
What difficulties did the student face while doing the lesson and how to overcome them			Correction

Results of Lesson One							
Results	N	Results	N	Results	N	Results	N
	4		3		2		1
	8		7		6		5
	12		11		10		9
							13








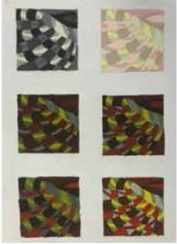





Comment:

Line: In their analysis of the elements, the students used organic lines to embody the softness of the natural form.

shape: Students used in their analysis of the natural elements of organic spaces.

Color: Students used to choose their colors using compatible color methods.





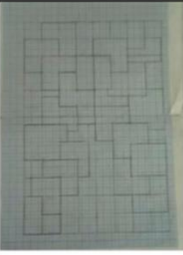


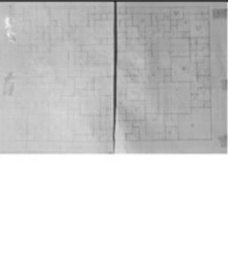





The numbers from 1 – 13 symbolize the number of 13 individuals from the research sample (_ the 24 individuals)

Results of lesson Two							
Results	N	Results	N	Results	N	Results	N
	4		3		2		1
	8		7		6		5
	12		11		10		9
							13

Comment:

The geometric grid's unit was selected by the natural element analyzed by the students. The angle of the unit was chosen by choosing the best movement for the direction of the lines and the coordination of areas and colors.



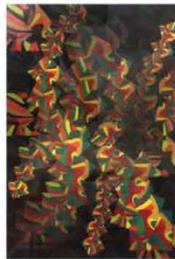
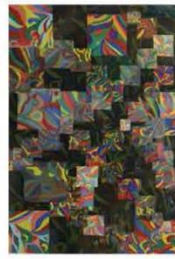



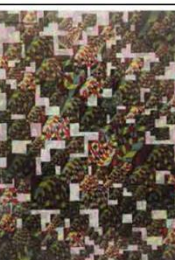





The numbers from 1 – 13 symbolize the number of 13 individuals from the research sample (_ the 24 individuals)

Results of Lesson Three							
Results	N	Results	N	Results	N	Results	N
	4		3		2		1
	8		7		6		5
	12		11		10		9
							13

Comment:

The square geometric grid was created within the framework of the design panel and several measurements of the grid cell were used, in addition to the use of a design process such as addition and various repetition methods added to the grid.

The numbers from 1 – 13 symbolize the number of 13 individuals from the research sample (_ the 24 individuals)

Results of Lesson Four							
Design results	N	Design results	N	Design results	N	Design results	N
	4		3		2		1
	8		7		6		5
	12		11		10		9
							13

Second: Comment:

- The results of the students' work in the design material were based on the square geometric network with the use of repetition and overlap methods in the design.
- The colors of the design analyzed element were also selected based on the compatible color systems in the design, which resulted in various design panels in their forms.

The numbers from 1 to 13 symbolize the number of 13 members of the research sample (the 24 individuals)

Teaching unit results Comment	
Rhythm	The students used balance by taking into account the distribution of the four design elements in the spaces they created through the manipulation of geometric and organic spaces, and the elements were distributed in the initial spaces taking into account the balance in the distribution of each design element by analyzing the areas consistent with the context of the composition of each painting for students separately
Color	Very few students used the dot element during the implementation of their design paintings, but they inserted it while merging it with the contactor, and one student, student No. (1), used it because he wanted to show depth in some of its spaces.
Line	The students used the calligraphy element in all their work, with the types of geometric lines and the organic line, but the zigzag line was not used by the students significantly, while the straight geometric line and the organic line are the two most types that students used in their designs
Shape	The students used geometric and organic spaces, they used regular and irregular geometric spaces, and also introduced organic spaces with geometric spaces in a harmonious manner, whether in the construction of paintings or within the treatment of shape areas.
Texture	The contact varied between the real and realistic touches in our daily lives, and the unrealistic touches that are inspired by the imagination of the students, and the students took into account the gloom and openness in the distribution of their touches significantly. Which resulted in most paintings showing some depth in the designs
(Numbers 1-13 symbolize the number of 13 Students of the 24-research sample)	

Design Art's Information

Student Number	Student Name	Brush size	Colors used	Material	Work Size	Design principles	Design element	Design Printing
1	Ahmed Bahnsawy	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
2	Arwa abdulgawad	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
3	Esraa Mostafa	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
4	Eman samir	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
5	Eman kamal desouki	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
6	Aya ibrahim sayed	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
7	Riham mohamed gadullah	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
8	Sara Sami Mursi	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
9	Sara Mohamed Taha	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
10	Salma Omar Ali	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
11	Nouralhuda abdulhafez	2/4/6	Gouache color	Canson paper 300gm	35x35cm	Rhythm	color, line, shape, texture	transparent paper
12	Shoruq	2/4/6	Gouache	Canson	35x35cm	Rhythm	color,	transparent

	magdi	6	e color	paper 300gm	m		line, shape, texture	t paper
12	Melessa magdy romani	2/4/ 6	Gouach e color	Canson paper 300gm	35x35c m	Rhythm	color, line, shape, texture	transparen t paper

Fifteenth: Research Results and Recommendations:

The results were presented to a committee of arbitrators* in the subspecialty, to answer the questions ** A scale consisting of (5) questions revolving around the availability of five characteristics and the answer was (yes) or (no) and the following is a presentation of the percentages of the arbitrators' agreement on the availability of the five characteristics.

Special results:

- 1- The arbitrators agreed 100% on the availability of the characteristic "that the teaching unit as an independent factor is a positive change in the behavior of the members of the research sample that appears in their ability to perceive the elements of nature and carry out operations aimed at forming an geometric grid included in design panels."
- 2- The judges agreed 81% on the availability of the property "that the respondents were able to formulate the shapes in an innovative way."
- 3- The judges agreed 84% on the availability of the property "that the students are able to analyze the shapes."
- 4- The judges agreed 93% on the availability of the property "that the students are able to form compatible color combinations".
- 5- The judges agreed 87% on the availability of the property "that the students are able to achieve superposition through color".

General results:

- 1- Nature has a huge number of diverse systems of formal relations, especially systems of endless formal relations.
- 2- The relationship between the singular and the formal system of relationship is a constructive relationship and their overlap in nature makes the repetition of each an infinite sequence of structures and formations.
- 3- The Geometric system and the design structure in the systems of formal relations of natural elements can be seen with the naked eye and realize their connection to the growth systems of these elements, and benefit from them in the formulation of works of art that depend on engineering systems.
- 4- The foundations of design can be taught through the study of students of the systems of formal relations of natural elements, and the study of the foundations of design is one of the educational approaches that provide students with the ability to contemplate nature and delve into the essence of its construction.

* See research appendices.

** See research appendices.

The more opportunities students have to study many systems of formal relations in nature, the easier it is for them to use them using experimental approaches, which may be controlled by geometric systems or are automatic, in order to develop new formal systems of relations that can be used in their artwork.

Sixteenth: Recommendations:

In light of the results of the current study, the researcher made a number of recommendations and suggestions that may be useful in the field of design.

- The researcher recommends making more teaching units in various other fields.
- The researcher recommends delving into natural visions closely because of their visual inventory that benefits students and they are inspired by many designs that enrich the field of design.
- Opening channels of communication between all artistic fields can lead to new artistic creations with an innovative aspect and expand the perceptions of art teachers and students.
- The results of the current research can be employed in future research that uses computer programs in design formulations.

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Research Appendices

Appendix (1) The final image of the questionnaire and the scale of judging the availability of some characteristics in the design panels.

Appendix (2) Stages of calculating the percentage of the arbitrators' agreement on each of the characteristics included in the scale.

Appendix (1)

The final image of the questionnaire and the measure of judging the availability of some characteristics in the design panels.

Prof.

Greetings.

Prof. Ahmed Mustafa Mohamed Abdel Aziz, Professor of Mass Communication, School of Humanities and Creative Arts, University of Hertfordshire – Hosted by global Academic Foundation - Egypt, is conducting research entitled: Developing a Teaching Unit Based on Analysis of Natural Forms to Enhance Design Skills in Third-Year Art Education Students at Ain Shams University

The research requires the establishment of a scale to judge the availability of six main characteristics that achieve the objectives of the research, and the role of the arbitrator is to answer b (Ö) if the property is available, and answer b (×) if the property is not available, and the following is the form of the scale (the final form after modification).

Student Number	characteristics Name	Availability	
		Ö	×
1	the members of the research sample were able to perceive the elements of nature and carry out operations aimed at forming an geometric grid included in design panels.		
2	the members of the research sample were able to formulate the shapes in an innovative way.		
3	the members of the research sample are able to analyze the shapes.		

4	the members of the research sample are able to form compatible color combinations.		
5	the members of the research sample are able to achieve superposition through color.		

- Please review the items of the scale and express an opinion on their appropriateness in light of the objectives of the current research.

Thank you.

Researcher

Appendix (2)

Stages of calculating the percentage of arbitrators' agreement on each

One of the properties contained in the scale

The first stage: Each arbitrator shall judge the availability or non-availability of the five characteristics in (13) design representing the results of the current research through the following form:

Student Number	(Numbers) Plates and their judging (availability of characteristics)								Total feature availability in the 13 designs	
	1		2		3		4			
	Yes	No	Yes	No	Yes	No	Yes	No		
1									To the end of the 13 Design	
2										
3										
4										
5										
6										

The second stage: reaching the percentages of the arbitrators' agreement on the availability of each of the five characteristics through the following model, which aims to reach the percentage of arbitrators' agreement for one student only and repeats the use of this model to reach the percentages for each of the five characteristics on the scale.

Arbitrators*	Availability or unavailability of the feature					% Arbitrators Agreement		Average Arbitrators Agreement	Total number of Arbitrators
	Design (1)		Design (2)		To the end of the 13 design				
	0	x	0	x					
First Arbitrator									
Second Arbitrator									
Third Arbitrator									

From the previous model can get:

- 1- The total number (Ö) of each arbitrator on each property.
- 2- Finding the average agreement of the arbitrators on the availability of the property by dividing the average agreement of the arbitrators by the number of arbitrators (3 arbitrators).
- 3- Finding the percentage of arbitrators' agreement on the availability of a property by dividing the average agreement of the arbitrators by the number of plates, which is 13 design, and then multiplying the quotient $\times 100$ to avoid fractions.

The result (percentages) were then rounded to avoid fractions as well.

Prof. Al-Husseini Ali Mohamed, Professor of Design and former Head of the Department of Decorative Design, Faculty of Art Education, Helwan University

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2. Prof. Omnia Rashad, Professor of Designs, Faculty of Art Education, Helwan University