

# Designing the Future: The Role of AI in Evolving Interior Design Education

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## Abstract

*This is a conceptual paper with an exploratory survey component to illustrate attitudes in the Tunisian context. The advent of computer-aided design (CAD) revolutionized interior design, transitioning practitioners from manual methods to digital platforms. This technological shift ignited debates about the impact on design quality and authenticity. Now, artificial intelligence (AI) presents a similar paradigm shift, necessitating a critical examination of its role in interior design education. This paper delves into the potential and ethical implications of AI in interior design pedagogy. It explores how AI tools can enhance creativity and problem-solving skills, while addressing concerns about their potential to undermine human agency. The research proposes strategies for integrating AI into curricula, emphasizing its role as a tool to augment, not replace, human creativity. By adopting a proactive approach, interior design education can equip students to navigate the evolving technological landscape, ensuring they can harness AI for innovative and ethical design practices. This will empower them to shape the future of interior spaces that seamlessly blend technological advancement with human insight.*

**Keywords:** Artificial Intelligence, Interior Design Education, Digital Tools, Design Pedagogy, Ethical Implications.

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## Introduction

Interior design has undergone a continuous evolution, with teaching methods and design principles adapting alongside technological progress. From the era of drafting boards and protractors to the current reliance on computer-aided design tools (De los Reyes, 2006), each technological leap has significantly impacted both interior designers and their instructors. Presently, we stand on the cusp of yet another transformative shift the integration of artificial intelligence (AI) into the realm of interior design (Fleischmann, 2024). This development prompts critical inquiries and debates, necessitating a comprehensive exploration of its potential implications, particularly on the education of aspiring interior architects. As AI tools gain prevalence, it becomes imperative to scrutinize how they can improve design processes, influence creative expression, and mold the future of interior spaces, all while ensuring that educational methodologies evolve to adequately equip students for this new landscape. This study specifically focuses on the Tunisian higher education context as a case example, analyzing how AI integration can be implemented effectively given local infrastructural, cultural, and pedagogical conditions an aspect currently lacking in the international literature on interior design education.

The assimilation of AI across various sectors has sparked both enthusiasm and skepticism (Estep, 2024). In various fields, AI enhances processes and supports advancements, while different industries adopt innovative technologies to improve their operations (Dwivedi et al., 2021). In the domain of interior design, AI introduces new avenues for crafting adaptive environments, optimizing spatial utilization, and tailoring design solutions to individual preferences (Chauncey & McKenna, 2024). Nonetheless, this technological advancement comes with its share of challenges. Ethical and philosophical dilemmas loom large, especially concerning the potential for job displacement due to automation and the evolving concept of creativity in an era dominated by machine learning (Przegalinska & Triantoro, 2024). These considerations become particularly acute within interior design education, where the integration of AI tools demands a

reevaluation of curricula and teaching methodologies to ensure that future designers can adeptly blend technological capabilities with the core tenets of creativity, ethics, and user-centric design (Nouri, 2025a).

This research delves into the transformation of interior design education in light of technological progress, with a specific emphasis on the impact of AI. The goal is to evaluate how AI has reconfigured the landscape of interior design, shedding light on its innovative contributions as well as the obstacles it presents. Given the potential of these emerging digital tools, it is crucial to grasp their transformative power in shaping functional and aesthetically pleasing spaces. As the interior design profession navigates the integration of AI, there is an urgent need to confront the implications and reservations this technology raises for the future of design practice, encompassing its effects on creativity, collaboration, and the role of the designer.

Lastly, we propose the integration of courses in social sciences and computer science into interior design curricula to ensure that designers remain actively engaged in the creative process. The contribution of this paper is primarily conceptual proposing a curriculum framework for AI integration in interior design education while the survey presented in Section 2 serves as exploratory and illustrative, not as a confirmatory empirical study. This interdisciplinary approach will furnish interior designers with the requisite skills to address challenges that AI may not fully comprehend. By harnessing the capabilities of AI, interior designers can assume a proactive stance, enabling them to innovate and shape spaces more effectively rather than merely reacting to technological shifts. This amalgamation of knowledge will enhance their capacity to create environments that are not only functional but also deeply resonate with human experiences and needs.

## **1. Main text Interior Design Tech Evolution**

### *1.1. A Historical Perspective: The Evolution of Interior Design and Technology*

The interplay between interior design and technology has been a complex and often contentious relationship. Throughout history, the field has demonstrated a tendency to resist rapid technological change, preferring to cling to traditional methods and aesthetics (Schummer et al., 2009). The Gothic era, for instance, showcased remarkable craftsmanship and architectural innovation (Cleaver & Lepine, 2012). Yet, even during this period of significant artistic and technological advancement, interior designers often adhered to established conventions. The Industrial Revolution, a period of profound societal and economic transformation, also had a limited impact on interior design practices (Nouri, 2023). While new materials and manufacturing processes emerged, many designers opted to use these innovations to replicate historical styles rather than exploring new design possibilities (Walter, 2022). The twentieth century witnessed a growing awareness of the gap between the rapid pace of technological progress and the conservative nature of interior design. Influential figures like Le Corbusier criticized the field's reluctance to embrace modernity. Despite these calls for innovation, the emphasis on individual expression and artistic freedom often clashed with the demands of technological advancement (Simic, 2006). The digital revolution of the 1990s marked a turning point. The introduction of computer-aided design (CAD) software offered interior designers' new tools to visualize and create space. While some designers initially resisted this technological shift, fearing that it would diminish the creative process, CAD ultimately proved to be a powerful tool for innovation and efficiency (Yetton et al., 1994). The advent of Building Information Modeling (BIM) further transformed the industry. BIM's ability to integrate various design disciplines and facilitate collaboration between stakeholders has significantly streamlined the design and construction process (Rinchen et al., 2024). However, concerns about the potential dehumanizing effects of BIM have persisted. Some designers have expressed fears that BIM could lead to a loss of individuality and creativity (Oesterreich & Teuteberg, 2019). Despite these initial concerns, both CAD and BIM have become indispensable tools for contemporary interior designers (Hu, 2021). These technologies have empowered designers to experiment with complex forms, materials, and spatial configurations. By automating routine tasks and improving communication, CAD and BIM have freed up designers to focus on higher-level creative thinking (Saad et al., 2024). The future of interior design lies in a harmonious blend of tradition and technology (Nouri, 2025b). By embracing digital tools while maintaining a strong connection to human values and aesthetics, designers can create spaces that are both functional and inspiring.

### *1.2. The Convergence of AI and Interior Design: A New Era of Creativity*

For conceptual clarity throughout this paper, we distinguish three categories of digital tools. First, traditional digital tools (e.g., CAD, BIM) are rule-based, non-learning software that executes explicit user commands without autonomous adaptation. Second, AI-assisted tools include optimization algorithms, intelligent plugins, predictive analytics, and recommendation systems that learn from data patterns but do not generate novel content autonomously. Third, generative AI systems, such as text-to-image (e.g., Midjourney, DALL-E, Stable Diffusion), text-to-text (e.g., ChatGPT, Claude),

and text-to-3D, produce new designs, text, or images based on probabilistic models trained on large datasets. Our curriculum proposals refer primarily to AI-assisted tools and generative AI, while acknowledging that traditional digital tools remain foundational for technical drafting and building information modelling.

The intersection of interior design and technology has the potential to revolutionize the way we conceive and experience spaces. As artificial intelligence (AI) continues to advance, its impact on interior design is becoming increasingly evident (Samuel et al., 2022). A recent experiment conducted by DamiLee (DamiLee, 2023) provides a glimpse into the future of AI-driven design. In this challenge, human architects competed against AI to design a 280 square meter house on a challenging sloped terrain. The AI-generated designs not only captivated the judges but also demonstrated remarkable speed and efficiency. This experiment highlights the potential of AI to accelerate the design process and generate innovative solutions. Furthermore, AI can enhance the creative process by providing designers with new tools and techniques. For example, AI-powered design software can generate a wide range of design options based on specific parameters, allowing designers to explore different possibilities and identify optimal solutions (Saad et al., 2024). Additionally, AI can analyze vast amounts of data to identify trends and preferences, enabling designers to create personalized and user-centric spaces. While AI offers significant advantages, it is important to recognize that it is not a replacement for human creativity. AI can augment human capabilities, but it cannot fully replicate the nuanced understanding of human behavior and emotions that is essential to great design (Jarrahi, 2018). A collaborative approach, where AI and human designers work together, is likely to yield the most innovative and impactful results. As AI continues to evolve, it is crucial for interior designers to embrace this technology and adapt their skills to the changing landscape. By understanding the potential of AI and its limitations, designers can harness its power to create extraordinary spaces that enhance human experience.

### *1.3. AI Revolutionizing the Interior Architecture Process*

The interior architecture and design sector is undergoing a profound transformation driven by the rapid advancements in artificial intelligence (AI). From the initial design phases to implementation, AI is revolutionizing how interior architects conceptualize and execute their projects, enhancing both efficiency and creativity throughout the process (Hanafy, 2023). In the early stages of design, AI tools are changing how designers visualize spaces, enabling the creation of realistic renderings and immersive experiences that help clients better understand proposed concepts. Additionally, AI-driven spatial analysis assists in evaluating site conditions and optimizing interior layouts. Generative design technologies further empower interior architects by allowing them to explore a wide range of design options based on specific constraints and objectives (Lee et al., 2024). Examples of current AI design tools include RoomsGPT for automated room layout generation based on user prompts and SpacelyAI for staging and visualization of interior spaces; these are illustrative examples among many tools marketed today. This capability enhances creativity and ensures that the final designs are both functional and visually appealing, optimizing for factors like spatial efficiency and energy performance. Throughout the construction documentation phase, AI tools streamline the creation of detailed drawings and specifications, while AI-driven estimators accurately predict project costs and ensure compliance with regulations (Rane, 2023). On construction sites, AI-powered robotics and automation increase efficiency and safety, facilitating tasks with precision. In the post-occupancy phase, AI tools monitor building performance, helping owners optimize energy use and maintenance. As AI technology continues to evolve, its influence on interior architecture will expand, presenting both significant opportunities and challenges. By embracing these innovations, interior architects can create more sustainable, efficient, and innovative spaces, fundamentally reshaping the profession's future.

As AI-powered tools become increasingly sophisticated, interior design education must evolve to equip students with the skills and knowledge necessary to navigate this rapidly changing landscape. While technological proficiency is essential, it is equally important to foster a deep understanding of human-centered design principles. By prioritizing the well-being and experiences of occupants, interior designers can create spaces that are not only aesthetically pleasing but also functional, sustainable, and emotionally resonant.

A holistic approach to interior design education should include several key elements. Students must develop technological literacy by becoming proficient in AI-powered tools and software, such as CAD and BIM. A strong focus on human-centered design is essential, as understanding human behavior and needs helps create spaces that resonate with occupants. Designers should also be aware of the ethical implications of AI, including data privacy, algorithmic bias, safety, AI's potential to 'hallucinate' unsafe or non-compliant design solutions, the need for human checks to adhere to building regulations and safety parameters, transparent handling of intellectual property related to original design ideas, and awareness of what data (including client images and descriptions) is being 'fed' into AI tools. Furthermore, sustainability and occupant wellbeing should be core criteria when evaluating AI generated design options. Commitment to sustainability is crucial, emphasizing the design of spaces that minimize environmental impact and promote well-being. Finally, collaboration with disciplines like architecture and psychology fosters innovative design solutions. By nurturing

designers who are both technologically proficient and human-centered, we can enhance quality of life and positively impact the built environment.

## 2. Assessing Tunisia's Readiness for AI-Driven Interior Design Education

Tunisia represents an under researched context where higher education digital transformation is ongoing but uneven across institutions, and where a strong tradition of craft and handmade design rooted in local cultural heritage creates both opportunities and tensions with AI adoption. This makes Tunisia a significant case for studying how to balance technological innovation with preservation of traditional design skills. To gauge the level of acceptance and preparedness for AI integration in interior design education in Tunisia, a survey was conducted among 200 participants, including students, educators, and industry professionals. The methodology adopted for this study is as follows. The research aim was to explore the attitudes of Tunisian interior design students, educators, and industry professionals toward AI integration in interior design education, and to identify perceived barriers, ethical concerns, and readiness for curriculum change. Regarding sampling and participants, a convenience sample of 200 participants was recruited, comprising 120 students enrolled in interior design programmes at three Tunisian universities, 50 educators, and 30 industry professionals. Recruitment was conducted via email invitations and in-person requests during university visits. No demographic data (age, gender, years of experience) was collected in order to preserve participant anonymity and encourage honest responses. The instrument was a 12-item questionnaire developed by the author specifically for this study. The questionnaire included nine 5-point Likert scale items (1=strongly disagree to 5=strongly agree) covering perceived usefulness of AI, ethical concerns, fear of loss of traditional skills, and readiness for curriculum change. Example items include: 'AI tools can improve the efficiency of interior design processes'; 'I am concerned that AI will reduce the need for traditional hand-drawing skills'; and 'My institution should update its curriculum to include AI tools'. Three open-ended questions asked about expected benefits, main risks, and preferred types of AI training. For data collection, the survey was administered online via Google Forms during March–April 2024. Invitations were sent by email to institutional mailing lists and professional association contacts. Participants were informed that the survey was anonymous and voluntary, with no incentives offered, and the average completion time was 12 minutes. Finally, for data analysis, descriptive statistics (percentages and mean scores) were calculated for Likert scale items. Open-ended responses were analysed using thematic grouping to identify recurring themes, reported qualitatively in the text.

The survey aimed to assess attitudes, identify challenges, and explore opportunities related to AI adoption in the Tunisian context (Fig 1).

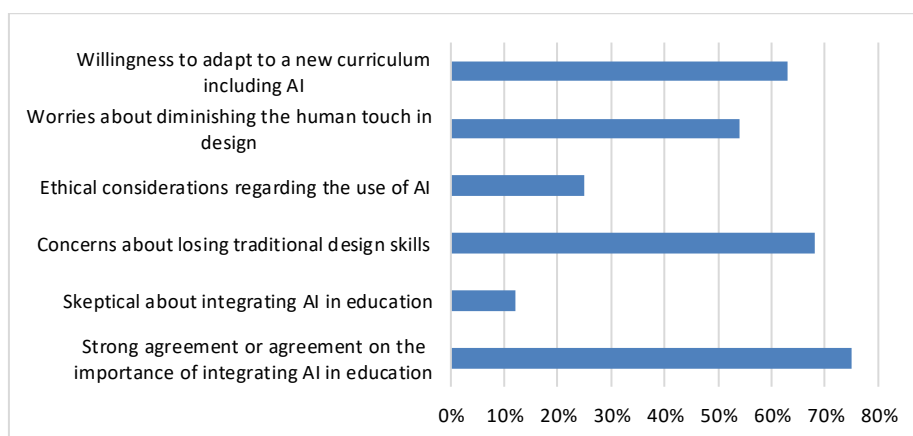


Fig.1 Survey Results on Attitudes Toward AI Integration in Interior Design Education in Tunisia

A significant majority (75%) of respondents expressed strong support for the integration of AI into interior design education. This positive outlook reflects a growing recognition of AI's potential to revolutionize the field. However, concerns were also raised. A considerable number of respondents (68%) expressed fears about the potential loss of traditional design skills and cultural heritage. This 68% concern mirrors the historical resistance to CAD and BIM documented in Section 1.1, suggesting that each major technological shift in interior design triggers similar anxieties about de-skilling and loss of authenticity. Recognizing this pattern can help educators design transition strategies that acknowledge rather than dismiss such fears. Additionally, 25% raised ethical concerns regarding the use of AI in local contexts, highlighting the need for responsible and ethical AI implementation. Despite these concerns, a majority of

respondents (63%) indicated their readiness to embrace a new curriculum that includes AI. This suggests a willingness to adapt to technological advancements and acquire new skills.

To ensure a successful integration of AI into interior design education in Tunisia, it is crucial to strike a balance between technological innovation and cultural heritage. By carefully considering the ethical implications and potential challenges, educators can develop a curriculum that empowers students to harness the power of AI while preserving the unique cultural identity of Tunisian interior design. While there is widespread enthusiasm for the integration of AI into interior design, concerns remain about its long-term impact on the profession. While AI can undoubtedly automate routine tasks and accelerate the design process, it is crucial to consider the potential impact on creativity, human connection, and the overall value of design.

Addressing the five challenges identified in the introduction specifically for the Tunisian context, the following mitigations are proposed. First, regarding ethical and philosophical dilemmas, educators should incorporate short ethics case discussions using local Tunisian design examples, such as privacy concerns in residential projects or bias in AI-generated cultural motifs. Second, to address fears of job displacement, AI should be explicitly taught as a collaborative assistant rather than a replacement, through paired human-AI design exercises in which students must critique and modify AI outputs. Third, to counter the potential loss of creativity, hand-drawing and conceptual studio modules should be retained alongside AI tools; survey data showed that 68% of Tunisian respondents feared skill loss, which supports this balanced approach. Fourth, to re-evaluate curricula, a phased introduction over three academic years is recommended: awareness of AI tools in year one, applied use in design projects in year two, and critical evaluation of AI limitations in year three. Fifth, to ensure future designers can adeptly blend technological capabilities, each AI tool introduction should be paired with a human-centered design project that requires students to reflect in writing on what the AI could not understand, such as cultural symbolism or emotional tone.

The recent survey conducted in Tunisia highlighted a significant gap between industry practices and academic education. While design firms and technology companies are rapidly adopting AI tools, educational institutions often lag behind in updating their curricula. This disconnect can leave students unprepared for the challenges and opportunities of the modern design landscape. To bridge this gap, interior design education must evolve to incorporate AI into the curriculum. By integrating AI tools into coursework, students can develop the skills necessary to effectively utilize these technologies and harness their potential for innovation. However, it is essential to maintain a balance between technological advancements and human-centered design principles. AI should be viewed as a tool to augment human creativity, rather than replace it.

Furthermore, educators must emphasize the importance of critical thinking, problem-solving, and ethical considerations in the design process. As AI becomes more sophisticated, it is crucial to ensure that designers are equipped to make informed decisions about the ethical implications of their work. By addressing these challenges and embracing the opportunities presented by AI, interior design education can prepare the next generation of designers to thrive in a rapidly changing world.

### **3. The Evolving Role of AI in Interior Design Education**

The traditional interior design studio, a cornerstone of design education, has long relied on established pedagogical methods (Salama, 2016). Students have historically engaged in design projects rooted in historical styles and movements, working closely with instructors to develop their skills. However, as technology continues to advance, the integration of AI-assisted design tools is becoming increasingly essential. By incorporating AI into the interior design curriculum, educators can empower students with innovative tools to enhance their design process. AI-powered tools can generate a wide range of design concepts, analyze spatial relationships, and optimize material usage. These tools can accelerate the design process, allowing students to explore more creative possibilities and refine their ideas. Furthermore, AI can play a crucial role in the visualization and presentation of design concepts. By automating tasks such as rendering and 3D modeling, students can allocate more time to the conceptual and creative aspects of their work. This shift can lead to more sophisticated and impactful designs. Interior design is inherently a human-centered discipline, and the emotional and experiential qualities of a space are paramount. AI can assist in the technical aspects of design, but it is the human designer who brings empathy, intuition, and cultural understanding to the process. By embracing AI and integrating it into the interior design curriculum, educators can prepare students for the challenges and opportunities of the future. As supported by educational research (Salama, 2016), interdisciplinary collaboration with social sciences, computer science, and psychology helps interior design students critically evaluate AI outputs rather than accepting them uncritically a key skill when AI tools produce plausible but culturally or contextually inappropriate suggestions. This will ensure that the next generation of designers is equipped to create innovative, sustainable, and human-centered spaces.

Incorporating specific AI-based courses into the interior design curriculum can greatly enhance students' education. Integrating AI into humanities-focused interior design courses can greatly enhance learning by providing tools for analysis, creativity, and informed decision-making. In Politics and Design, AI can analyze political trends and their

influence on design through text and image analysis, while generative AI can help students create speculative designs based on political ideologies. In Sociology and Design, AI can process cultural and social data to identify patterns that shape design preferences and simulate how people interact with spaces, aiding in the creation of inclusive environments. For Philosophy and Design, AI can facilitate debates on aesthetics and ethics, generate designs inspired by philosophical movements, and evaluate the societal impact of design decisions. In Economics and Design, AI tools like cost-estimation software and market trend analysis can help students balance creativity with financial and sustainability considerations. AI-powered design tools, virtual reality simulations, and feedback systems can be integrated across all courses to enhance creativity, inclusivity, and functionality. By incorporating AI, students gain a deeper understanding of the cultural, political, and economic influences on design, preparing them to create spaces that are innovative, inclusive, and impactful.

Incorporating programming courses into interior design curricula can empower students to become active creators rather than passive consumers of technology. By learning to code, students can customize existing design tools to fit specific needs, increasing efficiency and productivity. They can also develop innovative tools and scripts to automate repetitive tasks, streamline workflows, and explore new design possibilities. Additionally, programming skills enable students to collaborate effectively by understanding the technical aspects of digital collaboration, fostering seamless communication with other professionals. Programming also enhances creative problem-solving, encouraging a systematic and critical approach to addressing design challenges. A strong foundation in programming deepens students' understanding of the relationship between design and technology. By learning to code, students gain insights into the algorithms and data structures that underpin digital design tools, enabling them to make more informed decisions about the technology they use and how they apply it in their work. Ultimately, integrating programming into interior design education is essential for preparing students for the future of the profession. By equipping designers with the skills to create, adapt, and innovate, the field of interior design can continue to evolve and thrive in the digital age.

In summary, integrating AI and programming into the interior design curriculum equips students with the tools and skills necessary to thrive in a rapidly evolving industry. AI enhances creativity, efficiency, and decision-making by providing innovative tools for analysis, visualization, and automation, while programming empowers students to customize and develop technology to meet specific design challenges. Together, these technologies prepare future designers to create meaningful, sustainable, and human-centered spaces that balance technical proficiency with creativity and empathy. By embracing technological advancements, interior design education can ensure students are ready to shape the future of the profession.

## **Conclusion**

This research explores the transformative potential of artificial intelligence (AI) within the realm of interior design. Through a comprehensive examination of historical trends, current AI applications, and future possibilities, we have identified a compelling need for a new paradigm in interior design education. Our proposed curriculum framework seeks to equip future designers with the knowledge and skills necessary to harness the power of AI while upholding ethical considerations. By integrating AI into the design process, we aim to foster innovation, enhance efficiency, and elevate the overall quality of interior design projects. However, the successful integration of AI requires a delicate balance between technological advancement and human creativity. It is crucial to ensure that AI tools are used as aids to human ingenuity, rather than as replacements for it. By fostering a deep understanding of both technological and humanistic aspects of design, we can cultivate a new generation of designers capable of addressing complex challenges and shaping the future of the built environment. As AI continues to evolve, it is imperative that interior design education remains adaptable and responsive to these changes. By fostering a culture of innovation, critical thinking, and ethical practice, we can ensure that the next generation of interior designers is well-prepared to thrive in an increasingly AI-driven world. Concretely, we propose that Tunisian interior design programs introduce a modular AI literacy component integrated into existing studio courses, rather than creating a separate standalone AI course, in order to balance innovation with limited resources and preserve hands-on design training.

Integrating AI into interior design education transcends mere technological adoption; it entails a nuanced interweaving of pedagogical strategies, ethical considerations, and ensuring accessibility for all. A strategic and deliberate approach to this integration is pivotal. Collaboration among educational bodies, industry stakeholders, and regulatory entities is indispensable in fostering an educational ecosystem that embraces the potential AI offers while upholding the ethical and creative standards integral to the interior design profession.

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