

DIGITAL INTEGRATION IN TRADITIONAL PRINTMAKING AND PAINTING: EXPLORING THE IMPACT OF COMPUTER-AIDED DESIGN ON CONTEMPORARY GRAPHICS PRACTICE

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Abstract

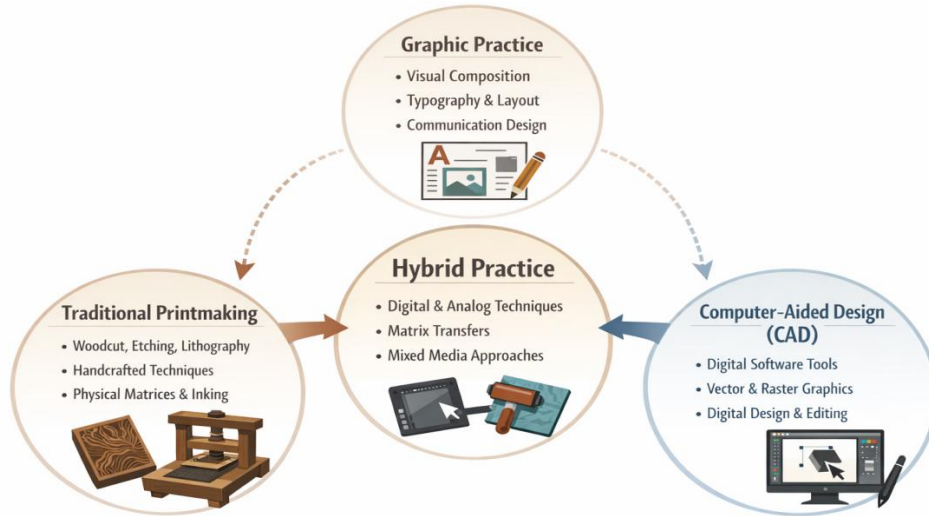
This paper examines the digital integration of Computer-Aided Design (CAD) technologies into traditional printmaking and painting practices, focusing on its implications for artistic production, materiality, and pedagogy. The world of art is constantly evolving, and one of the most fascinating developments in recent years is the rise of digital printmaking and painting practices. This contemporary movement bridges traditional technique with modern technology, offering artist's new ways to create, explore, and express their creativity. As digital tools increasingly intersect with analogue methods, printmaking and painting are undergoing a transformation that challenges conventional notions of originality, craftsmanship, and authorship. Adopting a non-empirical, theory-driven approach, the study draws on postmodern theory, media theory, and material culture studies to analyze how digital integration reshapes creative processes and visual outcomes. The paper argues that digital tools do not displace traditional techniques in printmaking and painting but rather expand the expressive potential of these art forms through hybrid practices that merge precision with tactility.

Keywords: Digital Integration, Traditional Printmaking, Painting, Computer-Aided Design, Art Theory,

Introduction

Printmaking and painting are distinct, often complementary, visual arts techniques. Painting applies pigment directly to a surface (canvas, paper) for a unique work, while printmaking transfers images from a prepared surface (matrix) to another medium, allowing for multiple, unique, original copies. Main techniques include relief (woodcut, linocut), intaglio (etching, engraving), planography (lithography), and stencil (screen-printing) and all of which emphasize physical engagement with tools and materials. These processes historically and traditionally defined the discipline through their emphasis on craftsmanship, reproducibility, and tactile experience. In short age long practices. Akhogba (2010), printmaking produces multiple original impressions (editions) while in the same vein, Imumorin (2026), painting produces a single and original result that is a unique piece. Ojemekele (2025) corroborated with the above scholars position that painting produces single master piece at a given time. However, the emergence of digital technologies, particularly Computer-Aided Design (CAD), has significantly altered the landscape of contemporary graphic, print and painting practices. The boundaries separating painting, digital art, and printmaking have become increasingly permeable, giving way to a converged practice that prioritizes conceptual inquiry over medium specificity. The integration of digital tools into traditional printmaking and painting has generated both opportunities and critical debates from questions surrounding authenticity, originality, and the role of the artist have become central to discussions amongst the art scholars in contemporary art discourse. This paper explores the impact of CAD on traditional printmaking and painting practices, arguing that digital integration represents positive expansion rather than a replacement of established methods. By examining this paradigm shift through theoretical perspectives, the study highlights the evolving nature of printmaking and painting in a technologically driven era.

Figure 1:
Conceptual Model
Digital Integration in Traditional Printmaking and Contemporary Graphic Practice



Developed by Authors (2026)

Traditional printmaking encompasses a range of artistic processes grounded in the transfer of ink from a prepared surface, commonly referred to as a matrix, onto another support such as paper or fabric. This matrix may be carved, incised, etched, or chemically treated, depending on the specific technique employed. Methods such as woodcut and linocut (relief printing), engraving and etching (intaglio), and lithography (planographic printing) each embody distinct technical principles and aesthetic possibilities. What unites these diverse processes is their emphasis on indirect image production, where the artist works through a mediating surface rather than directly on the final support. This mediation introduces elements of anticipation, reversal, and process-based thinking, requiring the artist to conceptualize the final image in advance. Graphic practice, while closely related to printmaking, extends the scope of visual production into the realm of communication and design. It involves the deliberate organization of visual elements such as line, shape, colour, typography, and space, to convey meaning effectively to an audience. In this sense, graphics operates not only within the studio but also within broader cultural and social contexts, including advertising, publishing, and digital media.

Beyond technique, traditional printmaking is deeply tied to ideas of multiplicity and reproducibility. However, these impressions are not identical replicas; subtle variations in inking, pressure, and material conditions ensure that each print retains a degree of uniqueness. This balance between repetition and variation has historically positioned printmaking at the intersection of art and communication, enabling both aesthetic exploration and the dissemination of visual ideas.

Figure 2:
Printmaking (Planography)



Akhogba, Albert Ehi, *Market Closed*, 2009, Printmaking (Planography), Photo by the artist.

Painting is the expression of ideas and emotions, with the creation of certain aesthetic qualities in a two-dimensional visual language. The elements of this language is shapes, lines, colours, tones, and textures that are used in various ways to produce sensations of volume, space, movement, and light on a flat surface. These elements are combined into expressive patterns in order to represent real or supernatural phenomena to interpret a narrative theme or to create wholly abstract visual relationships. An artist's decision to use a particular medium, such as tempera, fresco, acrylic, oil, water colour or other water-based pigments, ink, encaustic, gouache or casein, as well as the choice of a particular form, such as mural, easel, panel, miniature, manuscript illumination, scroll, screen or fan, panorama, or any of a variety of modern forms, is based on the sensuous qualities and the expressive possibilities and limitations of those options. The choices of the medium and the form, as well as the artist's own technique, combine to realize a unique visual image.

Figure 3:
Painting



Imumorin, Monday Omokhoje, *Triumphant Dance*, 2025, Canvas (Acrylic, Tempera, Calcium, Oxides and PVA), Photo by the artist.

Figure 4: Painting



Ojemekale, Ighodalo *Triditional Bride*, 2023, Mixed Media (Acrylic, Oil and Enamel on Recycled Paper), Photo by the artist.

Computer-Aided Design (CAD) represents a significant shift in how visual compositions are conceived and developed. As a digital toolset, CAD enables artists and designers to construct, manipulate, and refine images with a level of precision and flexibility that is difficult to achieve through manual methods alone. Within printmaking, CAD functions as both a conceptual and preparatory medium. Artists can experiment with compositional arrangements, test color variations, simulate textures, and correct errors without permanently altering the work. This capacity for non-destructive editing fundamentally changes the creative process,

encouraging iterative exploration and reducing the risks traditionally associated with printmaking techniques. Furthermore, CAD introduces new forms of visual language rooted in digital aesthetics. Vector-based graphics, pixel-based imagery, and algorithmically generated patterns expand the formal vocabulary available to printmakers. These digital elements can then be translated into physical form through processes such as photo-transfer, digital plate-making, or laser engraving. In this way, CAD does not merely replicate traditional methods but extends them, enabling a dialogue between virtual and material modes of production. Hybrid practice emerges from the intersection of these analogue and digital domains, representing a contemporary approach that resists strict categorization. It involves the integration of traditional printmaking techniques with digital processes within a single workflow. In essence, the conceptual relationship between traditional printmaking, graphic practice, and CAD underscores a continuum of artistic production that evolves in response to technological and cultural changes. While traditional methods emphasize material engagement and process, digital tools introduce flexibility and expanded possibilities, and hybrid practices synthesize these attributes into new forms of creative expression.

Theoretical Framework

This paper is anchored on the following theories: the postmodern theory, media theory, and material culture theory with a view of making graphics, printmaking and painting practices more understandable.

i. Postmodern Theory

This theory offers a critical lens for understanding how contemporary art practices challenge traditional ideas of originality, authorship, and authenticity. According to Kadhim and Nagla Taha (2022), influential thinkers such as Jean Baudrillard and Jean-François Lyotard argue that in postmodern culture, the distinction between the “original” and the “copy” has become increasingly unstable. Baudrillard’s concept of simulation suggests that representations no longer merely reflect reality but can replace or even precede it, creating what he calls “hyper-reality.” In such a condition, reproductions, whether digital or mechanical, are not secondary to an original but exist as independent realities. Lyotard, on the other hand, critiques the collapse of “grand narratives,” including long-standing beliefs about artistic genius and originality. He proposes that knowledge and meaning are now fragmented, plural, and context-dependent (Walton, 2009). Applied to visual arts domain, this implies that the value of an artwork no longer rests solely on its uniqueness or singular authorship but on its capacity to engage multiple interpretations and contexts. Within this theoretical framework, the integration of Computer-Aided Design (CAD) in printmaking and painting exemplifies postmodern artistic practices. CAD technologies enable artists to manipulate, replicate, and reconfigure images with precision and ease, blurring the boundary between handmade and machine-generated works. Digital files can be reproduced endlessly without degradation, challenging the traditional printmaking and painting emphasis on limited editions, master piece and the “aura” of the original artworks.

Furthermore, CAD fosters hybridity by combining various media, styles, and cultural references within a single composition. Artists can appropriate existing images, remix visual elements, and create layered meanings that reflect the postmodern condition of plurality. In line with Adamson and Pavitt (2011), this process aligns with postmodern strategies such as pastiche, parody, and bricolage, where meaning is constructed through recombination rather than invention from scratch. In the context of contemporary printmaking and painting, CAD does not merely function as a technical tool but as a conceptual medium that embodies postmodern ideals (Xinjiang & Jin, 2025). It reinforces the shift from originality as singular creation to originality as reinterpretation and recombination. As a result, artworks become dynamic, reproducible, and open-ended, reflecting a broader cultural movement toward multiplicity, fluid identity, and the decentralization of artistic authority.

Media Theory

Media theory provides a critical framework for understanding how artistic tools and technologies do not merely serve as neutral channels for expression but actively shape the meaning, reception, and cultural significance of artworks. Kumar (2014) explains that a central figure in this discourse is Marshall McLuhan, whose famous assertion that “the medium is the message” emphasizes that the form of a medium embeds itself in the content it transmits. In other words, the properties of a medium, its structure, speed, interactivity, and sensory qualities, profoundly influence how meaning is constructed and understood. In the context of printmaking and painting, traditional media such as woodcuts, etching, and lithography and canvas, fabrics, oil paint, acrylics etc respectively carry with them specific material and tactile qualities. Langin-Hooper (2023) notes that these include the physical resistance of surfaces, the manual labor involved in carving or engraving, and the subtle variations that arise in each printed impression. Such characteristics contribute to the aesthetic value and interpretive depth of the artwork, often emphasizing craftsmanship, materiality, and the artist’s direct engagement with the medium. However, the introduction of digital tools, particularly Computer-Aided Design (CAD) and other software, transforms this relationship between medium and meaning. Millett (2013) explains that as a result, the “message” conveyed by digitally mediated printmaking and painting often reflects qualities such as efficiency, multiplicity, and technological sophistication.

Moreover, digital tools shift the creative process itself. Instead of a linear progression from sketch to plate to print or paint, artists may engage in iterative, non-linear workflows involving layering, editing, and simulation. This

changes not only how artworks are produced but also how they are conceptualized (Grba, 2022). The screen becomes an interactive space where ideas are tested and transformed before physical realization, thereby blurring the boundary between process and product. From the viewer's perspective, the presence of digital mediation also affects interpretation. Pesce and Franze (2025) enlighten that audiences may perceive digitally produced prints as less tied to physical labor and more aligned with contemporary visual culture, where images circulate rapidly across digital platforms. According to Kumar (2014), this can alter expectations regarding authenticity, originality, and artistic intention. The work may be understood not just as an isolated object but as part of a broader network of digital images and technological processes. Media theory can therefore be considered to position technology not as a passive instrument but as an active agent in artistic creation. In contemporary printmaking and painting, digital tools co-author the artwork by shaping its form, aesthetics, value, styles and meaning. This underscores a key insight of media theory that changes in medium inevitably lead to changes in artistic practice, perception, and cultural value.

iii. Material Culture Theory

Material Culture Theory emphasizes the central role that physical objects and materials play in shaping human experience, social relations, and cultural meaning. Lunn-Rockliffe, Derbyshire and Hicks (2019) explicate that rather than viewing materials as passive or secondary to ideas, this perspective argues that objects actively participate in the construction of meaning and identity. A key contributor to this field is Daniel Miller, who contends that material things are deeply embedded in everyday life and human understanding is often mediated through tangible engagement with objects (Thompson, 2025). From this standpoint, materials are not neutral carriers of artistic expression; they possess agency in influencing how artworks are produced, perceived, and valued. The textures, weight, durability, and sensory qualities of materials such as paper, ink, metal plates, or woodblocks all contribute to the experiential and interpretive dimensions of art. In printmaking, for instance, the grain of wood in a woodcut, the etched lines on a metal plate, or the absorbency of paper are not incidental, they shape the visual outcome and the emotional resonance of the work (Singhal Labs, 2025).

Material engagement is also a form of knowledge production. The artist's interaction with tools and substances, mixing inks and oil paint, preparing surfaces, applying pressure constitutes a tactile and embodied process through which skills are developed and meaning is generated. Nimkulrat and Groth (2025) align this with Miller's view that understanding emerges through practice and physical interaction, not solely through abstract thinking. In this sense, the source explains that printmaking is as much about doing as it is about representing. With the integration of digital technologies such as Computer-Aided Design (CAD), Material Culture Theory becomes particularly relevant in highlighting what might otherwise be overlooked. While digital processes enable precision, speed, and reproducibility, they often lack the immediate tactile engagement that defines traditional printmaking and painting. However, rather than replacing materiality, digital tools tend to reconfigure it. The final printed output still depends on physical substrates, ink, paper, and printing surfaces, thereby maintaining a crucial connection to material experience (Glogar, Petrak, & Nagli, 2025).

This hybrid practice creates a dynamic interplay between the virtual and the physical. For example, a digitally designed image may be transferred onto a plate and printed using traditional techniques, resulting in a work that embodies both computational precision and tactile richness. The slight variations in ink distribution, pressure, and paper texture reintroduce elements of unpredictability and uniqueness, even within digitally generated compositions. Furthermore, Material Culture Theory draws attention to the cultural and symbolic meanings embedded in materials. Choices of paper quality, ink type, or printing method can signal artistic intention, cultural identity, or historical reference (Millett, 2013). In many African printmaking and painting traditions, for instance, locally sourced materials may carry cultural significance that extends beyond their functional use, reinforcing a sense of place, historical ethos and cultural heritage.

In contemporary printmaking and painting, therefore, Material Culture Theory underscores the continued relevance of materiality in an increasingly digital age. It reminds us that even as technology transforms artistic processes, the physical presence of materials remains vital to how artworks are experienced, interpreted, and valued (Nimkulrat and Groth, 2025). The fusion of digital and traditional elements does not diminish material significance; rather, it expands the possibilities for meaning-making through a richer, more layered engagement with both tangible and virtual forms.

Digital Integration in Printmaking and Painting Practices

The integration of CAD into printmaking and painting has fundamentally transformed the world of design process. Digital tools allow artists to experiment with multiple compositions, adjust elements with precision, and visualize outcomes before engaging in physical production (Anesu, et al., 2025). This reduces the limitations associated with irreversible manual techniques and encourages greater complexity in design. In the advent of CAD and technology, printmakers and painters have advanced tremendously in the area of methodology and techniques. Processes such as laser engraving, digital screen preparation, and photo-polymer plate production exemplify how digital tools enhance technical possibilities (Pesce & Franze, 2025). These developments have introduced new

forms of efficiency and accuracy, while simultaneously challenging traditional definitions of skill and craftsmanship.

The question of originality becomes increasingly complex in digitally integrated practices. Digital files can be easily reproduced, modified, and distributed, raising concerns about authorship and authenticity. From a postmodern perspective, however, this reproducibility is not necessarily a limitation but rather a reflection of contemporary artistic realities. Artists often embrace appropriation and iteration, viewing creativity as a process of transformation rather than invention. Despite these technological shifts, the material qualities of printmaking and painting remain essential. The physical interaction with printing and painting surfaces, the tactile nature of ink, and the variations produced through manual processes continue to define the uniqueness of each print (Nimkulrat & Groth, 2025). Hybrid practices often seek to balance digital precision with these tactile qualities, resulting in works that embody both innovation and tradition in the 21st century.

Implications for Contemporary Graphic Practice

Contemporary painting is now exploring beyond the formal application of traditional pigments on traditional grounds that are no longer confined but has evolved into an expansive practice that incorporates diverse materials, digital processes, and spatial formats. According to Hudson (2024), the medium has gained renewed relevance by engaging with contemporary exploration and conceptual concerns such as identity politics, environmental issues, and technological mediation, while still maintaining its tactile and temporal qualities. This development aligns with Krauss's (1999) concept of the post-medium condition, in which artistic practice is no longer governed by the rules of a single medium. Instead, painting functions as a conceptual framework that can absorb photographic, digital, and print-based strategies while preserving the evidence of human gesture and material engagement. Although digital art, introduces a different set of material conditions. Rather than relying on physical pigment and substrate, it operates through code, pixels, and screen-based interfaces. However, this does not render it immaterial. Miller and Horst (2023) emphasize that digital environments possess their own form of materiality, as users experience them through physical devices and sensory perception. Printmaking as a mediating practice occupies a unique position between painting and mechanical reproduction. It involves transferring an image from a prepared matrix onto a surface, which allows for multiple impressions while still retaining material texture and process-based traces. Baxter (2023) highlights that technique such as photopolymer etching produce tangible three-dimensional surfaces, distinguishing them from the uniform structure of digital imagery. In current practice, printmaking often converges with painting through mixed-media experimentation. Some artists incorporate printmaking methods directly into painted surfaces, while others use painting to alter or complete printed images. This fusion challenges the traditional hierarchy that positions painting as a unique object and printmaking as a reproductive process. Ingold (2007) suggests that such material combinations reveal how meaning emerges from the interaction between maker, tool, and substance. Toward a converged visual practice the merging of painting, digital art, and printmaking reflects a broader shift in contemporary art toward hybrid and post conceptual modes of making. Osborne (2026) contends that all current art operates within a post conceptual framework, where the choice of medium is secondary to the critical ideas being explored. Within this context, a single work may combine digital imaging, printed layers, and hand-painted elements to question authorship, authenticity, and the role of technology in creative production. This convergence also responds to Lida's (2024) observation that contemporary art tends to subvert established conventions and re-examine the relationship between representation and reality. The integration of different processes becomes a method for investigating how images circulate, mutate, and gain significance across various platforms and contexts.

The integration of digital technologies into printmaking and painting has broadened the scope of contemporary graphics practices. Artists are increasingly engaging in interdisciplinary approaches that combine elements of fine arts, applied arts, and digital media. This has led to the emergence of new visual languages that reflect the complexities of contemporary visual culture. At the same time, digital integration has made printmaking and painting more accessible by lowering barriers to experimentation and production (Langin-Hooper, 2023). Artists can develop and refine ideas digitally before committing to physical processes, thereby reducing material waste and cost. However, this accessibility also raises concerns about the potential erosion of traditional skills and the standardization of visual aesthetics.

Pedagogical Implications

The evolving relationship between digital and traditional methods necessitates a rethinking of educational approaches in printmaking and painting as well. Shiri and Baigutov (2025), elucidate that Art education must strike a balance between preserving foundational manual techniques and incorporating digital competencies. Students should be equipped with the skills to navigate both domains and to critically assess the implications of their chosen methods. Pedagogy should also address conceptual issues such as authorship, originality, and ethical practice in the digital age. Langin-Hooper (2023), concludes and posited that by encouraging experimentation and critical reflection, educators can foster a more holistic understanding of printmaking and painting that prepare students for contemporary artistic practices.

Conclusion

Conclusively, the integration of Computer-Aided Design (CAD) into traditional printmaking and painting represents a significant development in contemporary graphic practice. Rather than displacing analogue methods, digital tools expand the possibilities of artistic expression and facilitate the emergence of hybrid forms. Painting continuously offers a direct, material encounter with the surface, while digital methods expand possibilities for reproduction and the spatial manipulation of materials. Printmaking and painting serve as connective media that mediate between the singular and the multiple, the manual and the mechanical. Together, these practices illustrate how contemporary artists negotiate the relationship between hand, machine, and material in an era shaped by digital culture. The result is a dynamic field in which meaning is constructed through the interplay of process, technology, and cultural context. Through the lenses of postmodern theory, media theory, and material culture studies, this paper has demonstrated that digital integration reshapes both the processes and meanings of printmaking and painting. As technology continues to evolve, the discipline remains dynamic, adapting to new conditions while retaining its material and cultural foundations.

Recommendations

- i. Art institutions should adopt a balanced curriculum that combines traditional printmaking and painting techniques with digital tools such as CAD. This will enable students to develop both tactile skills and digital competencies, preparing them for contemporary artistic practices.
- ii. Art educators or whoever is in position of teaching and learning should encourage students to engage with theoretical frameworks such as postmodern theory, media theory, and material culture theory as parts of their creative processes. This will go a long way to reshape their understanding of how concepts such as originality, medium, styles and materiality will influence artistic meaning, fostering more reflective and conceptually grounded artworks.
- iii. Institutions should provide access to up-to-date digital tools, such as design software and digital printers, while maintaining well-equipped traditional printmaking and painting studios. These dual engagements will support the evolving nature of printmaking and painting and ensure that students experiment across both physical and digital domains without boundaries.
- iv. Artists and students should be encouraged to explore interdisciplinary methods that combine printmaking and painting with other media such as photography, textiles, digital illustration, and installation. This will align with contemporary artistic trends and postmodern ideals of multiplicity and hybridity, thereby expanding creative possibilities and enhancing innovation in printmaking and painting practices.

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