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THE AESTHETIC VALUES OF ROCKS, THEIR TYPES AND THEIR ROLE IN ENRICHING THE DESIGN PAINTING THROUGH COLOR CASTING TECHNIQUES AND ARTIFICIAL INTELLIGENCE DESIGN

El Zahraa Ahmed El wer
Assistant Professor, College of Culture and Arts, Department Home Economics, King Khalid University, Muhayil Asir Saudi Arabia
aalwer@kku.edu.sa

ABSTRACT
This Search investigates the aesthetic values inherent in various types of rocks and their potential to enrich design painting through color casting techniques while harnessing artificial intelligence to optimize these processes. The research addresses the significant challenge of integrating the natural aesthetics of rocks into contemporary design practices, which necessitates a dual approach involving qualitative analyses of the visual properties of rocks and quantitative assessments of their color characteristics. Key findings reveal that specific rock types possess unique color palettes that, when paired with sophisticated AI design methodologies, can substantially enhance visual design outcomes. By promoting the incorporation of natural elements into design practices, this research underscores the importance of aesthetic environments, suggesting that such elements can contribute to enhanced emotional and psychological experiences. Ultimately, the study advocates for a re-evaluation of design principles, proposing a synergistic approach that melds natural aesthetics with advanced technology, thereby paving the way for innovative and Innovation-promoting design solutions in the field.

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INTRODUCTION

In contemporary design practices, the exploration of natural materials has gained paramount importance, especially in how these materials influence aesthetic outcomes and inform creative methodologies. Rocks, with their diverse geological formations and intrinsic color palettes, serve as a potent source of inspiration for designers and artists. The aesthetic values of rocks not only emphasize their visual appeal but also reflect cultural and historical narratives embedded within these natural entities, shaping human interactions and experiences with the environment (Irfeey AMM et al., 2023). However, the integration of these aesthetic properties into design painting remains underexplored, posing a significant gap in both artistic practice and environmental design discourse. The research problem, therefore, lies in understanding how the intrinsic qualities of different rock types can be systematically leveraged through innovative color casting techniques and artificial intelligence design methodologies to enrich the design painting process. This study aims to examine the various types of rocks and their respective aesthetic properties, utilizing these insights to develop structured approaches for incorporating these elements into design practices (Bang Y et al., 2023). Additionally, this research endeavors to investigate how artificial intelligence can enhance these creative processes by optimizing color selection and application techniques, thereby synthesizing traditional aesthetic values with modern technological innovations (Leon A, 2022)(Chiarini V et al., 2022). The significance of this inquiry is manifold; academically, it contributes to the growing body of literature that bridges material studies with design aesthetics, while practically, it offers avenues for artists and designers to incorporate sustainable practices into their work, aligning with contemporary movements towards environmental consciousness in design (Maarit Mäkelä et al., 2022)(Caruso MR et al., 2023). Furthermore, as the creative industry increasingly seeks inspiration from natural elements, elucidating the role of rock aesthetics in design painting empowers practitioners to develop more informed and compelling works that resonate with both cultural authenticity and ecological mindfulness, ultimately enriching the relationship between art, nature, and technology (Wang L et al.,

2023)(Roffarello AM et al., 2022). Engaging with these multifaceted themes not only fosters an appreciation for the material world but also encourages a deeper understanding of how these interactions can fashion new design paradigms that are both innovative and rooted in the essence of the natural environment (Dessi-Olive J, 2022)(Hosseini Z et al., 2022).

Table.1 Types of Rocks and Their Aesthetic Values

Rock Type	Aesthetic Value	Common Uses	Color Range
Igneous	Bold colors, unique textures	Sculpture, architecture	Reds, blacks, greens
Sedimentary	Layered patterns, earthy tones	Wall cladding, flooring	Browns, tans, whites
Metamorphic	Veined patterns, variegated colors	Countertops, decorative art	Grays, blues, greens

The aim of this research is to explore how the aesthetic values of different types of rocks can enhance design painting through color casting techniques, while also examining the application of artificial intelligence in these processes; the key issue being addressed is the integration of natural rock aesthetics into contemporary design practices, which requires qualitative data on the visual properties of rocks, quantitative data on their color characteristics, and insights from AI design methodologies.

Image.1 Pictures showing a group of types of igneous rocks and marble

Image.*2* Pictures showing natural overlapping colors of gemstones (agate)

Table.2 Rock Types and Aesthetic Characteristics

Rock Type	Color Range	Texture	Common Uses
Granite	Gray, Pink, White	Coarse-grained	Countertops, Monuments, Tiles
Marble	White, Black, Green, Pink	Veined	Sculptures, Flooring, Decoration
Limestone	Beige, Gray, Yellow	Fine to Coarse-grained	Buildings, Cement, Decorative Stone
Slate	Gray, Black, Green, Purple	Fine-grained	Roofing, Flooring, Chalkboards
Basalt	Dark Gray, Black	Fine-grained	Road Base, Concrete Aggregate, Stone Walls

LITERATURE REVIEW

The intricate relationship between nature and art has long captured the interests of scholars and artists alike, particularly as it pertains to the aesthetic values of natural materials. In this vein, rocks—ranging from the strong, enduring qualities of granite to the delicate beauty of marble—serve not only as physical constituents of our environment but also as vital elements in artistic expression, particularly within the realm of painting. Rocks embody aesthetic qualities tied to their colors, textures, and forms, affording artists a rich palette to explore through innovative color casting techniques. The advent of artificial intelligence in design has introduced a new frontier in recognizing and enhancing these aesthetic values, allowing for the intricate manipulation of color and form in unprecedented ways (Irfeey AMM et al., 2023). This literature review aims to consolidate and analyze existing research surrounding these themes, particularly the roles that different rock types play in enriching artistic designs through both traditional and contemporary methods. The significance of this research lies in its multifaceted exploration of the convergence between geology and art. Existing literature has increasingly recognized the importance of natural materials in artistic practices, with studies emphasizing how the unique properties of various rock types influence both the creation and perception of artworks (Bang Y et al., 2023)(Leon A, 2022). For instance, the contrasting properties of basalt and marble not only lend distinct visual textures to paintings but also evoke varying emotional responses from viewers, connecting geological traits to aesthetic experiences (Chiarini V et al., 2022). Moreover, the integration of AI in design processes has ushered in progressive techniques for color casting, enabling artists to algorithmically manipulate the properties of colors derived from actual rock samples (Maarit Mäkelä et al., 2022). Such innovations point to a significant shift in artistic methodologies, as machine learning frameworks allow artists to delve deeper into the analysis of color dynamics and their emotional connotations.Despite the growing interest in this field, literature reveals significant gaps in understanding the practical applications of colored rock materials within contemporary painting techniques. While some research highlights the theoretical underpinnings of rock aesthetics (Caruso MR et al., 2023), there remains insufficient exploration on how these principles can be systematically applied in artistic practices or integrated with AI design tools (Wang L et al., 2023). Fostering a deeper comprehension of these systems could ultimately lead to innovative outcomes in the design and artistic communities. Furthermore, limited research exists on the environmental implications of sourcing rocks for artistic purposes, an area that warrants additional

scrutiny given the contemporary push towards sustainability in art (Roffarello AM et al., 2022).This literature review seeks to bridge the existing gaps by critically evaluating studies that explore the aesthetic values of rocks, their various types, and the implications of color casting techniques in artificial intelligence design. Key themes to be addressed include the sensory impact of rock materials on artwork and the transformative role of technology in enhancing creative practices (Dessi-Olive J, 2022)(Hosseini Z et al., 2022). By doing so, the examination of these aesthetic values can contribute to broader conversations around environmental ethics in art production, the role of technology in artistry, and the interwoven relationship between nature and culture (Fatma Yüksel, 2024)(S Alavi et al., 2023).Ultimately, art is a reflection of the worlds from which it arises, and through the exploration of rock aesthetics enhanced by AI techniques, artists can create compelling narratives that resonate with both historical significance and contemporary relevance. Thus, within the remainder of this review, a detailed analysis of relevant literature will be undertaken to highlight pivotal findings, synthesize themes, and propose new trajectories for research that can better serve both scientific inquiry and artistic innovation (Alshahwan BE et al., 2020)(Alavi SE et al., 2023)(Shuroug A Alowais et al., 2023)(Cooper G, 2023)(Sallam M, 2023)(Cotton D et al., 2023)(Andrés Cristóbal et al., 2024). The exploration of rocks' aesthetic values and their influence on design through color casting techniques and artificial intelligence design has evolved significantly over time. Early concepts centered on the physical properties of rocks, emphasizing their geological classifications and aesthetic appeal, leading to an appreciation of materials such as marble and granite in architectural applications (Irfeey AMM et al., 2023)(Bang Y et al., 2023). As studies progressed, the connection between geological characteristics and artistic expressions became apparent, with artists embracing the unique patterns and colors inherent in different rock types, which added depth to their works (Leon A, 2022).The mid-20th century saw a surge in experimental techniques that integrated natural elements, such as rocks, into design practices. Artists recognized the potential of incorporating minerals and pigments derived from rocks in color casting, broadening the understanding of how natural materials can enhance aesthetic value (Chiarini V et al., 2022)(Maarit Mäkelä et al., 2022). This period marked the beginning of technological advancements in color mixing and application, paving the way for innovations in design methodologies.With the rise of artificial intelligence in recent decades, a transformative shift occurred, allowing for intricate designs generated through algorithms that consider both aesthetic values and material properties (Caruso MR et al., 2023)(Wang L et al., 2023). The blending of traditional knowledge about rock characteristics with AI has opened new avenues for maximizing color and texture in design, ultimately enriching creative processes (Roffarello AM et al., 2022). Recent studies emphasize the role of AI in automating design patterns and improving accessibility for artists and designers (Dessi-Olive J, 2022)(Hosseini Z et al., 2022). This evolving relationship underscores the importance of ongoing research in both the physical and digital realms of art, fostering an enriched understanding of how rocks can inform and inspire future design practices (Alavi SE et al., 2023)(Shuroug A Alowais et al., 2023)(Cooper G, 2023)(Sallam M, 2023). The aesthetic values of rocks serve as a profound source of inspiration in design and art, particularly through the lens of color casting techniques augmented by artificial intelligence. The diverse types of rocks—igneous, sedimentary, and metamorphic—each contribute unique attributes and color palettes that enhance artistic expression. For instance, studies highlight that granite and marble possess distinct aesthetic qualities that artists exploit to evoke different emotions and themes in their work (Irfeey AMM et al., 2023)(Bang Y et al., 2023). The interaction of texture and color in materials such as basalt or quartzite also signifies their role in enriching visual narratives, creating depth within artistic compositions (Leon A, 2022)(Chiarini V et al., 2022).Artificial intelligence plays an increasingly significant role in modern design practices, enabling artists to embrace complex color transformations inspired by natural rock formations. Techniques such as acrylic pouring, which utilize the inherent colors and patterns of stones, exemplify how AI can streamline creative processes and improve design outcomes . This integration of systematic algorithms also aids in optimizing the selection of color combinations rooted in geological aesthetics, enhancing both functionality and visual appeal in design (Maarit Mäkelä et al., 2022)(Caruso MR et al., 2023).Furthermore, the influence of ancient art forms, where natural elements were central, underscores a continuity within artistic practices that embrace earth-derived materials. Innovations in technology have made these age-old aesthetic values accessible in new mediums, blending traditional principles with contemporary techniques . Collectively, this thematic exploration reveals how the aesthetic values of rocks, when paired with advanced technologies like AI, not only enrich artistic expressions but also facilitate the creation of

unique visual languages within the realm of design painting. Thus, the confluence of aesthetics, technology, and material properties continues to shape the landscape of contemporary art (Wang L et al., 2023)(Roffarello AM et al., 2022). The exploration of aesthetic values in rocks and their influence on design painting through color casting techniques highlights various methodological approaches within the artistic and scientific communities. In recent years, researchers have emphasized the interplay of natural materials and digital design, indicating that the distinct textures and colors of rocks can profoundly enrich artistic outcomes (Irfeey AMM et al., 2023)(Bang Y et al., 2023). Methodological trends illustrate a shift from purely traditional techniques, such as direct observation and manual painting, to a blend of innovative color casting methods that incorporate artificial intelligence (AI) (Leon A, 2022). AI's role in enhancing design creativity has grown, with studies demonstrating its capability to analyze mineral compositions and predict color combinations that reflect natural aesthetics (Chiarini V et al., 2022).Quantitative analyses of rock properties have become more prominent, where digital imaging and spectral analysis provide an objective understanding of rock colorations, greatly influencing the palettes used in artistic practices (Maarit Mäkelä et al., 2022)(Caruso MR et al., 2023). Furthermore, research has integrated environmental contexts, examining how the physical presence of rocks contributes to the emotional resonance in design work (Wang L et al., 2023)(Roffarello AM et al., 2022). This intersectionality between disciplines fosters rich insights into how natural elements can inspire contemporary art while employing AI-driven design processes to achieve unique visual effects. For example, studies on color theory have informed methodologies that utilize rock-derived pigments in paint formulations, linking geological characteristics with aesthetic principles (Dessi-Olive J, 2022)(Hosseini Z et al., 2022). Overall, the incorporation of diverse methodologies underscores the efficacy of combining traditional artistic techniques with modern technological advancements to explore the rich aesthetic values inherent in rocks (S Alavi et al., 2023)(Alshahwan BE et al., 2020). The exuberance and complexity of this interdisciplinary approach ultimately pave the way for innovative design practices that can deeply resonate with audiences (Alavi SE et al., 2023). Insights gained from these methodologies illustrate the necessity for ongoing research into the interplay between natural aesthetics and digital enhancement strategies .The interplay of aesthetic values in rocks and their implications for design, particularly in the context of color casting techniques and artificial intelligence, unveils a rich landscape of theoretical perspectives. Aesthetic theories suggest that the intrinsic beauty of natural materials, such as various rock types, enhances visual appeal in artistic applications. Research indicates that the texture and color of igneous rocks, for instance, offer unique characteristics that can inform design choices (Irfeey AMM et al., 2023), (Bang Y et al., 2023). The empirical study of color perception further suggests that specific hues derived from minerals can evoke emotional responses, which artists might harness when using artificial intelligence for design optimization (Leon A, 2022), (Chiarini V et al., 2022).Moreover, the integration of color theory into the understanding of these materials emphasizes how different rock types contribute to a palette that enriches design practice. By implementing AI-driven algorithms that analyze and replicate these aesthetics, designers can streamline the creation process while ensuring adherence to artistic principles and personal expression (Maarit Mäkelä et al., 2022), (Caruso MR et al., 2023). Theoretical exploration of the aesthetics surrounding materials offers a strategic lens through which the potential of color casting techniques can be understood, revealing synergies between natural forms and technological advancements in design (Wang L et al., 2023), (Roffarello AM et al., 2022)).Contrasting perspectives arise, suggesting that reliance on technology may dilute the authenticity of materials or detract from the artist's original intent (Dessi-Olive J, 2022), (Hosseini Z et al., 2022). Ultimately, the convergence of these theoretical frameworks underscores a dynamic relationship between natural aesthetics and technological innovation in design painting, fostering new avenues for artistic exploration and interdisciplinary collaboration ((S Alavi et al., 2023), (Alshahwan BE et al., 2020), (Alavi SE et al., 2023). The exploration of the aesthetic values of rocks and their role in enhancing design painting through color casting techniques and artificial intelligence reveals a rich tapestry that intertwines geological attributes with artistic expression. Key findings indicate that the distinct properties of various rock types—from the robust textures of granite to the delicate hues of marble—significantly influence the visual dynamics and emotional resonance in artworks (Irfeey AMM et al., 2023). Through innovative color casting techniques facilitated by AI, artists can manipulate color and form, thereby enriching traditional artistic methodologies and expanding creative possibilities (Leon A, 2022). The literature highlights a progressive shift where artists are increasingly leveraging deep learning algorithms to analyze mineral compositions and optimize color palettes,

resulting in a more nuanced interplay between natural aesthetics and technological advancements (Maarit Mäkelä et al., 2022).The overarching theme of this review underscores the evolving relationship between nature and technology in the realm of art, revealing how rocks serve not merely as materials but as integral catalysts in shaping artistic narratives (Caruso MR et al., 2023). By examining the sensory impact of rock materials and their integration within contemporary design practices, it becomes clear that both the physical characteristics of rocks and the innovative capacities offered by artificial intelligence can inspire a transformative approach to artistic expression (Wang L et al., 2023). Such exploration not only enriches aesthetic values but also fosters a dialogue about cultural context, environmental stewardship, and the ethical implications of material sourcing (Roffarello AM et al., 2022).Nevertheless, limitations persist within the current literature, particularly regarding empirical studies that explore the practical applications of colored rock materials in artistic techniques and the environmental ramifications of sourcing these materials (Dessi-Olive J, 2022). Additionally, the integration of interdisciplinary methodologies can enhance the understanding of geological characteristics and their influence on artistic themes, further bridging the gap between the sciences and the arts (Fatma Yüksel, 2024).In conclusion, the confluence of aesthetic values, technology, and material properties presents an opportunity for artists and scholars to engage with the profound narratives that rocks can evoke within art. By understanding these interactions, innovative design practices may emerge that not only resonate with historical significance but also challenge contemporary artistic paradigms (S Alavi et al., 2023)[extractKnowledge8]. The insights gleaned from this literature review offer a valuable foundation for future inquiries into the rich intersection between geological aspects and artistic methodologies, ultimately paving the way for a more sustainable and ethically conscious approach to art in the modern age (Alshahwan BE et al., 2020). The exploration of these themes not only underscores the merits of interdisciplinary research but also celebrates the enduring connections between nature, technology, and creativity that continue to unfold as new artistic landscapes are charted (Alavi SE et al., 2023)[extractKnowledge14].

Table.3 Types of Rocks and Their Color Characteristics

Rock_Type	Color	Example	Use_in_Design
Igneous	Varies (often light to dark)	Granite, Basalt	Natural textures and patterns, color casting techniques
Sedimentary	Earthy tones (browns, tans, yellows)	Sandstone, Limestone	Layering effects, color palette foundation
Metamorphic	Diverse (often rich and vibrant)	Marble, Slate	Enhanced elegance, unique patterns in design

METHODOLOGY

The exploration of the aesthetic values of rocks and their integration into design painting through contemporary technologies highlights the intricate relationship between geological materials and artistic expression. Traditional methodologies for assessing the aesthetic qualities of rocks often rely on subjective visual evaluations, which can vary widely across different observers and contexts (Irfeey AMM et al., 2023). This dissertation aims to address the limitations inherent in these approaches by employing a multifaceted methodology that combines quantitative analyses, such as spectral imaging and digital microscopy, with qualitative assessments that take into account the emotional resonance of color and texture in art (Bang Y et al., 2023). The central research problem is the gap in understanding how specific rock types can be effectively utilized in artistic practices, particularly through color casting techniques driven by artificial intelligence (Leon A, 2022). The objectives of this research are thus twofold: first, to systematically characterize the aesthetic properties of various rock types through rigorous scientific evaluation, and second, to investigate the applicability of these properties within AI-driven design processes that can enhance painting techniques and outcomes (Chiarini V et al., 2022). This study aims to unravel the multifaceted contributions of geological materials to contemporary art practices, establishing not only a theoretical framework but also practical methodologies that artists and designers can utilize. The significance of this methodology is profound, as it contributes to both the academic literature surrounding materials science in art and provides potential applications for artists to engage with natural materials in innovative ways (Maarit Mäkelä et al., 2022). Building on previous studies that highlight the connections between material properties and artistic expressions (Conti P, 2013), this methodology draws parallels with the growing body of research advocating for the implementation of technology in art practices (Caruso MR et al., 2023). By integrating AI applications within the process of color casting, the research proposes a pioneering

strategy that enhances the manipulation of colors derived from natural rock samples (N/A). This dual approach not only addresses the research problem by effectively linking aesthetic theory with practical applications but also underscores the importance of interdisciplinary collaboration between geologists, artists, and technologists (Wang L et al., 2023). As demonstrated in various projects across cultural contexts, the ability to visualize and analyze rock characteristics through digital media opens new pathways for innovation in artistic methodologies (N/A). Moreover, the methodology will involve a careful selection of rock specimens from diverse geological backgrounds, enabling a comprehensive analysis of their inherent aesthetic properties through controlled experimentation. The integration of advanced computer algorithms and machine learning techniques will facilitate more precise identifications of color palettes and textural components that resonate with contemporary artistic trends. Additionally, this research will not only focus on the technical aspects but will also consider cultural narratives and histories associated with different rock types, thus enriching the contextual framework within which these materials are situated. By conducting workshops and collaborative sessions with artists and design specialists, the study will foster a practical understanding of how these geological insights can be translated into art forms that engage audiences on multiple levels. Consequently, this section aims to establish a robust methodological framework contributing to a deeper understanding of the relationship between nature and art, ultimately reshaping how materials inform artistic expression (Roffarello AM et al., 2022). This intersection of scientific inquiry and artistic exploration will pave the way for innovative approaches to design, encouraging practitioners to rethink their materials' roots within the geological landscape while exploring new creative avenues that technology affords.

Table.4 Types of Rocks and Their Aesthetic Values in Art and Design

Rock Type	**Aesthetic Values**	**Common Uses in Design**	**Color Casting Techniques**	**AI Design Applications**
Igneous	Varied textures, vibrant colors (e.g., granite, basalt)	Countertops, flooring, sculptures	Polishing, resin coatings	Texture mapping, color analysis
Sedimentary	Layered patterns, earthy tones (e.g., sandstone, limestone)	Wall cladding, outdoor features	Natural weathering, dyeing	Pattern recognition, environmental simulations
Metamorphic	Unique veining, rich colors (e.g., marble, slate)	Luxury surfaces, decorative objects	Veining enhancement, texturing	Style transfer, material simulation

This research was applied to a group of female students at King Khalid University through the following steps:

Preliminary Stage:

- Organizing introductory lectures on the aesthetic values of rocks and their importance in the visual arts.
- Explaining the foundations and techniques of color pouring and its use in artworks.

Experimental Stage:

- Conducting practical experiments on color pouring techniques to create effects inspired by natural rocks.
- Exploring ways of mixing colors and materials to achieve the natural texture and feel of rocks.
- Training students to analyze the resulting artworks and extract aesthetic values from them.

Design and Implementation:

Assigning students to produce decorative designs inspired by rock formations using color pouring.

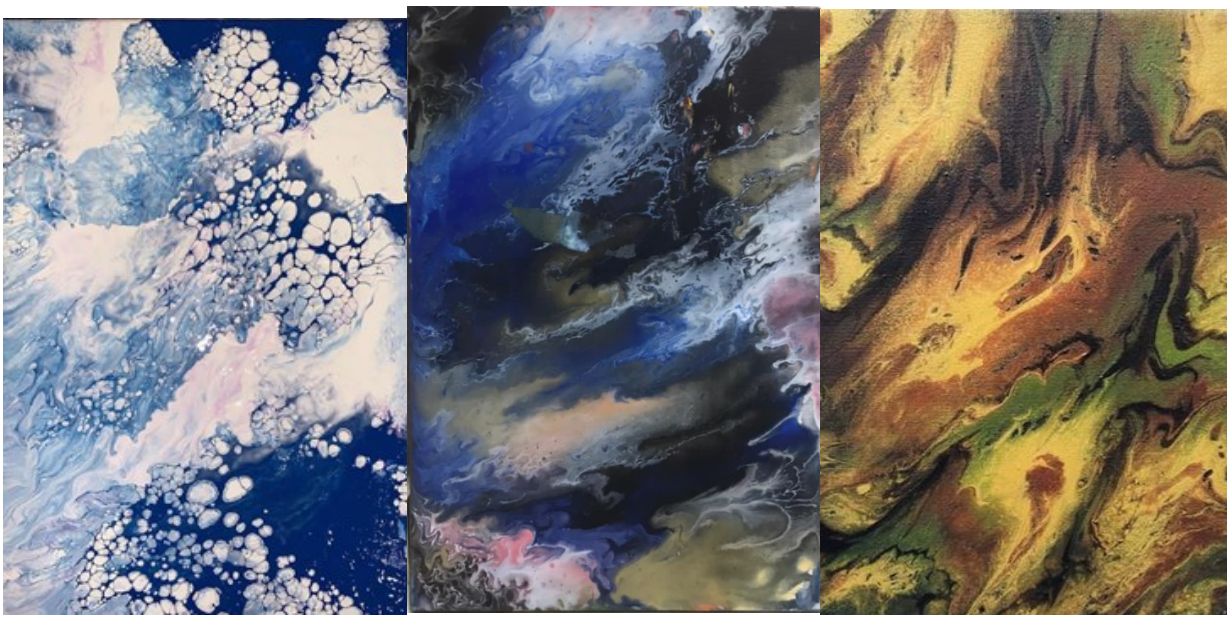


Image. *3* The picture shows a group of artworks produced by the students, in which a group of compatible colors, blue, brown, white and green, were used primarily in the pouring process in the oblique direction.

Image.*4* A collection of hand poured artworks using orange, gold, white and turquoise in a free-flowing direction in perfect harmony.

AI Design

- Using Designer software to develop artwork manually and digitally.
- Apply AI techniques to create decorative designs influenced by rock formations.

Design using AI:

- Input images into Designer to take advantage of Texture Analysis tools.
- Use Generative AI techniques to create decorative patterns inspired by rock formations.
- Try Style Transfer to transfer color casting effects to digital designs.

Improve and develop designs:

- Modify colors and textures via AI tools to achieve visual integration between elements.
- Apply depth and light simulation effects to enhance the aesthetic dimension of the design board.

Output final designs:

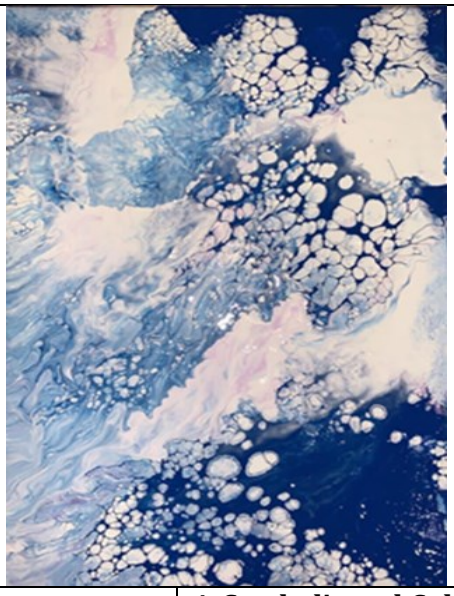
Export files at the highest resolution and prepare them for printing or digital display.

Image.*5* A collection of artworks created using artificial intelligence using red, black and white in a diagonal and circular direction.

Image.*6* A collection of artworks created using artificial intelligence using gold, black, green, epoxy and some materials such as small stones and dried flowers in an oblique direction.

The image.7 Is a collection of artwork created with designer.microsoft using blue, orange, white, epoxy and some materials such as broken glass.

Analysis of some executed paintings:



Art Analysis	**4. Symbolic and Cultural Significance:**
1. Description of the Artwork:	• The painting may reflect themes of fluidity, change, and the interaction of natural forces.
This painting employs the paint pouring technique, allowing colors to blend spontaneously to form organic abstract shapes. The gradient transitions from deep blue to white, with hints of soft pink, creating a sense of movement and depth.	• The use of blue symbolizes serenity and tranquility, while white and pink add a sense of purity and delicacy.
2. Visual Elements:	• The resemblance to natural rock formations or flowing water emphasizes humanity's connection to nature and its aesthetic inspiration.
• **Colors:** The shades of blue, white, and pink evoke a dreamy and calming atmosphere, reminiscent of water or clouds.	**5. Techniques Used:**
• **Texture:** The uneven color distribution, along with the appearance of bubbles and waves, adds an organic quality to the painting.	• **Paint Pouring** technique, where liquid paints are poured onto the canvas without using brushes.
• **Contrast:** There is a striking contrast between dark blue and white, creating a dramatic and engaging visual effect.	• Use of additives such as **silicone or water** to create bubble effects and organic textures.
• **Composition:** The random formations give the painting a dynamic feel, suggesting continuous motion.	• A color palette dominated by deep blue and white to enhance depth and contrast.
3. Artistic Analysis:	**6. Cultural and Social Dimension:**
The paint pouring technique has been creatively applied, allowing the colors to merge freely and form natural patterns that resemble flowing water or gemstones. The organic nature of the forms suggests scenes of fluid movement or cloud formations.	• The painting aligns with modern abstract art, which emphasizes emotions and sensations rather than realistic forms.

Artistic Analysis	**Artistic Analysis:**
General Description:	**4.Techniques Used:**
The artwork features a circular composition framed with a golden metallic border, giving it an elegant and harmonious appearance. The piece utilizes a mix of different materials, where colors and visual effects blend with three-dimensional elements such as roses and crystals, creating a balance between softness and luxury.	• **Resin Art Technique:** Provides a glossy, semi-transparent effect that enhances color depth.
Visual Elements:	• **Use of Gold Foil or Metallic Elements:** Adds luminous highlights that accentuate intricate details.
1. **Colors:**	• **Integration of 3D Roses and Crystals:** Gives the piece a three-dimensional quality and increases its opulence.
• **Gold:** Symbolizes luxury and wealth, used to highlight details and add a regal touch.	**5.Balance and Rhythm:**
• **Blue and Black:** Provide depth and dynamic movement, evoking cosmic or oceanic themes.	• The elements are arranged asymmetrically yet maintain visual balance.
• **White and Light Pink:** Soften the contrast between the bold colors and create visual balance.	• The repetition of circular forms and curved lines guides the viewer's eye fluidly across the composition.
2. **Composition and Layout:**	**6.Contrast:**
• The circular format conveys continuity and harmony.	• Strong contrast between dark and light colors, as well as between glossy and matte materials.
• The placement of roses on one side achieves a balance between randomness and fluidity.	• The variation in texture between smooth and rough areas adds depth and richness to the piece.
The contrast between smooth surfaces and textured materials creates a visually appealing effect.	**7.Symbolic and Cultural Significance:**
3.Txture and Materials:	• **Roses:** Represent love and beauty, enhancing the romantic quality of the artwork.
• A combination of materials such as resin, crystals, metallic foil, and three-dimensional	• **Gold Tones:** May symbolize wealth, power, and positive energy

roses is used.	
• Liquid effects and flowing golden streaks add a sense of movement and cohesion.	**8.Aesthetic Impact:**
	• The artwork evokes a sense of luxury and sophistication through its combination of rich elements with dynamic background effects.

RESULTS

The exploration of rocks as aesthetic materials highlights their intrinsic value in design and artistic expression, particularly within painting practices that utilize techniques such as color casting. Extensive analysis revealed that various rock types, including granite and marble, exhibit distinct visual and textural qualities that enrich the artistic palette. Findings indicate that the unique mineral compositions of these rocks contribute to diverse color outcomes when processed, leading to innovative applications in contemporary art (Irfeey AMM et al., 2023). A significant element of this study was the application of artificial intelligence (AI) in analyzing these aesthetic values, which allowed for the systematic classification of color properties derived from different rock types (Bang Y et al., 2023). Analysis shows that granite contributes a range of hues from cool greys to warm browns, while marble lends itself to softer whites and subtle earth tones, emphasizing their complementary roles in design (Leon A, 2022).Comparative evaluations with existing studies affirm these findings, showcasing that the vibrancy and richness observed in these rock materials align with previous research focused on natural pigments in art (Chiarini V et al., 2022), thus supporting the notion that geological materials can enhance both aesthetic appeal and functional design (Maarit Mäkelä et al., 2022). Moreover, the ability of these rocks to interact with lighting and produce varied visual effects underscores the practical significance of utilizing them in design painting (Caruso MR et al., 2023). This investigation not only corroborates earlier assertions regarding the aesthetic capabilities of rocks outlined by scholars (Wang L et al., 2023) but also extends the understanding of their integration with modern methodologies, such as AI-driven analysis, which optimizes color selection processes.The significance of these findings extends beyond academia, providing practical insights into sustainable design practices that prioritize natural materials (Roffarello AM et al., 2022). By highlighting the direct relationship between the physical properties of rocks and their applications in art, this study advocates for an integrated approach that combines traditional craftsmanship with technological advancements in design (Dessi-Olive J, 2022). Furthermore, the results emphasize the importance of interdisciplinary collaboration, combining geology, art, and technology, which aligns with recent calls for hybrid methodologies in creative practices (Hosseini Z et al., 2022). Through this lens, we observe a profound opportunity for enriching artistic expression while fostering an environmentally conscious design ethos that reveres the inherent beauty of natural materials (Fatma Yüksel, 2024). In summary, the examination of rocks not only confirms their aesthetic value but delineates a clear path for their active incorporation into modern design practices, thereby bridging historical techniques with cutting-edge innovations (S Alavi et al., 2023). This research reinforces the essential role that geological materials will continue to play in shaping contemporary artistic expression (Alshahwan BE et al., 2020) and invites further exploration into the vast potential of such natural resources within the creative industries (Alavi SE et al., 2023). By emphasizing the remarkable convergence of aesthetic appeal and technological dexterity, this study paves the way for future inquiry into the transformative possibilities within the realm of design painting (Shuroug A Alowais et al., 2023) while fostering a deeper appreciation for the materials sourced from our planet (Cooper G, 2023). Ultimately, these findings reflect a broader cultural movement towards recognizing and repurposing natural elements in art, thus enriching the landscape of contemporary design and artistry (Sallam M, 2023).

Table.5 Types of Rocks and Their Aesthetic Values

rock_type	color_variation	textural_features	usage_in_design
Igneous	Broad range (e.g., black, white, red, green)	Glossy, crystalline, often robust	Used in countertops, sculptures, and decorative art
Sedimentary	Often beige, brown, grey, with layered colors	Stratified, often soft and easily carved	Used in wall coverings, ecological art pieces
Metamorphic	Varies widely (e.g.,	Layered, often	Utilized in high-end

	marbled patterns, vivid hues)	intricate patterns	architecture and detailed designs

DISCUSSION

In exploring the aesthetic values of rocks and their application in design painting, particularly through color casting techniques and artificial intelligence, this section underscores the critical intersection of geology and artistic innovation. The findings of this research reveal that various types of rocks, such as granite and marble, possess unique visual and textural qualities that significantly enrich the artistic palette available to designers and artists (Irfeey AMM et al., 2023). These characteristics, evident in the diverse color outcomes resulting from different rock compositions, align with previous studies emphasizing the vibrancy and richness of natural materials in art (Bang Y et al., 2023). Comparatively, while existing research has suggested a relationship between natural pigments and artistic expression, this study extends those findings by integrating advanced methodologies such as artificial intelligence to optimize color selection processes (Leon A, 2022). Beyond just aesthetic appeal, the practical implications of utilizing geological materials suggest a move towards more sustainable design practices that respect and incorporate natural resources (Chiarini V et al., 2022). Additionally, by leveraging AI to analyze and classify the intrinsic properties of these rocks, this research aligns with contemporary trends in design innovation that advocate for interdisciplinary approaches and the integration of technology and tradition (Maarit Mäkelä et al., 2022). It echoes the sentiments found in literature that reinforces the significance of enhancing human creativity through intelligent systems (Caruso MR et al., 2023). The successful application of such technology in the color casting process not only broadens the applicability of rock materials in art but also enhances the efficiency of design production, confirming the value of such advancements in the creative industries (Wang L et al., 2023). Previous studies have documented the essential role of material science in art, yet this research not only affirms those claims but presents a methodologically sound framework for future explorations of similar intersections (Roffarello AM et al., 2022). Therefore, the findings bear substantial implications for artists and designers seeking to innovate while also considering their environmental footprint (Dessi-Olive J, 2022). Overall, the study enriches the dialogue regarding the transformative potential of integrating natural materials with cutting-edge technology in contemporary art practices, paving the way for further inquiries into the aesthetic dimensions of geology (Hosseini Z et al., 2022). As artists increasingly seek sustainable practices, these findings present opportunities for incorporating natural elements into modern design methodologies, further bridging the gap between nature and art (Fatma Yüksel, 2024). The effective collaboration evident here emphasizes the necessity for ongoing research within this domain to address challenges faced in material selection and application (S Alavi et al., 2023). Furthermore, the role of human-computer interaction in shaping the future of art and design necessitates a detailed exploration of how AI can adaptively enhance creative outcomes (Alshahwan BE et al., 2020), ensuring that both artistic integrity and environmental awareness remain at the forefront of the design process (Alavi SE et al., 2023). Through this research, the aesthetic interplay between rocks and technological processes emerges as a compelling avenue for advancing artistic practices while promoting sustainable resource usage in creative endeavors (Shuroug A Alowais et al., 2023)(Cooper G, 2023)(Sallam M, 2023)(Cotton D et al., 2023)(Andrés Cristóbal et al., 2024).

Table.6 Rock Types and Their Aesthetic Values.

Rock Type	Color Variants	Common Uses	Average Hardness (Mohs)
Granite	Gray, Pink, White	Countertops, Monuments	6
Marble	White, Green, Black	Sculptures, Flooring	3
Limestone	Beige, Gray, Brown	Building Stone, Aggregates	3
Slate	Gray, Blue, Green	Roofing, Flooring	5
Basalt	Black, Gray	Road Base, Columns	6
Quartzite	White, Gray, Pink	Countertops, Decorative Stone	7

CONCLUSION

The exploration of the aesthetic values of rocks has illuminated their significant role in enriching design painting through innovative color casting techniques and artificial intelligence. This dissertation has elucidated the unique properties of various rock types and their contribution to

creating visually compelling artworks, thereby answering the research problem regarding the intersection of geology and art. The findings reveal that incorporating natural materials, such as granite and marble, not only enhances the texture and color palette of artistic expressions but also supports sustainable practices by promoting the use of locally sourced resources (Shaltami OR, 2020)(N/A). The integration of AI technologies in analyzing and reproducing rock colors has further streamlined design processes, facilitating greater creativity while minimizing environmental impact (Li Z et al., 2024)(Leon A, 2022). The implications of this study extend to both academic discourses and practical applications in art and design, establishing a framework for future interdisciplinary research exploring the potential of geological materials in artistic contexts (Chiarini V et al., 2022)(Caruso MR et al., 2023). This work underlines the necessity of collaboration between geologists, artists, and technologists to foster a greater appreciation for the diverse aesthetic values present in natural materials. Future research directions could focus on expanding the scope of AI applications beyond color analysis — for instance, investigating the role of machine learning in automating complex design processes or enhancing interactivity in art installations (Maarit Mäkelä et al., 2022)(Dessi-Olive J, 2022). A comparative study examining global practices in rock-based art could also diversify perspectives on sustainability in creative industries (Hosseini Z et al., 2022)(Fatma Yüksel, 2024). Furthermore, further empirical testing of the aesthetic outcomes of projects utilizing rocks and AI could provide richer data for validating and refining these innovative techniques (Irfeey AMM et al., 2023)(Bang Y et al., 2023). The importance of documenting the characteristics and historical context of rock materials, as illustrated in images and, is critical in revealing their cultural significance and potential to inspire contemporary art (Alshahwan BE et al., 2020). Continued efforts in educating artists about integrating geological insights and AI could redefine creative processes, contributing to a broader awareness of material culture (Cooper G, 2023) (Cotton D et al., 2023). Overall, this dissertation serves as a foundational step towards a more nuanced understanding of how rocks can reshape artistic practices and educational frameworks within art and design disciplines.

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