

Structured AI Dialogue as Pedagogical Scaffold: Rethinking Learning Pathways in Interior Design

Studio Education

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Research Overview

This study investigates how structured conversational frameworks with generative artificial intelligence (GenAI) function as pedagogical scaffolds in interior design studio education. Through qualitative thematic analysis supported by descriptive survey triangulation, the research examines how staged AI dialogue enhances problem framing, reflective articulation, and human-centered design agency.

Purpose of Study

Generative artificial intelligence (GenAI) is increasingly entering higher education, yet its pedagogical integration in studio-based design learning remains largely unstructured. In many design studios, students interact with GenAI tools through spontaneous prompting or visual experimentation, which may produce rapid outputs but does not necessarily support deeper learning processes. Without clear instructional design, GenAI risks becoming a shortcut rather than a meaningful learning tool.

This study examines how GenAI can be integrated into interior design studio education through structured conversational interaction. Rather than focusing on GenAI as a tool for producing final design artifacts, the research investigates how dialogue with GenAI tools can support early stages of design thinking, including problem framing, concept articulation, and spatial visualization.

The study addresses three research questions:

1. How structured interaction with GenAI supports early-stage problem framing in interior design studio learning.
2. How prompt articulation encourages reflective clarification of design intentions.
3. How staged human–GenAI interaction preserves human-centered design judgment while leveraging GenAI-supported visualization.

By examining these dynamics, the study contributes to discussions on technological innovation in education and proposes a pedagogical approach for integrating GenAI into studio-based design learning.

Research Methods

The study was conducted in an undergraduate Interior Design I studio course, where GenAI tools were introduced through an AI workshop and integrated into several stages of the design process. Students first developed design ideas through observation and discussion before engaging GenAI tools for conceptual exploration and visualization. The instructional workflow emphasized

staged interaction with GenAI, including textual dialogue for idea development, prompt-based image generation, and visualization refinement using three-dimensional models.

Data were collected through two in-depth semi-structured interviews with students who actively used GenAI during their design projects. The interviews explored students' experiences with GenAI-supported ideation, prompt writing, spatial visualization, and the role of GenAI in design decision-making.

The interview data were analyzed using inductive thematic analysis. Initial coding identified recurring patterns in students' descriptions of GenAI-assisted design workflows. These codes were grouped into five analytical themes: GenAI-supported problem framing, prompt articulation as reflective practice, GenAI-assisted spatial visualization, communication friction with GenAI tools, and human-centered design judgment.

To provide additional context, responses from a post-course questionnaire completed by eight students were analyzed descriptively. Given the limited sample size, the survey results were used to support qualitative interpretation rather than to generate statistically generalizable conclusions.

Results and Discussion

The analysis indicates that GenAI contributed most effectively when used as a structured conversational scaffold rather than as a direct generator of design solutions.

First, GenAI dialogue supported early-stage problem framing. Students reported that when a design direction was unclear, interacting with GenAI allowed them to explore multiple spatial possibilities and clarify potential design approaches. Instead of producing final solutions, GenAI expanded the range of ideas available during the initial stage of the design process.

Second, prompt writing emerged as a reflective design activity. Students described constructing prompts as requiring them to clearly articulate spatial relationships, materials, and design intentions. In many cases, prompt writing resembled composing short scenario descriptions that translated abstract ideas into explicit language. This process helped students clarify their own design thinking before visualizing the concept.

Third, GenAI played an important role in spatial visualization and concept exploration. Students used GenAI-generated images to imagine potential transformations of classroom environments and to explore alternative spatial atmospheres. In several cases, combining GenAI image generation with three-dimensional models improved visualization accuracy and supported refinement of final presentation materials.

Fourth, students frequently encountered communication friction and technical limitations when interacting with GenAI tools. Generated images sometimes failed to reflect design intentions or repeatedly produced similar results. These challenges required students to revise prompts, reinterpret outputs, and iteratively refine instructions. Such experiences highlighted the importance of iterative interaction in GenAI-assisted design workflows.

Finally, students consistently emphasized the importance of human-centered design judgment. While GenAI helped generate visual possibilities, students maintained that core design

decisions—such as spatial integration, concept development, and final proposal refinement—remained the designer's responsibility.

Overall, the findings suggest that the educational value of GenAI in studio learning lies not in automation but in structured dialogue that supports reflection, articulation, and spatial reasoning. When integrated thoughtfully into the design process, GenAI can serve as a pedagogical scaffold, enhancing students' ability to organize and develop their design ideas.

Keywords

Generative AI; Interior Design Education; Instructional Scaffolding; Prompt Writing; Studio Pedagogy