

Arabic Calligraphy and the Cosmos for Contemporary Textile Designs Using Computer Aided Design (CAD)

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Abstract:

Calligraphy is the art of decorative and practicing hand writing or lettering. Arabic calligraphy was originally used as a tool of expression, and a form to deliver the language. It is the main mode of visual communication, particularly in Islam. It combines form, ratio, and aesthetics. The subject of using calligraphy in art and design raises different questions dealing with the aesthetic quality of the calligraphy in terms of form and theme. It opens wide possibilities for the applications of Arabic calligraphy in typographic paintings and contemporary arts.

This study will examine the following question: Can we combine different digital imagery of the cosmos (e.g. Galaxies, Stars, Ant & Cat eye Nebula...etc.) with Arabic calligraphy to create different designs for textiles? This paper will outline the practice-based method as a constructive approach to open ranges of possibilities for the researcher to produce different types of designs (25 designs) for wall hangings by using Computer Aided Design (CAD).

This research emphasizes the importance of employing Arabic calligraphy in the area of textile and it encourages the development of extensive studies on the aesthetic quality of the images of the cosmos in order to enhance the creativity and innovation on the part of art and design students. Finally, this study highlights the importance of the link between calligraphy, science and the arts by exploring the uniqueness of the vision of the universe for artists and textile designers.

Key Words: Arabic Calligraphy, Cosmos, Textile Designs

المخلص:

إن الخط هو فن الزخرفة والتدريب علي الكتابة والحروفية ويعد فن الخط العربي أداة عن التعبير و اللغة. فالخط هو وسيلة التواصل البصري الرئيسة وبخاصة في الإسلام، فهو يجمع بين الشكل والنسب وعلم الجمال. ويثير موضوع استخدام الخط في الفن والتصميم أسئلة مختلفة تتناول القيم الجمالية للخط من حيث الشكل والموضوع. إنه يفتح إمكانات واسعة لتطبيقات الخط العربي في لوحات الطباعة التصويرية والفنون المعاصرة.

تحاول هذه الدراسة اختبار السؤال التالي: هل يمكننا الجمع بين الصور الرقمية المتعددة للكون (مثل: المجرات ، النجوم ، ... الخ) والخط العربي لتصميم تصميمات متنوعة للمنسوجات؟ سوف تحدد هذه الورقة المنهج التطبيقي بوصفه أسلوب بناء لفتح عديد من الإمكانيات للباحثة لإنتاج أنواع مختلفة من التصاميم، (25 تصميمًا)، للمعلق الحائطي باستخدام برامج الكمبيوتر الجرافيكية المساعدة للتصميم.

يحرص هذا البحث على تأكيد أهمية استخدام الخط العربي في مجال النسيج، كما يشجع على تطوير دراسات مكثفة للقيم الجمالية لصور الكون من أجل تشجيع مهارات الابتكار لدى طلاب الفن والتصميم. وأخيرًا، تسعى هذه الدراسة إلى إبراز أهمية اكتشاف الروابط بين الخط العربي والعلوم والفنون الدالة على تفرد كوننا وتوضيح ذلك للفنانين ومصممي النسيج.

الكلمات المفتاحية: الخط العربي ، الكون ، تصاميم المنسوجات

1-introduction

Arabic calligraphy is one of the most prominent manifestations of artistic genius among Arabs. The subject of using calligraphy in plastic art and contemporary design has raised many questions that deal with the aesthetic dimensions of the fonts /style in terms of content and form. The understanding of beauty of calligraphy and its usage has become direct related to modern values that allow for creativity in paintings, and modern art. Artists and designers always look for new sources of inspiration which can be historical patterns, calligraphy or nature such as cosmos and its galaxies. Cosmos and its magnificence and richness can attract a designer/ artist to conveying the harmony of its scenes, galaxies, movements and objects in order to generate different designs, forms, or applications. Cosmos is full of magnificent scenes and many dynamic objects and phenomena which are reflected clearly through the movement of the spiral or curved lines, the arc shapes and the various galaxies. Cosmic phenomena and objects have diversity of colors in each image, unity of element and objects, harmony and diversity of objects and textures such as: black holes, neutron stars, supernovas, planetary nebulas, dwarf stars and lightning. In this research, the researcher has benefited from all these in highlighting the aesthetics of these images.

The problem of the study:

It is defined by the following question: Can we combine different digital imagery of cosmos (such as: Galaxies, Stars, Ant & Cat eye Nebula...etc.) with Arabic calligraphy in the designing of innovative printed wall hangings?

Research Objective:

It is to benefit from the enormous artistic potentials- resulting from the merging of Arabic calligraphy and images from cosmos- to enrich the designs of printed hangings.

Importance of research:

- 1 – Highlighting cosmos objects and galaxies and the Arabic calligraphy as a source for creation of innovative printed designs for wall hangings.
- 2 - Finding unconventional creative solutions for printed designs through the merging of the images of cosmic objects with Arabic calligraphy

Scope of the study:

The study is limited to the following:

1. Creating print designs of wall hangings for places and research centers associated with cosmos (such as the Planetarium in Cairo or Sharjah Center for Space and Astronomy in the UAE, etc.)
2. The research has resulted from a subjective experience of the researcher.

Research Methodology:

This research follows both a descriptive analytic approach and an experimental approach. The analytical descriptive approach has to do with using the description and analysis of the designs resulting from the merging of cosmos objects/ galaxies and Arabic calligraphy. The experimental practice method is using the potential of CAD to combine the two themes in designs by the researcher herself to reach the best results.

2- Arabic Calligraphy:

Calligraphy has been a prominent approach of visual expression, especially in Islam. At its beginning, Arabic calligraphy was a tool of expression and a pattern of delivering language and thought. Later, and over a period of 13 centuries, it found its most magnificent expression in the works of Arabs and Arabic script users within the Islamic civilization that spread from Morocco and Spain, and through Persia, to the Far East and India. It is considered as an instrument and a tool to communicate and record by combining structure, sizes, and aesthetics. Originally it was limited to the Arabian Peninsula, then it spread further through the Islamic World. It became the most important element in all artistic designs among Muslim people (ElAraby 1997).

The origin of Arabic writing goes back to the first alphabet produced by the Phoenicians. “The Phoenicians were living on the coastal areas of Lebanon, Palestine, and Syria”. Zoghbi (2007) notes that the Middle East was positioned in the middle of the Ancient World, between East and West, therefore it had played an essential role in the spread of the Phoenicians’ alphabet, “That is why the Phoenician alphabet is the mother of both Latin and Arabic scripts” (Zoghbi 2007, p1). ElAraby (1997) agrees the Arabic alphabet comes from the Nabatean, and calligraphy in general is considered to have been originated from ancient Egyptian styles: Hieroglyphic, Hieratic, and Demotic. He adds,

The Phoenician script and the Musnad, with its varieties of Safawi, Thamudic, Lihiane, Sabaeen, and Himyaric, were the historical precursors of I n d i and the Nabatean. The Hiri, and the Anbari developed from the Nabatean. The Hijazi developed from the Anbari. Kufic, the earliest form of Arabic script, was a result of imposing design, order, and organization on the Hijazi. This Arabic theory explaining the origin and development of Arabic script developed by Al-Kurdy is illustrated as follows.

2 a-Arabic calligraphy styles:

ElAraby (1997) declares that the starting of the Kufic calligraphy opened the door to artists and calligraphers to develop a vast variety of calligraphic styles that continued for centuries. Several styles of script have been developed over time, each with an array of expressions and different compositions. These include Kufic and Cursive styles (Figure 1) (Moustapha & Krishnamurti 2001, 294).



Figure 2. Illustrating Kufic and Cursive styles of Arabic writing

The art of calligraphy was encouraged in Baghdad by Ibn Muqla over three centuries. Later, the calligraphers of Istanbul adopted that responsibility, practicing and extending calligraphy still more Schami (2010) notes that calligraphy is subject to strict laws dating back to Ibn Muqla and his successors . Every script variation contains numerous opportunities for repetition, reflection and style of ligature, so a calligrapher may form or design it in line with his aesthetic standards (Schami 2010, 26). Several styles of writing have developed over the centuries. With the beginning of the computer age, hundreds more have appeared, although no single significant trend can be distinguished amongst that huge number of styles.

Arabic calligraphic styles and types developed in various Arabian cities, "with different writing techniques and 'writing tools'" (Zoghbi 2007, 2). There are six classic styles that remain known: Kufi, Thuluth, Naskhi, Riq'a, Farsi and Diwani.

Kufi: Called after the Iraqi city al-Kufa, it has an angular appearance that gives it a religious characteristic, evoking minarets which have been used in the architecture of mosques, palaces and others. 'Floral' Kufi and 'woven' Kufi are popular styles that can be used for ornamentation.

Thuluth: It means 'one-third', and once referred to the width of the tip of the reed pen used for writing it. It is known as 'the mother of calligraphy' and is often used when printing particularly fine books and religious texts, and for decorating mosques and buildings.

Naskh: Created by Ibn Muqla to assist the work of copying (Arabic: nasakha) to make it easy to read text clearly. Today most books in Arabic use this style which is elegant and clear.

Riq'a: Emerged from Ottoman calligraphies that aimed to get full simplicity, this type of script spread quickly because of being free of ornamentations and being especially suitable for handwriting.

Farsi: The script is elegant, with a dynamic and frequently diagonal line. Today this style is central in Iran.

Diwani: It was used for diwan (state chancelleries). Its characters frequently following the line of a circle with its diameter equivalent to the height of the letter alif (Schami 2010, 27-29).

Each type of Arabic calligraphy has its own features, style, strict rules and context (edition, illustration, architectural decoration, etc.). Each writing style can be differentiated principally with the following: 1-Geometric shape of the letters; 2- Number and form of letter variations; 3- Presence of outline and number of dots; 4- Presence of form, role and number of diacritics; 5- Use, form or shape and size of Kashida (Hssini & Lazrek 2013, 479).

Finally, calligraphers and designers wanted to free themselves from rules and give themselves the possibility to express their own thoughts in terms of composition, proportion, and artistic style. Nowadays, computer software and computer networks are providing a variety of sources of ornaments and different styles of Arabic calligraphy which help artists and designers to generate endless forms and compositions without the knowledge of the classical rules.

3- Cosmos:

Cosmogony indicates "the origination of the physical universe and its evolution," and it originates from a Greek term indicating the origin of the cosmos or any specific system in the universe with its early development (Hasan & Tuah 2014, 124). The size and age of the Cosmos are beyond ordinary human understanding and it is rich beyond measure which is measured by distance with the speed of light (Sagan 1980, 10). Sagan (1980) adds that the Cosmos is mainly empty and no planet or galaxy or star can be typical. The Cosmos is before us and we are in the territory of the nebulae, "eight billion light-years from Earth, halfway to the edge of the known universe". A galaxy is comprised of gas and dust and upon billions of stars. "Every star may be a sun to someone". In a galaxy are stars and creations/ or objects and, there may be, "intelligent beings and spacefaring civilizations". There are several hundred billion (10¹¹) galaxies, each one with a hundred billion stars. "In all the galaxies, there are perhaps as many planets as stars, 10¹¹ x 10¹¹ = 10²², ten billion trillion" (Sagan 1980, 11).

Close to the Galaxy there are planets, orbiting stars in the Magellanic Clouds and in the spherical clusters that surround the Milky Way. There is a view of the Galaxy expanding with a massive spiral form comprising 400 billion stellar inhabitants, with dissolving gas clouds, condensing planetary systems, supergiant and middle-aged stars, red giants, planetary nebulae, supernovae, neutron stars and black holes (Sagan, 1995, p147). As Dick & Lupisella (2009) maintain, the idea that the universe and its integral parts are continuously evolving has become widely acknowledged in the last few years – "a century after Darwin proposed that evolution by natural selection applies to life on our own planet" (Dick & Lupisella 2009, V). It considers the analysis of the various developmental and generational changes in the gathering and composition of radiation, matter, and "life throughout all space and across all time. These are the changes that have produced our galaxy, our Sun, our Earth, and ourselves" (Dick & Lupisella 2009, 3). Although cosmic evolution was first recognized early in the 20th century, the connections between planets, stars, and galaxies, and the evolution of the universe itself, became much better known through the findings by planetary examinations and space telescopes in the end of the century. They also note that researchers from a variety of disciplines began to study the probabilities of space inhabitant and "the biological universe" (Dick & Lupisella 2009, V). During the twentieth century, the idea of we are part of a cosmos billions of years old and billions of light years in extent, started slowly and entered human awareness and culture that all parts of this cosmos are connected ; and that the stories of our galaxy, our solar system, our planet, and ourselves are part and parcel of the ultimate main story of the universe, "over the last 50 years the much more encompassing idea that Carl Sagan embodied in the phrase 'the cosmic connection' has become more part of our daily lives, and our cosmic consciousness will be even more increasing in the future (Dick & Lupisella 2009, 25).

3a- Planet and Galaxies:

A planet orbits the Sun and has a scale large enough to cause gravity to control the strength of the body and so becomes approximately round. It is the only body of its size in the area of the Solar System at that distance from the Sun (Morison 2008, 75). NASA's Hubble Space

Telescope was launched in 1990 and has observed six of the Solar System's eight planets: It has not observed the Earth, and Mercury. Hubble has spotted moons around other planets and studied several dwarf planets. The planets of our Solar System shaped out of the debris that circulates around the Sun when it was created some five billion years ago. As the dust and rocks gradually combined, the Solar System we know began (Usher & Christensen 2014, 39).

Galaxies come in innumerable shapes, ranges and distances. A galaxy is a massive gathering of gas, dust, and of stars and their solar systems bound together by gravity. We can see some of them close "as a few hundred thousand lightyears away and others so far away that they lie more than 95% of the way across the universe" (Usher & Christensen 2014, 86). Spiral galaxies, elliptical galaxies, and irregular galaxies are three main types of galaxies. However, our galaxy is called the Milky Way (figure 2) because it looks as a milky band of light in the sky¹. The Milky Way Galaxy is a flat disk with a spiral pattern of thicker areas within it (figure 3) and a "diffuse halo of stars forming a sphere around it. The Solar System lies within this disk, off-center, so we see the Milky Way from the inside" (Usher & Christensen 2014, 85).

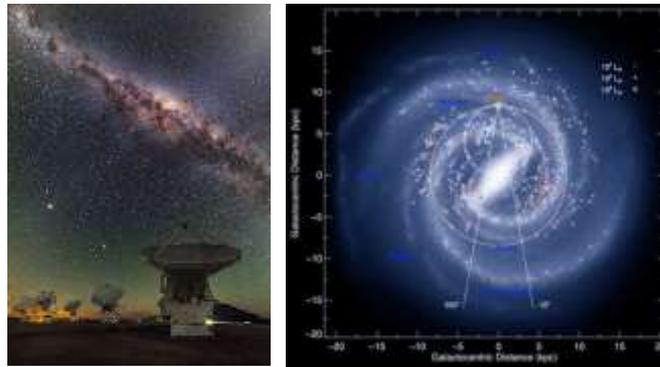


Figure 2: The band of the Milky Way galaxy can be seen at night in areas with dark skies.

Figure 3: This artist's concept of the Milky Way's spiral structure is based on the measured distances of young, hot stars and ionized clouds of hydrogen gas².

Most stars have their own planets, so there are probably tens of billions of other solar systems in the Milky Way galaxy alone. Solar systems can also have more than one star, which is called binary or multi-star systems, if there are two or three or more stars. It is located in an outer spiral arm of the vast Milky Way galaxy. It consists of the Sun (our star) and everything that revolves around it. This contains "the eight planets and their natural satellites (such as our moon), dwarf planets and their satellites, as well as asteroids, comets and countless particles of smaller debris"³.

3b- Deep-Sky objects:

Any of various cosmic objects such as galaxies, planetary nebulae, diffuse nebulae, star clusters, double stars, and supernova that are observable only by Space Telescope because they are not visible to normal eyesight. These objects, as figure 4 shows, are beyond our solar system and far beyond the Milky Way.

¹ <https://imagine.gsfc.nasa.gov/science/objects/milkyway1.html>

² <https://imagine.gsfc.nasa.gov/science/objects/milkyway1.html>

³ <https://solarsystem.nasa.gov/solar-system/our-solar-system/overview/>



Figure4: Hubble's Messier Catalog⁴ - Deep-sky object NASA

Most of the artwork in this paper is inspired by and uses photos of deep sky objects because of their mysteriousness and richness. Vast galaxies are full of forms, a variety of color combinations, unique textures created from gases, objects and dust that allow for a fresh and original perspective to novel textile designs.

4- Contemporary textile designs

The aim of this part is to present the answers to the main research question of the paper: Can we combine different digital imagery of the cosmos (e.g. galaxies, stars, ant & cat eye nebula...etc.) with Arabic calligraphy to create different designs for textiles?

This part will show the potential of Computer aided design- CAD- software, different images of cosmos and Arabic calligraphy for experimentation and how new aesthetic and artistic wall hanging can be created. It will show the 25 designs that are created by combining different types of cosmic objects (photos collected from NASA website, books or from astronomy apps.) with different styles of Arabic calligraphy, letters or words, to fill in the background using CAD software (photoshop).



Design 1: 50cm / 70cm



Design 2: 50cm / 70cm



Design 3: 50cm / 70cm

⁴ <https://www.nasa.gov/content/goddard/hubble-s-messier-catalog#grid>

An Arabic calligraphy phrase like “Glory to God” was combined with photos of Ring Nebula and Orion Nebula from Cosmos such as in **Design 1** where golden colored dots were used in a circular shape around Orion Nebula and repeated in some areas with different sizes and colors of Arabic words and stars for achieving the effect of movement and balance. The hot and cold colors are used to achieve harmony and contrast in the visual perception of forms. **Design 2** presents the merging of images from Nebula (defined as a cloud of *space* gas and dust) and Galaxy by using the repetition of few Arabic letters and multiple gradients to achieve depth. The use of hot and cold colors shows contrast and harmony in design elements. In **Design 3** a layer of some Arabic characters (kufi) is repeated in the background to stress the shape of the Galaxy and Star Clusters. The letters and qur’anic texts were distributed in different sizes, shapes and colors to achieve depth and balance.



Design 4: 50cm / 70cm

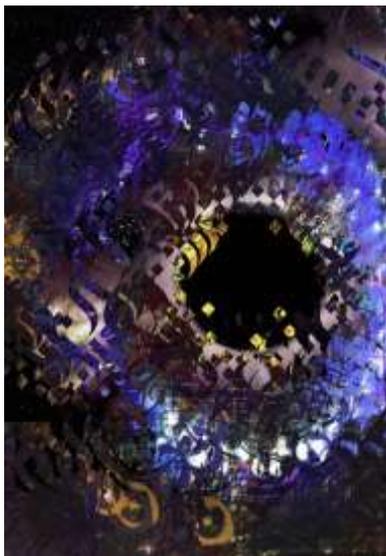


Design 5: 50cm / 70cm



Design 6: 60cm / 40cm

However, design 4 ,5 and 6 show different artistic interpretations of galaxy, stars imagery and different sizes of the image of Light Echoes from a Red Supergiant (an image of the shells of dust surrounding the aging star V838 Monocerotis) overlapping with different styles and sizes of Arabic calligraphy. These designs rely on creating different dominant points by stressing the red colour of the aging supergiant star and breaking the movement of the circles by different sizes of letters or qur’anic words and by changing colors, using dark with contrasted colors and textures in order to create exciting designs.



Design 7: 45cm / 60cm



Design 8: 45cm / 70cm



Design 9: 45cm / 70cm

Design 7⁵ presents the mystery of black hole (astronomical phenomenon) as it gathers mass and consume the dust and gas from the galaxy around them, allowing them to grow to enormous sizes. Design 8 expresses the solar eclipse phenomenon – this eclipse occurs when the Moon totally or partially blocks the Sun. Thulth letters were used brushed with different colors and sizes to stress the eclipse phenomenon. **Design 9** focuses on repeating mainly the Ain letter (ع) by merging the different cosmos objects such as cat eye nebula, Orion Nebula & Supernova 1987A (supernova is the explosion of a star). They are used in multiple color gradients with hot and dark colors to experiment with the contrast to achieve rhythm and a balanced design.



Design 10: 45cm / 70cm



Design 11: 70cm / 45cm



Design 12: 70cm / 45cm

Designs 11 and 12 focus on using different sizes of Arabic letters and words brushed in Photoshop on the images of Supernova, a Galactic Spectacle and The Cat's Eye Nebula. **Design 10** presents the repetition of different sizes of red and blue Nebulas with stars in different colors with modern forms of Alif (ا) with dots (Arabic calligraphy letters are usually measured with dots).

⁵ <https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-a-black-hole-k4.html>



Design 13: 45cm / 65cm



Design 14: 50cm / 70cm



Design 15: 50cm / 70cm

Designs 13 and 14 show a planet in our Galaxy (Mars/ Venus) and stars with layers of Arabic letters using degradations and contrasted colors to stress the 3D form. **Design 15** presents a photo of a Star Cluster Burst into Life and Cosmic space with dust by using the different types of letters and words from kufi and thuluth with different textures and mixing hot colors in some areas to create depth and contrast.



Design 16: 50cm / 70cm



Design 17: 45cm / 70cm



Design 18: 40cm / 60cm

Design 16 is a mixture between a scanned hand drawing of sun and dust with photos of explosions from the Sun's surface, together with a repeated Alif letter, dots and other Arabic letters, using contrasted colors to present the burst. **Design 17 and 18** portray unique combinations of Spiral Galaxy, stars and Galaxy Clusters with the use of different types of letters and changing the color and textures. The contrast shows the form of the spiral shape and achieves harmony.



Design 19: 50cm / 70cm

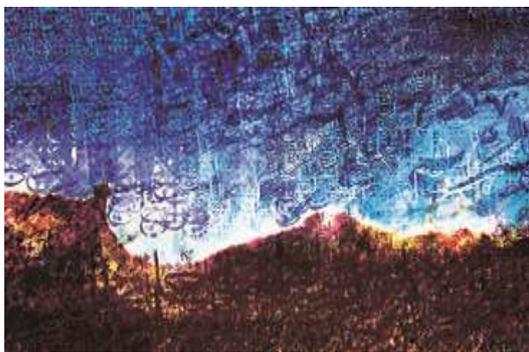


Design 20: 40cm / 60cm



Design 21: 40 cm /60 cm

In design 19, a layer of some words was mixed with a layer of a cosmic object called: The Ant Nebula. The repeated letter was applied to stress the shape of the Nebula. The cold and hot colors were used to show the light effect. **Design 20, on the other hand**, is combining a hand drawing of a Butterfly Nebula and photos of stars and repeated letters. The design was based on letters of different sizes and mixing hot and cold colors to achieve movement and variation in order to create attraction and balance. **Design 21** shows various layers of different types of letters with a cosmic picture of Crab Nebula. The design was based on multiple sizes of letter and the use of gradations around the outer shape of the cosmos object to achieve harmony and balance with using three colors such as: blue, shades of red and black.



Design 22: 70cm / 50cm



Design 23: 70cm / 50cm

Design 22 shows a 'landscape' image from the cosmos. It presents the use of stars and overlapping of the repeated multiple sizes of letters and different tones of color to construct the shape of "hills and valleys" in the cosmos. **Design 23** presents a layer of some words that is mixed with a layer that depicts the image of sunrise on Earth. The design aims to achieve a sense of the glowing of sunrise by using arrays of words with multiple dimensions and gradations to achieve relaxation and to fulfill visual attraction with a sense of depth. Hot and cold colors are used together to achieving harmony.



Design 24: 50cm / 60cm



Design 25: 70cm / 50cm

Designs 24 and 25 depict Sunrise over the earth and viewing the beauty and the uniqueness of our earth. Various types and sizes of words / letters with different colors are used to stress depth. In both designs there is a stress on color manipulation and gradations, using dark color in some areas and outside the shape of the earth to present the 3D form. It shows part of the Earth where it is away from the Sun and the space looks black because there is no close bright source of light, like the Sun. Both designs focus on the reflection of light on some areas in the surfaces of the earth to portray its beauty and uniqueness.

5- Conclusion and recommendations

Arabic Calligraphy is the most valued art form in the Islamic world and it is the main mode of visual communication because it is strongly tied to the *Qur'an*. The aesthetic quality of the calligraphy opens wide possibilities for design and contemporary arts in terms of subject and form, style, ratio, and theme. This is proved through the process of the integration of different types of images from cosmos/ galaxies and the aesthetic Arabic calligraphy using Computer Aided Design CAD for the purpose of creating contemporary wall hangings. Additionally, exploring the potential of CAD (Photoshop) to provide various shapes, forms and colors of the Arabic calligraphy over layers of galaxies, stars or cosmic phenomena in order to create depth and new aesthetics has proved to be rewarding and allows for creating endless artistic designs

The study recommends the students from the art and design discipline: 1- to study the aesthetic quality of the cosmic/ deep space objects, galaxies and natural phenomena to enhance their creative abilities. 2- to study the styles and history of Arabic calligraphy to be able to use them in the field of art and design in general, and textile printing application in particular. 3- to encourage the integration between Arabic calligraphy and the different manifestations of natural phenomena. 4- to develop interest in linking science and the arts.

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