GenAI Street Experiments: A Critical Framework for Urban Design Teaching and Learning

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Abstract
The recent rise of generative artificial intelligence (GenAI) tools promises to disrupt how cities are planned and designed. Some of these tools aim to empower diverse stakeholders to "reinvent their streets" by visualising how adopting a cycling lifestyle or adding outdoor seating could transform an urban environment. Implemented as part of educational exercises, text-to-image generative AI offers opportunities to help future planners envision different urban scenarios in a studio learning environment. However, biases, injustice and glitches remain a pressing concern, underscoring the need for future planners to critically engage with these technologies. In this paper, we draw on our experience designing and teaching a course focused on fostering critical skills for engaging with GenAI in urban design studio learning. Using a novel framework, we discuss how these tools can be integrated into planning education.

Keywords: Generative AI; Street experiments; Urban design pedagogy; Critical framework; Studio-based learning; AI bias

1 Introduction

Future generations of urban planners and designers will confront intertwined challenges of climate change, social justice and rapid digital transformation. To navigate such complexity and uncertainty, students must master transformative tools and skills (Bertolini, 2020; McCune et al., 2023). A core competence is the ability to catalyse societal transitions. Tassone et al. (2018) highlight three essential abilities for future planners: a) engagement with real-world problems; b) responsiveness in formulating actions; and c) critical thinking that questions preconceived assumptions. Further, pedagogical approaches grounded in regenerative education—learning that remains within the planet's socio-ecological boundaries—can strengthen students' sense of agency (Mang, n.d.). Planning curricula are therefore beginning to embed futuring exercises: active, critical and reflective explorations of alternative futures (Bertolini et al., 2024; Hoffman et al., 2021). These activities respond to the urgency of environmental crises while challenging expert-determined modes of thought. Urban design, urban experimentation and tactical-urbanism modules offer a practical entry point, with several programmes now introducing courses on street re-allocation and street experiments, defined as temporary interventions that subvert car-oriented streetscapes, re-allocate space to prioritise active mobility and public life, to help communities to envisage radically different mobility systems (Bertolini, 2020).

A growing body of educational material is being developed on street experiments. Open-access MOOCs such as Street Experiments for Sustainable and Resilient Cities (Technical University of Munich / EIT Urban Mobility, Coursera) and Reclaiming the Street for Liveable Urban Spaces (University of Amsterdam, Coursera) guide learners through planning, implementing and evaluating street experiments, while Planetizen's Learning Tactical Urbanism video series provides practitioner-led tutorials. At the university level, semester-long studios—for example, California College of the Arts' Active Urbanism: Tactical Interventions and the University of New Mexico's Urban Design Methods elective—immerse students in tactical-urbanism projects. Together, these courses illustrate the range of teaching formats that can be adapted when embedding futuring exercises in planning curricula. However, teaching such interventions demands that students collect, and compile detailed local spatial data, design alternative streetscapes and create visualisations—even though the intent of these projects is limited in duration and spatial extent.

Digital transformation in urban planning and design education is prompting debates on technology's role in education (Mishra et al., 2025). Generative artificial intelligence (GenAI) tools, as text-to-image generators are poised to reshape urban design studio teaching and learning. New platforms enable stakeholders—including students—to "reinvent their streets" and imagine allegedly 'healthier environments' (NL, 2025). They can illustrate, for example, how a cycling lifestyle or outdoor seating might transform a specific street. While GenAI opens fertile ground for experimentation, questions of how students and educators will consider mobility justice and equity and biases remain pressing and demand critical engagement. To date, we know little about the pedagogical opportunities and challenges of GenAI in urban design studio learning and how to improve AI literacy in teaching and learning and critically engage students and educators with the visual material produced in urban planning and design studios.

This paper addresses that gap by evaluating a pilot studio format introduced at the University College Dublin that integrated text-to-image Generative AI into a placemaking and urban design module centred on street experiments. In what follows we retrace media studies scholarship on critical content analysis of AI-generated images and present an analytical framework for interrogating AI-generated streetscapes and their cultural, social and political assumptions. After, we outline the urban design studio structure, tools adopted and implementation and report preliminary learning outcomes and student reflections. We conclude by identifying opportunities and challenges for future studio practice, proposing directions for further research, including longitudinal studies of GenAI-enhanced planning education and the development of open-source teaching resources.

2 Artificial intelligence in urban planning and design education

Recent research focuses on the emergence of generative AI in education and its impact on creativity and learning. A transformative application of generative AI in planning education offers opportunities for empowerment and creativity within the learning environment. An AI-enabled approach to higher education can enhance students' agency: it "embraces the idea that learners should pursue paths that align with their individual interests and potential, leading to diverse rather than uniform outcomes" (Mishra et al., 2025: 252). Previous studies indicate that generative AI can serve as a tool to support this agency—whether through storytelling, visualising abstract concepts or historical settings (Choi and Chang, 2025).

Yet, within planning we still know little about AI's potential to help envision alternative futures; meanwhile, mobility injustice remains a pressing concern, underscoring the need for planners to engage critically with these technologies. Planning education continues to struggle to integrate transformative skills into curricula. We aim to address this challenge by introducing and evaluating an educational approach that draws on one interdisciplinary module developed at University College Dublin.

2.1 Characteristics of Text-to-Image Generators for Studio-based Learning

Recently, Generative Artificial Intelligence (GenAI) has introduced new methodologies that can facilitate visualisation alternatives to urban design scenarios. This is particularly in relation to the domain of street experiments and mobility transformations. One of the advancements of this tool is the text-to-image generators. These generators can allow urban planners and designers to quickly conceptualise design alternatives for streetscapes. This is usually done by converting language descriptions into vivid visualisations (Virtual City Systems, 2024; Valença et al., 2025; Cabrera-Nyst, 2024). GenAI tools generally streamline urban design's conceptual and creative process. In addition, they ease the participatory planning process by making complex design ideas accessible to a broader range of stakeholders (Virtual City Systems, 2024; Valença et al., 2025).

2.2 Existing theories of text-to-image AI critical use

Established scholarship in media studies reflects on how images and other visual material are a "collective representation" (Barthes 1977), such that they reproduce social, cultural, ideological and historical meanings. Typically, meanings are encoded into images by their creators (e.g. photographer, designer) and decoded by the viewers. While in the past humans were the creators of images and were encoding meanings into them, now novel AI tools produce images that are a representation of data, and infographics for their underlying dataset (Salvaggio, 2023). Diffusion-based models are trained on collections of image-text pairing datasets, which are in turn assembled by humans (Salvaggio, 2023). The training images-and-text pairing datasets are created within specific social, economic and political contexts, thus exemplifying unstated assumptions, inscribed into datasets. Machine learning models by identifying patterns, reveal underlying assumptions of the human-gathered datasets. 'Just as archives are the stories of those who curate them' AI generates images are representations of information in the training datasets (Salvaggio, 2023). Details that are absent or poorly indexed in the dataset are omitted, indicating that ai-generated images can be analysed. Recent research in media studies suggests that as datasets are encoded into AI-generated images, we can understand and analyse layers of socio-cultural encoding within the data used to produce them (idem).

3 Critical framework for the analysis of GenAi street experiments in studio learning

Our overarching aim was to set up studio-learning sessions based on a framework that would allow students and educators to critically analyse how well AI-generated images reflect the realities and aspirations of street experiments or open streets, uncover biases in the underlying datasets, and use the images as discussion points for urban planning learning. The framework aims to critically analyse AI-generated images that depict various street experiments, such as car-free streets, pedestrian zones, or public open spaces. Using prompts and AI tools (e.g., Bing Image generator), in a studio learning environment, students will generate images and examine them through a detailed framework, identifying both strong and weak design elements, biases, and urban planning relevance. Based on the media studies scholarships on encoding/decoding meaning in images (Salvaggio, 2023) and urban design pedagogy, we developed a five-phase framework that guided the students throughout their systematic street experiments' AI-generated images critique (Table 1, Figure 1). The development of the framework was also guided by the following questions:

- How much does AI know about street experiments?
- What are the biases and glitches in ai-generated street experiment images?
- Are there clear references to one city/context?
- What about the use of colours/materials/transport means/people?
- Are there aspects in the Ai-image that openly undermine the aim of street experiments?
- How does the AI-generated street vary from the street experiments you analysed as groups?

This method allows students to critically analyse how well AI-generated images reflect the realities and aspirations of street experiments or open streets, uncover biases in the underlying datasets, and use the images as discussion points for urban planning.

Table 1 Critical Analysis Framework for AI-Generated Images of Street Experiments

Phase	Aim	Guiding Question	Analytical Focus
1. **Create a Sample Set**	Identify patterns	What do we see?	First-pass visual scan of dominant elements, activities and omissions.
2. **Content Analysis**	Identify strengths & weaknesses	What works and what glitches?	Systematic listing of well-rendered versus distorted or missing features. **Strengths:** Identify which elements are consistently well-rendered and accurate, e.g. clean streets, open spaces, or vibrant community activity. These might reflect frequent representations in the underlying datasets. **Weaknesses:** Look for distortions, missing features, or underdeveloped aspects, such as widespread car presence, poorly defined interactions between pedestrians and cyclists, unrealistic street furniture, or inaccessible design for differently abled people. This can indicate biases in the dataset, such as overrepresentation of certain types of cities or demographics.
3. **Link patterns to Dataset**	Interrogate values embedded in the data	- Whose streets, whose narratives? - What types of urban environments are over-represented or underrepresented (e.g., car-centric cities vs. pedestrian-friendly ones)? - What cultural, social, or political biases might have influenced the data?	Tracing cultural, social and political assumptions that surface from the underlying training data. Considering if these datasets reflect specific societal priorities like sustainability, safety, or inclusivity in urban planning.
4. **Connotative Analysis**	Examine social implications	Who benefits, and who is marginalised?	Reflection on potential equity impacts when applying each AI output to real contexts. Reassessment the original image and develop hypotheses about what might be missing or emphasized due to biases.
5. **Start Over**	Test hypotheses & model boundaries	Can we prompt alternative, fairer futures?	Iterative re-prompting to probe the latent space and validate (or reject) initial assumptions. Experimentation with prompts that push the AI to generate alternative or diverse visions of street experiments, Evaluation of how well the AI adapts to more niche or socially conscious prompts.

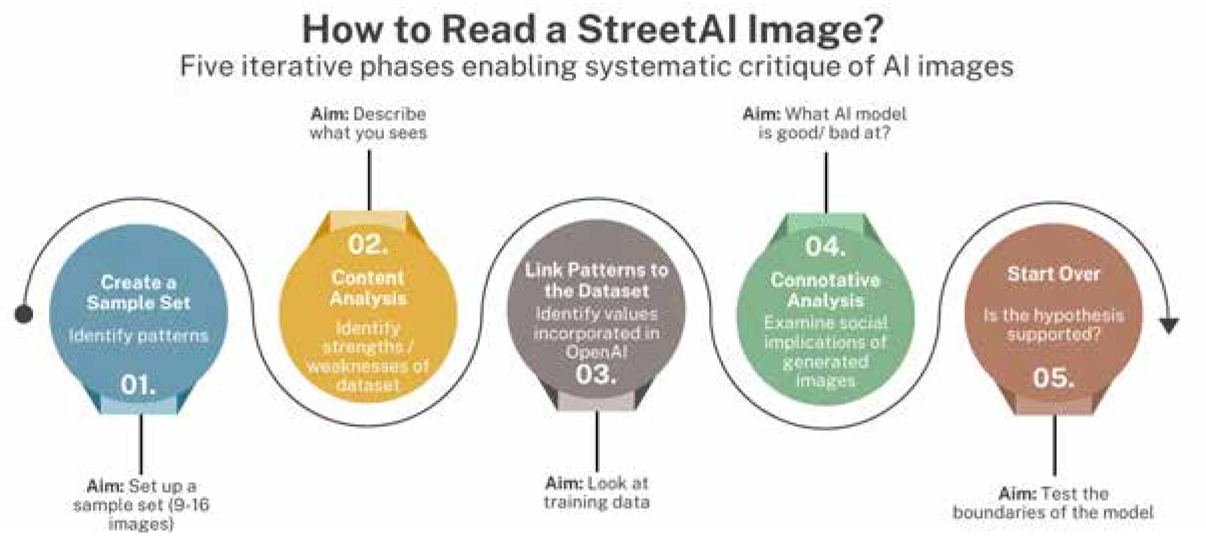

Figure 1 Five Phases for Systematic Critique of AI Images

4 Methods and Case Study
For this paper, we used the Placemaking Urban and Rural Design module (Plan4005W) run at the Chang'an–Dublin International College of Transportation (CDIC), University College Dublin as a case study. It focuses on the fundamentals of urban design, tactical urbanism and analysis of street experiments across cities around the world. Within this module, the students were introduced to the concept of generative AI and its integration into urban design. Students practice using this new tool in a studio-based exercise as part of one assessment of the module. Within this exercise, the students were asked to examine and critique the images produced by AI text-to-image generators.

Three experimental lab sessions aimed to explore with students: (1) the use of AI-image generation services to create images of street experiments, (2) to build on and develop terminology on and about street experiments and use it as AI-image generation prompts, and (3) to critically examine the images created by AI, based on bias/ glitch/strength/weakness.

For each phase, a corresponding tutorial and hands-on studio task were delivered during Autumn 2024. In the assignment, the students (n = 116) were required to analyse selected case studies of pedestrian streets, street experiments, play streets or open streets. Students worked in groups of 4–5 and generated 9–16 images per prompt using the platforms listed below (section 5.1). The students also documented their reflections in an individual report.

This exercise aims to enhance the student's ability to critically evaluate how AI-generated visuals can support or misrepresent urban design principles discussed during the theoretical lectures of the module. Consequently, by the end of this exercise, the students should be able to a) understand how AI-generated images can visualize urban street experiments, b) develop critical thinking skills to analyse visual representations in urban design, c) identify biases in AI-generated content and reflect on their implications for urban planning, and d) synthesize their findings into an actionable urban design reflection.

By engaging with readings and texts assigned during theoretical lectures, students demonstrated their knowledge of relevant urban design literature in their assignments. In the assignment students critically analysed AI-generated images based on prompts that they developed that depict various street experiments, such as car-free streets, pedestrian zones, or public open spaces. Using prompts and AI tools (e.g., Bing Image generator), they generate images and examine them through the critical framework (section 3), identifying both strong and weak design elements, biases, and urban planning relevance of the AI-generated images.

Four generative AI platforms (Playground AI, Lumenor, GETIMG, and Bing Image Creator) were introduced to provide students with a broad overview of available technologies. However, students were instructed to select and work with only three tools for their assignments. This decision was based on several pedagogical and practical considerations:

1- The assignment sought to allow the students to deeply engage with the AI tools and the generated images. Thus, engaging with three platforms was more practical in allowing the students to perform an in-depth critical analysis of each tool's outputs.
2- Time and workload constraints were also contributing factors. The studio module took place within a limited number of sessions. Therefore, there was a risk of overwhelming the timeframe allocated for hands-on experimentation, prompting refinement and reflective writing, if we had asked the students to engage meaningfully with all four tools.
3- Some platforms had occasional access issues for students based on their geographic location or region. This could have introduced inconsistencies across students' submissions and hindered steady progress and completion of the assignments.
4- Lastly, giving the students the freedom to choose their preferred AI platforms encouraged comparative learning.

Data sources included teachers' feedback (based on the assessment rubric) and diary entries from in-class observations, students' individual reflective reports, and formal course evaluations. Images generated through text-to-image generative AI are referenced following the UCD Library Artificial Intelligence Library Guide (University College Dublin Library, 2025)

5 Findings
In this study, a selection of text-to-image generation tools has been tested in an urban design studio-based class to assist the students in the conceptualisation and communication of innovative streetscape design ideas. The incorporation of these AI-driven tools into pedagogical practices has been proven to be valuable for rapid design ideas generation and conceptualisation. However, adopting GenAI also has some drawbacks and challenges. For instance, during the studio classes, it was quite challenging for students to generate images with relevance and realism. Besides, Seneviratne et al. (2022) claim that addressing potential biases in data training and managing the technical learning curve is critical, particularly for new users of these tools.
This section outlines the different characteristics, strengths and limitations of each GenAI tool that has been utilised in the urban design studio-based classes. The aim is to emphasise the applicability of these tools in urban design pedagogical practices.

5.1 Overview of Generative Tools
We utilised four image-generation software: Playground AI, Lumenor, GETIMG, and Bing Image Creator (powered by DALL·E 3). They were selected based on their accessibility, diversity in model architectures, ease of use, and relevance to participatory and educational applications in urban design and planning. Most of these tools interpret natural language prompts to generate images, however, their performance and applicability differ (Table 2).
Recent studies indicate that the potential of utilising GenAI in generating urban design ideas is growing. GenAI tools enable users to generate novel forms of spatial expressions using language-based prompts (Paananen et al., 2024; Seneviratne et al., 2022). Nevertheless, these tools usually reflect a degree of inherited biases in data training and architecture models. This limits the applicability of tools in diverse or non-western contexts (Wang et al., 2025).

5.1.1 Tools Descriptions
• GETIMG
This AI-powered image generation tool is a comprehensive tool that can be used by designers and creators. It can allow users to select the AI model they prefer (e.g., GPT Image and FLUX.1). This tool has greater flexibility in its use; it can facilitate the following:

- Text-to-image generation by using text prompts.
- Image-to-image transformation through existing image modifications.
- AI Canvas (outpainting) through the expansion of images beyond their original borders.
- DreamBooth custom AI Models that enable users to train their own model (good for experimentation and idea modifications). (Getmig.ai, n.d.)

• Playground AI
This AI platform features a highly flexible web-based interface that supports multiple AI models, including Stable Diffusion and DALL-E (Liu et al., 2024). It has the flexibility of using language-based prompts and reference image upload. Also, it allows users to train their own models. It offers stylistic control and model switching, which makes it ideal for experimentation and learning environments (Liu et al., 2024). Nonetheless, the outputs of this platform are mostly aesthetic rather than analytical. In addition, they lack the spatial logic needed for rigorous urban planning applications (Paananen et al., 2024). Despite these drawbacks, this tool is still considered useful for composition and exploring visual ideas.

• Lumenor AI
This platform is an advanced AI-powered image generation platform. It is mainly designed to aid in digital art creation. It uses advanced AI algorithms that facilitate image generation based on various inputs such as text descriptions and image references (Access Newswire, 2023; Newswire, 2023). This tool is similar to Playground AI in its ease of use and flexibility. Thus, making it applicable for learning purposes. Yet, it also has cultural and contextual biases.

• Bing Image Creator
This platform is powered by DALLE.E 3. It offers a user-friendly interface that uses text-based prompts to render or generate images. Bing Image Creator has the potential to recognise and understand urban elements such as streets, sidewalks, signage, bike lanes, street furniture, etc. However, the architectural or spatial quality and scale of its outputs can be inconsistent since it is still under training (Seneviratne et al., 2022). Moreover, the outputs of this interface usually lack cultural specificity. Nevertheless, altering the prompts to give more description of the geographical location can enhance the cultural representation of the generated image.

Table 2 Summary of the different AI platforms during the studio-based learning

Tool	Model Type	Strengths	Weaknesses	Input Types	Best Use Case
Playground Ai	Stable Diffusion, DALL·E	Flexible model selection; strong prompt control	Stylised outputs may require prompt tuning	Text prompts and reference image	Iterative design, prompt testing
Lumenor AI	Proprietary ML/DL models	High-quality digital art generation, adaptive learning; seamless integration with design software	Limited documentation on backend architecture; potential lack of urban planning specificity	Text prompts and reference image	Iterative design, prompt testing
GETIMG	Custom generative model	Equity-oriented; designed for mobility visualisations	Comprehensive toolset; user-friendly interface; supports custom model training	May require a learning curve for advanced features; potential limitations in architectural specificity	Iterative design, prompt testing
Bing	Transformer + Diffusion	Clear visual-semantic match, text rendering, and user-friendly interface	Can misrepresent urban scale; less stylistic nuance	Text Prompts	Planning demonstrations, quick visuals

5.2 Illustrative Student Assignment
This assignment, authored by one of the students (Code - **S1**), presents a critical analysis of AI-generated images from three platforms (Lumenor, GETIMG and Microsoft Bing). The student in this assignment evaluated how well these outputs support the transformation of urban spaces through street experiments. The student critiqued

the AI-generated images using the analytical framework that examines functionality, social impact, aesthetics, and sustainability (see section 3). Following the assignment brief, the student used 5 variations of prompts on every one of the three platforms and compared their outputs. The three prompts are as follows:

• **Prompt 1:** "A street experiment (an intentional, temporary change of the street use, regulation and/or form, aimed at exploring systemic change in urban mobility, away from "streets for traffic", and towards streets for people)" (see Figures 2, 3 and 4).

Figure 2 Image generated using Lumenor. The image was generated in response to the prompt 1

Figure 3 Image generated using GETIMG. The image was generated in response to Prompt 1.

Figure 4 Image generated using Microsoft Bing. The image was generated in response to Prompt 1.

Prompt 2: "A parklet is a small, intentional, temporary conversion of a parking space or street segment into a public space designed for people rather than vehicles. This intervention typically includes seating, greenery, and amenities that encourage social interaction, relaxation, and community engagement. Parklets serve to reclaim underutilized road space, fostering a shift in urban mobility paradigms towards more pedestrian-friendly environments and enhancing the overall quality of urban life" (see Figures 5, 6 and 7).

Figure 5 Image generated using Lumenor. The image was generated in response to Prompt 2.

Figure 6 Image generated using GETIMG. The image was generated in response to Prompt 2.

Figure 7 Image generated using Microsoft Bing. The image was generated in response to Prompt 2.

Prompt 3: "Play streets are designated areas where vehicular access is restricted to create a safe and inviting environment for children and families to engage in play and recreation. This intentional, temporary street transformation promotes community interaction and active lifestyles by repurposing the street as a dynamic space for games, activities, and social gatherings. Play streets challenge traditional street use, advocating for a vision of urban mobility that prioritizes children's needs and fosters a sense of community" (see Figures 8, 9 and 10).

Figure 8 Image generated using Lumenor. The image was generated in response to Prompt 3.

Figure 9 Image generated using GETIMG. The image was generated in response to Prompt 3.

Figure 10 Image generated using Microsoft Bing. The image was generated in response to Prompt 3.

Prompt 4: "Open streets are temporary closures of public roads to motor vehicle traffic, transforming them into vibrant spaces for pedestrians, cyclists, and community activities. This street experiment aims to explore the potential of urban thoroughfares as public plazas, promoting active transportation and social cohesion. By facilitating outdoor activities, such as markets, performances, and recreational events, open streets encourage a fundamental rethinking of street design and usage, prioritizing people over cars in urban environments" (see Figures 11, 12 and 13).

Figure 11 Image generated using Lumenor. The image was generated in response to Prompt 4.

Figure 12 Image generated using GETIMG. The image was generated in response to Prompt 4.

Figure 13 Image generated using Microsoft Bing. The image was generated in response to Prompt 4.

Prompt 5: "The reuse of public space refers to the intentional, temporary adaptation of existing public areas to serve new functions, such as community gatherings, art installations, or pop-up markets. This approach seeks to maximize the utility of underused urban spaces by fostering social interaction and cultural expression. By experimenting with diverse uses of public space, cities can better understand the needs and desires of their communities, leading to more responsive urban planning and a shift towards spaces that prioritize people and community engagement over traditional vehicular traffic" (see Figures 14, 15 and 16).

Figure 14 Image generated using Lumenor. The image was generated in response to Prompt 5

Figure 15 Image generated using GETIMG. The image was generated in response to Prompt 5

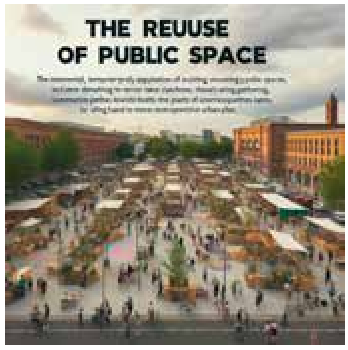

Figure 16 Image generated using Microsoft Bing. The image was generated in response to Prompt 5

For the critical analysis of the AI-generated images, the student followed the structure of the five-phase critical framework introduced in the course. This student's work demonstrates how this framework can be operationalised in student work.

In Phase 1 (**Create a Sample Set -** Identify patterns**):** The student conducted the first visual scan of recurring elements in the images. For instance, the frequent presence of greenery, benches and pedestrian zones (see Figures 5, 6 & 3). S1 was also able to note the absence of some elements such as seasonal variations and representation of elderly and disabled users. This indicates the student's awareness of the inclusion and omission of AI-generated visuals.

In Phase 2 (**Content Analysis –** Identify strengths and weaknesses): S1 highlighted some strengths within the outputs, such as green infrastructure, seatings, social interactions and pedestrian-friendly layouts. Besides, the student was also able to indicate some homogeneous design features and unrealistic or utopian representations (see Figures 4, 10 & 14).

In Phase 3 (**Link patterns to Dataset –** interrogate values embedded in data): S1 critically examined the underlying assumptions in the data training of GenAI platforms. For example, S1 identified some cultural and socio-economic biases that were represented in the Western design aesthetics of the urban contexts in the images (see Figures 2, 12 & 15). This indicates that GenAI tools tend to neglect the needs of diverse users or non-Western environments in their urban design visuals.

In Phase 4 (**Connotative Analysis –** examine social implications): The student linked the embedded biases to real-world planning consequences. S1 highlighted that privileging one aesthetic or demographic group can create a state of inequality. In the analysis, the student also indicated that these misrepresentations can unintentionally marginalise certain groups that are not visualised by GenAI tools.

In Phase 5 (**Start Over –** Test hypotheses and model boundaries): Even though S1 did not provide wide variations of prompting examples, the student was able to reflect on the value of each prompt iteration to refine the outcomes and challenge the initial assumptions. S1 discussed how rephrasing the prompting language or words could produce more inclusive and context-sensitive outputs and visuals
.
Beyond applying the analytical framework, S1 compared the generated outputs of the different tools used in the assignment. S1 indicated that each tool provided visually engaging streetscapes, however, the quality and the degree of realism differed greatly between each tool. For instance, Bing Image Creator was identified as having the capability to produce coherent urban compositions and plausible human figures. Nevertheless, Lumenor AI and GETIMG were noted for generating images with distorted or surreal elements, which questions their design capabilities.

In the student's report, some discrepancies in the way each tool interprets prompts were identified. This aligns with Salvaggio's (2023) and Seneviratne et al. (2022) findings that these tools still have limited platform-specific training data and algorithmic parameters. This comparative analysis shows the importance of tool selection and critical cross-platform evaluation when employing GenAI in urban design pedagogy.

5.3 Key Strengths and Challenges in Using GenAI in Studio Classes

As part of the studio-based module undertaken by students, a portion of their assessment involved evaluating their critical reflection and engagement with the GenAI tools used in their urban design tasks. By going through the students' work and writing their feedback, key distil trends were noticed. Table 3 summarises the main strengths and challenges observed.

Table 3 Summary of Key Strengths and Challenges in Student Engagement with GenAI Tools

Category	Observed Strengths	Observed Challenges
Critical Reflection	Most of the students carefully questioned the results of AI-generated images and were able to highlight ethical issues.	Some students lacked depth in analysing AI biases or broader implications.
Understanding of Bias	The students had some degree of awareness of cultural and geographical limitations in image outputs.	For some students, it was hard to explain how biases show up in visuals or impact fairness in cities.
Urban Design Theoretical Framework Application	Most of the students successfully integrated theoretical frameworks to guide their critiques.	There were some inconsistent applications of theoretical frameworks; some students relied more on aesthetics than critical analysis.
Prompt Engineering	Most of the students used creative and well-structured prompts that generated contextually rich outputs.	Several students struggled with specificity and realism in their prompt design.
Use of Visuals	The students presented clear visual representations, which supported their arguments effectively.	It was noticed that most of the students were over-reliant on visuals with insufficient accompanying critique.
Engagement with Tools	The students demonstrated a strong ability to navigate and use multiple GenAI platforms.	There was limited comparison between the different platforms; some focused only on tool functionality rather than outcomes.
Equity and Mobility Lens	The students showed a strong understanding of how AI tools can reveal or obscure mobility injustices.	There was a tendency to generalise equity concerns without linking them to concrete design implications.

These findings indicate that the students successfully engaged, reflected on, and critically analysed the integration of GenAI image generation tools in their module. They were also able to highlight the biases attached to these tools. However, more support is needed, particularly regarding integrating analytical frameworks in the prompt creation and output image analysis.

6 Discussion and conclusion

This paper explored the applicability of integrating GenAI tools into urban design education through a structured studio exercise. The objective was to investigate ways to develop students' transformative skills through an integrated learning approach designed to equip university students to navigate complex challenges and support societal transitions. This application also seeks to elevate the students' competencies in critical analysis, reflexivity and spatial justice awareness. These competencies align with the broader pedagogical aims of planning education, which includes developing future literacy, responsiveness, and the capacity for ethical reasoning as claimed by Tassone et al. (2018) and McCune (2023).

This paper presented a five-phase critical framework as part of an urban design studio-based module. This framework offers a clear structure for deconstructing GenAI outputs. The exercise undertaken by the students built on media studies theories of visual encoding and decoding (Salvaggio, 2023; Barthes, 1977), which encouraged them to look beyond general urban design aesthetics and look deeper to critique assumptions encoded in generated image datasets. This analytical approach adheres to the call for considering AI ethics and digital humanities when utilising algorithmic outputs (Crawford, 2021).

Throughout the studio classes and assessment of the students' individual reports, it was evident that the students were able to generate and analyse images and interrogate embedded socio-cultural and political assumptions. The student's assignment example presented here in this paper demonstrated how utilising the critical framework can support layered analysis. This layered analysis included not just identifying patterns, but also questioning whose narrative are being visualised. In addition, the student's comparison across the different used platforms in the exercise highlighted the major interpretive differences in GenAI tools. This supports the existing concerns in the literature about the opacity and variability of large text-to-image models (Seneviratne et al., 2022; Valença et al., 2025).

Furthermore, several pedagogical challenges were observed. Some students struggled with prompt engineering, which confirms the findings by Paananen et al. (2024) that prompt specificity is a skill and at the same time a barrier in GenAI-based design. Other students were struggling with articulating the spatial or equity-related implications of AI imagery. This indicates that the students need more scaffolding to connect urban theory to AI visual critique.

Generally, the findings of the paper indicate that GenAI can enhance urban design pedagogy when incorporated into urban design studio classes, particularly when using a structured/critical framework. GenAI can also foster the development of ideas, support visual thinking and enhance digital literacy. Nevertheless, there is a risk of reproducing dominant design imaginaries and marginalising alternative urban futures when implemented without explicit critical guidance, as claimed by (Townsend, 2020; Wang et al., 2025).

In conclusion, AI platforms provide opportunities and challenges as futuring exercises. Open dialogue between educators and students should foster debates on the development of culturally responsive prompts and integrate comparative analysis within the curriculum to expose the students to a wide range of tools. Moreover, the future direction of GenAI in urban design should include extensions to non-Western urban contexts, include the needs of marginalised groups, and develop collaborative pedagogy with open-access repositories of tested prompts and images. This pilot studio reinforces the imperative of embedding AI literacy in urban planning curricula as a technical and ethical practice.

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