frontiers in Education

TYPE Original Research
PUBLISHED 29 May 2026
DOI 10.3389/feduc.2026.1837890

OPEN ACCESS

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RECEIVED 24 March 2026
REVISED 25 April 2026
ACCEPTED 30 April 2026
PUBLISHED 29 May 2026

CITATION
Farran Hk, Hijjawi T, Jabali O, Ayyoub A and Khlaif ZN (2026) Artificial intelligence in interior design education: technology acceptance and creative agency in a resource-constrained context. Front. Educ. 11:1837890. doi: 10.3389/feduc.2026.1837890

Artificial intelligence in interior design education: technology acceptance and creative agency in a resource-constrained context

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Introduction: Artificial intelligence (AI) is increasingly embedded in art and design education, yet little is known about how students in resource-constrained contexts experience AI as part of interior design studio practice. Drawing on technology acceptance theory (TAM/UTAUT) and a philosophical view of design as hybrid cognition, the study conceptualizes perceived benefits and challenges as key drivers of students' expectations about AI in studio learning.
Methods: A survey instrument was developed to measure benefits, challenges and future prospects, and its psychometric quality was confirmed (KMO = 0.91; three-factor structure supported by EFA/CFA with good fit indices). The study investigated 246 interior design students at An-Najah National University, Palestine.
Results: Descriptive analyses showed that students reported positive perceptions of AI's benefits (M = 3.70) and future prospects (M = 3.53), alongside moderate-low concern about challenges (M = 2.55). Hierarchical regression indicated that perceived benefits strongly predict future prospects ($\beta = 0.72$), while challenges have a smaller negative effect ($\beta = -0.13$; Adjusted $R^2 = .52$).
Discussion: These findings suggest that anticipated creative enhancement and professional competitiveness, rather than ease-of-use alone, underpin AI acceptance in interior design education. The article discusses implications for studio pedagogy, arguing for curricular strategies that foreground creative agency, critical reflection and ethical awareness when integrating AI into art and design education, particularly in settings marked by economic and infrastructural constraints.

KEYWORDS
artificial intelligence, interior design education, design epistemology, hybrid cognition, technology acceptance (TAM/UTAUT), creative agency, ethics of AI

1 Introduction

Artificial intelligence (AI) is beginning to transform interior design education by reshaping how students ideate, visualise and communicate spatial proposals in studio-based learning. Building on earlier work that highlights AI's potential for space planning, visualisation and client engagement (Li et al., 2022; Yang et al., 2023), recent studies in art and design education point to its role in supporting more interactive, student-centred pedagogies and richer simulation of real-world design scenarios

(Gong, 2023). These developments are especially significant in developing and resource-constrained contexts, where access to advanced technologies and international design networks is uneven (Alrifai et al., 2023; Trias, 2023). In such settings, AI may not only enhance the technical quality of studio outputs, but also contribute to more sustainable and enriching learning environments for design students (Alshammari, 2025).

The integration of artificial intelligence into design education has accelerated markedly since the public release of generative tools such as DALL·E, Midjourney, and Stable Diffusion. Recent scholarship documents AI's expanding footprint across design curricula, with applications ranging from conceptual ideation to technical visualization and critique (Chiou et al. 2023; Yang and Chou, 2025). Studies have also examined comparative pedagogical approaches to integrating AI tools into design learning environments (Sopher and Varinlioglu, 2025). Notably, a recent investigation of Palestinian arts and design students—conducted at the same institution as the present research—found that perceived benefits strongly predict generative AI adoption ($\beta = 0.66$), while infrastructural and ethical concerns moderate uptake (Farran et al., 2025). Despite this emerging body of work, the literature remains concentrated in well-resourced institutional settings, with limited empirical attention to interior design education in the Palestinian context. The present study addresses this gap by offering a theoretically grounded, psychometrically validated investigation of AI perceptions among interior design students at An-Najah National University—extending recent Palestinian scholarship through a specific focus on creative agency and technology acceptance within design education.

AI-powered tools can analyse large datasets of design precedents, stylistic references and spatial constraints to generate personalised design suggestions. These systems draw on machine learning to infer user needs, anticipate design trends and optimise layouts for both functionality and aesthetics (Popkova and Gulzat, 2020). They can also support the creation of realistic 3D visualisations and virtual walkthroughs, enabling clients and tutors to experience proposed designs before implementation (Liu et al., 2022; Micoli et al., 2023). Such technologies streamline design workflows, reduce errors and facilitate communication between students, instructors and external stakeholders, potentially raising the overall quality of studio-based learning.

Beyond studio logistics, AI informs material reasoning, project logistics and adaptive environments; however, in this article these applications are treated as contextual background. The focus is placed instead on the epistemic and pedagogical implications of AI for creativity, authorship and aesthetic judgment in interior design education (Gong, 2023; Yang et al., 2023). As AI systems expand their role in generating form, style and spatial configurations, they invite deeper ontological and epistemological questions about design intelligence itself—questions that move beyond practical efficiency to interrogate how meaning, authorship and creativity are co-constructed by human and machine agents.

Historically grounded in human creativity, interior design is undergoing a paradigm shift as AI technologies become embedded within the creative process (Irbite and Strode, 2021; Li et al., 2022). Beyond their technical and pedagogical affordances, AI tools provoke philosophical inquiry into the nature of originality and aesthetic reasoning. The interaction between human intentionality and machine cognition challenges traditional conceptions of authorship and raises questions about how knowledge and artistic judgment are constructed in an age of algorithmic assistance (Cattabriga and Joler, 2023; Floridi, 2019; Verbeek, 2011). Within interior design education, this dialogue between human and artificial intelligence reshapes design thinking—moving it from a purely manual or craft-based activity toward a form of hybrid cognition in which human insight and computational reasoning converge.

From a linguistic-philosophical perspective, AI reconfigures design language by translating visual and spatial ideas into computational semiotics that mediate human intention through code. In this sense, AI-assisted design can be understood as a mode of epistemic inquiry that generates new forms of knowing through algorithmic interpretation and creative synthesis. This philosophical lens complements behavioural models of technology adoption, offering a dual perspective that integrates epistemic reflection with empirical modelling.

Grounding this inquiry in technology acceptance theory, the study conceptually aligns perceived benefits with perceived usefulness and perceived challenges with barriers that dampen behavioural intention (TAM; Davis, 1989). It also draws on UTAUT/UTAUT2 (Venkatesh et al., 2003, 2012), where performance expectancy maps onto benefits, and effort expectancy and inhibiting conditions resonate with challenges in resource-constrained contexts. These frameworks provide a robust foundation for interpreting how interior design students perceive and adopt AI technologies, particularly in creative and educational settings where subjective norms, epistemic beliefs and contextual limitations play a central role.

Although there is a rapidly growing body of literature on artificial intelligence in higher education, most studies focus on general-purpose learning technologies, large-scale online platforms or text-based generative tools, with limited attention to studio-based art and design education. Empirical research on interior design and architecture education has begun to document the technical affordances of AI for visualisation, optimisation and automation, but has seldom examined how students in resource-constrained contexts negotiate the creative, epistemic and ethical implications of working with AI as part of studio practice. In particular, there is a lack of theoretically grounded, psychometrically robust studies that integrate technology acceptance models with philosophical perspectives on creativity, authorship and hybrid cognition in design learning.

This study makes three distinct contributions to the literature on AI in design education. First, it provides one of the first psychometrically validated investigations of AI perceptions among interior design students in Palestine—a context marked by infrastructural constraints and limited access to global design networks, where empirical research on technology acceptance in creative disciplines remains scarce. Second, it extends TAM/UTAUT frameworks beyond their conventional application in information systems into the epistemologically distinct domain of creative studio education, demonstrating that perceived creative enhancement (benefits) outweighs traditional ease-of-use considerations in shaping students' future outlook ($\beta = 0.72$). Third, it introduces the concept of AI as a "cognitive collaborator" in resource-constrained settings, wherein AI tools function not merely as productivity aids but as epistemic

partners that may partially compensate for structural inequities in access to international precedents, mentorship, and professional exposure. Together, these contributions advance both the theoretical understanding of technology acceptance in creative disciplines and the practical agenda for equitable AI integration in design pedagogy within under-resourced educational contexts.

Demographic variables (gender, year of study, economic status, and place of residence) were collected as contextual covariates. Their inclusion acknowledges that technology acceptance may vary with socioeconomic and educational circumstances—particularly in resource-constrained settings like Palestine, where disparities in infrastructure and device access remain salient (Alrifai et al., 2023). While these variables did not emerge as significant predictors in the final model, their documentation provides essential contextual grounding for the sample.

To this end, the study provides a comprehensive investigation into the impact of artificial intelligence on interior design education at An-Najah National University. It pursues three central objectives: first, to identify the principal benefits and emergent opportunities that AI tools present to interior design students; second, to delineate the significant challenges and barriers that impede the effective adoption and integration of these technologies into their academic practice; and third, to examine how these perceived benefits and challenges jointly shape students' future prospects for AI's sustained integration within the pedagogical framework of interior design education. An-Najah National University is selected as a case because it is a leading Palestinian institution with a well-established Faculty of Fine Arts, operating in a context marked by both a vibrant cultural scene and distinct socioeconomic constraints. This makes it an informative setting for exploring how AI can serve as a transformative tool in a developing, resource-limited educational environment. Ultimately, the dual orientation—empirical and philosophical—aims to advance design pedagogy and deepen our understanding of how artificial intelligence reshapes the epistemology of creativity in interior design studios.

1.1 Theoretical overview of the main concepts

Artificial Intelligence (AI) redefines the epistemological foundations of design by transforming creativity from an individual act into a form of hybrid cognition, where human intentionality interacts with algorithmic reasoning. In this view, AI functions as a cognitive collaborator that extends human thought and reshapes the relationship between knowledge, authorship, and design agency. This aligns with Floridi (2019) notion of conceptual design and Verbeek (2011) theory of technological mediation, both emphasizing how intelligent systems co-construct meaning with their users.

Within design pedagogy, AI serves as a semiotic and cognitive medium, translating visual and spatial ideas into computational syntax. This transformation not only challenges traditional notions of creativity but also introduces new epistemic paradigms in education. Complementing this philosophical lens, behavioral models such as TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003; 2012) provide empirical grounding for understanding students' engagement with AI through perceived benefits and challenges. Together, these perspectives establish a unified conceptual framework for exploring how AI reshapes creativity, pedagogy, and the epistemology of design learning.

2 Methods

2.1 Study tool

A survey was developed to examine the impact of AI on interior design education, focusing on benefits, challenges, and future prospects. The instrument gathered demographic data (gender, year of study, place of residence, economic status, AI familiarity, and access to technology). Economic status was categorized using the local currency, the Shekel [approx. 1 Shekel = 0.27 USD during the study period: low (<1,999/~$540), middle (2,000–3,999/~$540–$1,080), high (4,000–5,999/~$1,080–$1,620), and very high (>6,000/~$1,620)].

The core sections used a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The **benefits** section (12 items) assessed AI's role in enhancing creativity, efficiency, and sustainability. The **challenges** section (10 items) addressed concerns about reduced creativity, deskilling, and ethical issues. The **future prospects** section (9 items) focused on AI's potential to enhance competitiveness and innovation in the local design sector.

2.2 Participants

A total of 246 students from the Interior Design department participated. As shown in Table 1, the sample was predominantly female (85.8%), with a large proportion being first-year students (47.6%). Most participants resided in cities (52.8%) and reported middle-income family status (54.1%). Over half had some familiarity with AI (52.0%) and high access to technology (56.5%).

2.3 Factorial validity and reliability

To control for potential common method variance (CMV) arising from self-reported survey data, Harman's single-factor test was performed. An unrotated principal component analysis indicated that the first factor accounted for 31.4% of the total variance, which is below the commonly accepted threshold of 50% (Podsakoff et al., 2003). This result suggests that CMV was not a major concern in the present study and that participants' responses reflect genuine distinctions among the measured constructs.

Prior to the exploratory factor analysis (EFA), sampling adequacy was verified using the Kaiser–Meyer–Olkin (KMO) test (KMO = 0.91) and Bartlett's Test of Sphericity ($\chi^2 = 2487.63$, $p < .001$), confirming that the data were suitable for factor analysis. A confirmatory factor analysis (CFA) was subsequently conducted using AMOS, which yielded good model fit indices ($\chi^2/df = 1.94$, CFI = .95, TLI = .93, RMSEA = .048), validating the structural integrity of the three-factor model (benefits, challenges, and future prospects).

TABLE 1 Participant demographics ($n = 246$).

Variable	Level	Count	Percentage %
Gender	Male	35	14.2%
	Female	211	85.8%
Year of study	First year	117	47.6%
	Second year	62	25.2%
	Third year	43	17.5%
	Fourth year	24	9.8%
Place of residence	City	130	52.8%
	Village	108	43.9%
	Camp	8	3.3%
Economic Status	Low (<1,999 Shekel/ ~$540)	21	8.5%
	Middle (2,000–3,999 Shekel)	133	54.1%
	High (4,000–5,999 Shekel)	67	27.2%
	Very High (>6,000 Shekel)	25	10.2%
AI Familiarity	Not familiar	79	32.1%
	Somewhat familiar	128	52.0%
	Familiar	36	14.6%
	Very familiar	3	1.2%
Access to Technology	Limited access (e.g., smartphones only)	15	6.1%
	Moderate access (e.g., personal computer)	92	37.4%
	High access (e.g., multiple devices)	139	56.5%

The survey demonstrated strong psychometric properties. As shown in Table 2, all domains exhibited high internal consistency (Cronbach's $\alpha > 0.87$) and satisfactory factor loadings (>0.50). The corrected percentage of variance explained for the Future Prospects factor was 44.72%, consistent with the reported reliability coefficients and factor loadings. This correction replaces a typographical error in earlier drafts, where the variance was mistakenly reported as 5.11%. Overall, the final three-factor structure (benefits, challenges, and future prospects) demonstrates robust factorial and construct validity, supporting the reliability of the measurement model used in subsequent analyses.

2.4 Data analysis

Data were analyzed using IBM SPSS (version 28). Prior to inferential testing, descriptive statistics were computed to examine normality, skewness, and kurtosis, all of which were within acceptable ranges (±1.0).

To assess students' perceptions of the three core constructs—benefits, challenges, and future prospects—one-sample t-tests were conducted against calibrated benchmark values of 4.2 (high agreement), 3.4 (moderate–high agreement), and 2.6 (moderate–low agreement) on the five-point Likert scale. These cut-off points were selected based on previous psychometric research suggesting that values above 4.0 indicate strong endorsement, while those around 3.4 reflect a transitional or moderately positive stance (Kuleto et al., 2021; Li et al., 2022). The lower threshold (2.6) was established as a midpoint between "disagree" (2) and "neutral" (3), capturing subtle variations in low–moderate perception levels. This nuanced calibration allows a more precise interpretation of students' attitudes than the conventional neutral benchmark (3.0).

To mitigate the risk of inflated Type I error from multiple comparisons, Bonferroni correction was applied to the t-tests, adjusting the significance threshold to $p < .017$ (0.05/3). All effect sizes were computed using Cohen's d, and confidence intervals (95%) were reported to strengthen the interpretive validity of the findings.

Hierarchical multiple regression analyses were subsequently performed to predict future prospects from perceived benefits and challenges, as detailed in Section 3.2. Multicollinearity diagnostics confirmed that Variance Inflation Factor (VIF) values were below 2.0, indicating acceptable independence of predictors.

3 Results

3.1 Levels of perceived benefits, challenges, and future prospects

One-sample t-tests were performed to assess the level of each construct (Table 3). The mean score for **perceived benefits** ($M = 3.70$, $SD = 0.63$) was significantly lower than 4.2 [$t(245) = -12.44$, $p < .001$, $d = -0.79$] but significantly higher than 3.4 [$t(245) = 7.51$, $p < .001$, $d = 0.48$], indicating a positive, though not extreme, perception.

The mean for **perceived challenges** ($M = 2.55$, $SD = 0.63$) was significantly lower than both 3.4 [$t(245) = -21.27$, $p < .001$, $d = -1.35$] and 2.6 [$t(245) = -1.32$, $p = .19$, $d = -0.08$], suggesting that challenges are perceived as moderate to low.

The mean for **future prospects** ($M = 3.53$, $SD = 0.66$) was significantly lower than 4.2 [$t(245) = -15.97$, $p < .001$, $d = -1.02$] but significantly higher than 3.4 [$t(245) = 3.09$, $p = .002$, $d = 0.20$], indicating a favorable outlook.

3.2 Predicting future prospects

A hierarchical multiple regression analysis was conducted to predict future prospects from perceived benefits and challenges (Table 4). In the first step, perceived benefits were entered as predictors, followed by perceived challenges in the second step. Demographic variables were tested in a preliminary block but were not retained, as they did not significantly improve model fit. The final model explained 52% of the variance in future prospects [Adjusted $R^2 = .52$, $\Delta R^2 = .01$, $F(2,243) = 133.67$, $p < .001$] (Table 4). Variance Inflation Factor (VIF) values were below 2.0, indicating no multicollinearity concerns.

In the final model, perceived benefits remained a strong positive predictor ($\beta = 0.72$, $p < .001$), while perceived challenges had a small but significant negative effect ($\beta = -0.13$, $p = .01$), confirming the

TABLE 2 Factorial validity and reliability.

Domain & Item	Factor loading	Variance explained	Cronbach's α
Benefits of AI		**49.85%**	**0.92**
a1. Enhances creativity	0.725		
a2. Improves efficiency	0.698		
a3. Predicts design trends	0.680		
a4. Provides better visualization	0.575		
a5. Supports sustainable practices	0.605		
a6. Optimizes materials and reduces waste	0.578		
a7. Offers data for market research	0.663		
a8. Simplifies complex tasks	0.731		
a9. Aids innovative solutions	0.594		
a10. Enhances designer-client collaboration	0.739		
a11. Simulates design scenarios	0.748		
a12. Enables virtual prototypes	0.757		
Challenges of AI		**42.15%**	**0.87**
b1. Reduces human creativity	0.591		
b2. Leads to loss of traditional skills	0.714		
b3. Limits personal touch	0.734		
b4. Hinders original ideas	0.707		
b5. Lacks emotional depth	0.709		
b6. Leads to design homogenization	0.509		
b8. Reduces job opportunities	0.592		
b9. High costs as a barrier	0.542		
b11. Ethical concerns	0.588		
b12. Undervalues human effort	0.552		
Future of AI		**44.72%**	**0.89**
c1. Enhance creativity	0.684		
c2. Improve efficiency and speed	0.703		
c3. Help stay competitive globally	0.619		
c4. Enable trend prediction and adaptation	0.655		
c5. Support sustainable practices	0.652		
c6. Facilitate personalized client experiences	0.685		
c7. Optimize materials and reduce waste	0.645		
c8. Assist in overcoming resource limitations	0.642		
c9. Foster innovation and new solutions	0.677		

Bold values in the Variance explained column indicate the percentage of variance explained by each factor. Bold values in the Cronbach's α column indicate the internal consistency reliability coefficient for each domain.

theoretical structure proposed by the Technology Acceptance Model (TAM; Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003).

4 Discussion

This study provides valuable insights into interior design students' perceptions of AI integration in their education. The findings reveal a strong sense of optimism, with perceived benefits significantly influencing a positive outlook on AI's future.

4.1 Positive perception of benefits and future prospects

The positive perception of AI's benefits (M = 3.70) aligns with global trends where AI is seen as a creative partner and a tool for overcoming resource barriers (Almaz et al., 2024; Li et al., 2022). Students likely view AI as a catalyst for enhancing creativity, efficiency, and access to global design resources, which is particularly valuable in a constrained academic setting. This optimism directly fuels the favorable outlook on AI's future (M = 3.53), a relationship strongly confirmed by the regression

TABLE 3 One-Sample *T*-test results for levels of perceived benefits, challenges, and future prospects.

Domain	M	SD	Comparison	t(245)	*p*	Cohen's d
Benefits	3.70	0.63	Test = 4.20	−12.44	<.001	−0.79
			Test = 3.40	**7.51**	<.001	0.48
Challenges	2.55	0.63	Test = 4.20	**−21.20**	<.001	−1.35
			Test = 3.40	−21.27	<.001	−1.35
			Test = 2.60	−1.32	.19	−0.08
Future Prospects	3.53	0.66	Test = 4.20	−15.97	<.001	−1.02
			Test = 3.40	3.09	.002	0.20

Bold values indicate statistically significant results after Bonferroni correction (adjusted significance threshold: $p < .017$).

TABLE 4 Stepwise hierarchical multiple regression predicting future prospects of AI.

Model	Predictor	R	R^2	ΔR^2	B	β	t	*p*
1	(Constant)	.71	.51	.51	0.77		4.36	<.001
	Benefits				0.75	0.71	15.88	<.001
2	(Constant)	.72	.52	.01	1.20		5.19	<.001
	Benefits				0.72	0.69	15.34	<.001
	Challenges				−0.13	−0.12	−2.83	.01

analysis ($\beta = 0.75$). This finding is consistent with studies in similar developing contexts, where students perceive AI as a key driver for future professional competitiveness.

4.2 Moderate level of perceived challenges

The moderate level of perceived challenges (M = 2.55) is a noteworthy finding. It suggests that students are more focused on the opportunities than the pitfalls. This could be attributed to an adaptive, forward-thinking mindset and the fact that AI is presented in their curriculum as a collaborative tool rather than a replacement (Li et al., 2023). Furthermore, the specific structure of the program may not yet have exposed students to the deeper ethical and professional dilemmas associated with AI, leading to a more optimistic assessment. The high proportion of first-year students (47.6%), who have less professional and technical experience, likely contributes to this lower perception of challenges.

4.3 The influence of demographics

While demographic variables were not significant predictors in the regression model against the powerful constructs of benefits and challenges, their distribution in the sample is important for context. The overwhelmingly female cohort (85.8%) may influence the findings, as some research suggests gender can mediate perceptions of technology, though this requires further study in this specific cultural context. As noted, the high percentage of first-year students likely skews the results toward greater optimism and lower perceived challenges, a factor that must be considered when interpreting the overall positive tone of the findings.

4.4 Relative impact of benefits and challenges

The regression analysis clearly demonstrates that perceived benefits are the overwhelming driver of positive future prospects ($\beta = 0.72$), while perceived challenges have a statistically significant but practically small negative effect ($\beta = -0.13$). This indicates that efforts to promote AI integration should primarily focus on demonstrating and delivering tangible benefits to students. Addressing challenges, such as ethical concerns and the cost of tools (Rashwan and Alhelou, 2022), remains important but may not be the primary factor shaping overall optimism.

4.5 Synthesizing opportunities and limitations

Taken together, these findings suggest that AI integration in interior design education is at a pivotal point. The convergence of high perceived benefits and manageable perceived challenges offers a strategic opportunity to implement AI in a thoughtful and equitable manner. Theoretical models, such as those proposed by Liu et al. (2022), reinforce the need for collaborative design ecosystems that emphasize personalization, sustainability, and efficiency while safeguarding human agency. To fully realize this potential, academic institutions and policymakers must co-develop curricula, ethical standards, and funding mechanisms that support responsible AI use. In this manner, educational institutions in similar contexts can position themselves as regional leaders in innovative, inclusive, and culturally grounded design education.

The findings further contribute to our theoretical understanding of technology acceptance in creative disciplines within constrained environments. The strong predictive power of perceived benefits ($\beta = 0.72$) over challenges ($\beta = -0.13$) extends established technology acceptance models beyond their traditional application in business software to the complex, human-centric domain of creative education. Our findings—that perceived benefits dominate the prediction of future prospects while challenges exert a smaller negative effect—extend TAM/UTAUT to creative education, suggesting that anticipated creative enhancement may be a stronger driver of uptake than traditional ease-of-use considerations in design studios. This perspective highlights the distinct dynamics of AI adoption in creative learning contexts, where the promise of enhanced imagination, innovation, and expressive freedom outweighs concerns about complexity or automation.

Beyond studio workflows, AI also informs material reasoning, project logistics, and adaptive environments; however, in this paper we treat such applications as contextual background and foreground the epistemic and pedagogical implications for creativity, authorship, and aesthetic judgment in interior design education (Gong, 2023; Yang et al., 2023).

5 Theoretical and practical implications

5.1 Theoretical implications

This study contributes to technology acceptance literature in creative education within a developing context. It empirically validates a model where perceived benefits and challenges directly influence the future prospects of an emerging technology, extending theories beyond traditional business software to AI in creative fields. It also highlights the potential for AI to reshape design pedagogy from skill-based imitation to innovation-driven practice.

The novelty of this study lies not in the magnitude of its statistical effects but in the specificity of its context and the integration of its theoretical lenses. To our knowledge, this is the first study to apply a rigorously validated TAM/UTAUT framework to interior design students in a Palestinian university, and one of few globally to conceptualize AI adoption in design education through the dual prisms of behavioral acceptance theory and philosophical epistemology (hybrid cognition). This synthesis opens new avenues for research that moves beyond techno-determinist accounts of AI in creative fields toward more nuanced understandings of how meaning, authorship, and creative agency are negotiated in human–machine design partnerships, particularly in settings where resource constraints make such partnerships not merely innovative but potentially transformative.

5.2 Practical implications

For educators, the findings underscore the urgency of integrating AI tools into the curriculum through new pedagogies that blend technical skills with critical and creative thinking. For university administrators and policymakers, this study supports investing in AI infrastructure, providing targeted faculty training, and developing ethical guidelines to ensure responsible use. Addressing the cost barrier for students is also critical for equitable access.

6 Conclusion

This study confirms that interior design students at An-Najah National University perceive AI as a beneficial force with the strong potential to reshape their education and future careers. While cognizant of challenges, their optimism is primarily driven by the anticipated advantages in creativity, efficiency, and innovation. To harness this potential, a strategic, balanced approach is essential. This involves integrating AI into the curriculum to foster higher-order thinking, investing in infrastructure and training, and developing ethical frameworks. By aligning AI adoption with the principles of sustainability, personalization, and user-centered design, educational institutions in similar contexts can establish leadership in innovative design pedagogy. This approach resonates with recent research advocating for sustainable interior design in classrooms to create an enriching environment that fosters creativity and improves student outcomes (Alshammari, 2025). Ultimately, such a transformation can empower a new generation of designers who are both technologically fluent and deeply grounded in their cultural and creative identities.

7 Limitations, implications, and further directions of study

This study has limitations. Its cross-sectional design and reliance on self-reported data from a single university limit generalizability. The sample's demographic skew (mostly female, many first-years) may influence the results. The initial research question regarding demographics in the regression was not fully met; demographics were collected but did not enter the final stepwise model, suggesting their influence is indirect or overshadowed by core perceptions. The anomalously low variance explained for the "Future Prospects" factor also warrants clarification in future methodological reporting.

A further limitation concerns the breadth of the survey instrument. The items were designed to capture generalized perceptual dimensions—benefits, challenges, and future prospects—rather than stage-specific AI applications within the interior design workflow (e.g., concept ideation, schematic development, rendering, or technical documentation). Consequently, the study does not differentiate between types of AI tools (e.g., text-to-image generators, space-planning algorithms, or parametric assistants) or the specific design phases in which students employ them. This trade-off between breadth and granularity reflects the exploratory aims of the research in a context where structured AI integration into interior design curricula remains emergent. Future studies should develop more refined instruments that map AI usage onto discrete stages of the design process and specific tool

categories, thereby yielding insights more directly actionable for studio pedagogy and curriculum design.

A primary limitation concerns the demographic composition of the sample, notably the high proportion of first-year students (47.6%). Students in their first year of an interior design program typically possess limited exposure to advanced studio pedagogy, professional ethics, and the complex creative and ethical dilemmas that arise when AI tools are integrated into mature design workflows. This relative inexperience may contribute to the notably low perception of AI-related challenges ($M = 2.55$) observed in this study. It is plausible that as students progress through the curriculum and encounter more sophisticated design problems—where questions of authorship, material specificity, and client-centered nuance become paramount—their appraisal of AI's limitations and risks may intensify. The present findings should therefore be interpreted as reflecting early-stage optimism rather than a comprehensive or longitudinally stable assessment of AI's role in interior design education. Future research should employ cohort-balanced or longitudinal designs to examine whether perceptions of AI challenges shift with academic and professional maturation.

Future research should employ longitudinal and mixed-methods approaches, incorporating interviews to explore the "why" behind these perceptions. Expanding the sample to include faculty and professional designers would provide a more comprehensive view. Comparative studies across different institutions and cultures are also needed to identify context-specific factors influencing AI adoption.

Additionally, the use of a single-institution, cross-sectional, self-report design may limit causal inference and generalizability. Future work should triangulate survey data with performance-based studio assessments and instructor evaluations, and deploy longitudinal designs to track changes in perceptions across cohorts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

This study was approved by the Institutional Review Board (IRB) of An-Najah National University (Protocol No.: FA.Oct.2025/121; Approval Date: 21 October 2025). The approved proposal was initially titled "The impact of artificial intelligence tools on the quality of interior design education…". The present manuscript represents a revised and theoretically refined version of the same study, with no changes to the research procedures or participant involvement.

Participation was voluntary, informed consent was obtained from all participants, and all data were collected anonymously.

Author contributions

HF: Supervision, Writing – original draft, Writing – review & editing. TH: Methodology, Writing – review & editing. OJ: Data curation, Writing – original draft. AA: Conceptualization, Formal analysis, Writing – review & editing. ZK: Data curation, Writing – review & editing.

Funding

The author(s) declared that financial support was not received for this work and/or its publication.

Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

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