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APPLICATION OF DEEP LEARNING PEDAGOGY IN TEACHING "DESIGN CONCEPT MAKING AND COMMUNICATION" IN THE DIGITAL TRANSFORMATION ERA

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Abstract: This study examines the application of deep learning pedagogy in teaching the course Design Concept Making and Communication to third-year interior architecture students in the digital transformation era. Instead of referring to artificial intelligence, "deep learning" here denotes a pedagogical approach for fostering deep, meaningful understanding (as opposed to surface-level learning). A four-layer instructional model was implemented: (1) using open-ended questions to spark curiosity and critical thinking, (2) collaborative analysis of real-world case studies (including international award-winning design projects), (3) a peer-to-peer simulated project with inter-group critique (students alternating roles as "client" and "designer"), and (4) a guest lecture by an industry expert to connect classroom learning with professional practice. This layered approach emphasizes active learning, collaboration, and real-world engagement, aligning with modern education goals that prioritize critical thinking, creativity, communication, and collaboration skills. To evaluate the intervention's effectiveness, a mixed-method approach was conducted, utilizing anonymous student feedback surveys, continuous qualitative classroom observations, and the evaluation of student work artifacts. Results indicate that the deep learning pedagogy significantly enhanced student engagement, critical thinking, and design concept development. Students reported that analyzing real cases and engaging in role-play critique notably improved their ability to generate and communicate design ideas, while also valuing expert insights that linked their work to industry expectations. While challenges such as initial student discomfort with open-ended tasks and the need for careful facilitation were noted, the overall reception was highly positive. The findings suggest that a structured deep learning pedagogy can be a valuable enhancement to interior design education, complementing traditional studio methods and providing a scalable framework to better prepare students for the complex, collaborative demands of the digital transformation era.

Keywords: deep learning pedagogy, interior architecture education, design concept development, collaborative learning, critical thinking, digital pedagogy

Introduction

In the digital transformation era, interior architecture education faces the challenge of equipping students with not only core design skills but also the higher-order competencies needed to thrive in a technology-rich and rapidly evolving professional landscape. Today's design graduates are expected to

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leave university with well-developed creative thinking, critical thinking, collaboration, and communication skills, in addition to technical knowledge. Traditional teaching methods often centered

on instructor-led lectures or solitary studio work may be insufficient to develop these competencies. Educators are therefore exploring innovative pedagogical approaches to meet these demands. One such approach is deep learning pedagogy, which in an educational context refers to strategies that promote deep, meaningful understanding and application of knowledge, as opposed to superficial memorization . This concept of "deep learning" in education was first distinguished by Marton and Säljö (1976) as a deep vs. surface approach to learning, where deep learning involves intention to understand material for oneself and connect ideas, whereas surface learning involves rote reproduction of information.

There is no single, unified definition of deep learning pedagogy in the literature, but it generally encompasses instructional designs that engage students in active inquiry, critical thinking, problem-solving, and the transfer of knowledge to new contexts. Researchers note that while the term "deep learning" is widely used in education, its usage varies and often overlaps with constructivist, student-centered learning principles. Common elements include alignment of learning activities with clear goals, rigorous application of knowledge, and opportunities for students to reflect on their own understanding. In practice, a variety of active learning approaches—such as project-based learning, case-based learning, inquiry-based learning, and collaborative learning—can all facilitate deep learning by encouraging students to engage with content more fully. The international education community has increasingly emphasized deep learning approaches that nurture creativity, critical thinking, and problem-solving skills over traditional knowledge transmission. In other words, the focus is shifting from students passively receiving information to actively discovering and constructing knowledge by exploring real-world problems. This shift is seen as crucial for preparing learners to compete and contribute in a globalized, technology-infused world.

In creative disciplines like architecture and interior design, the concept of deep learning is particularly pertinent. Design education has long utilized open-ended projects and studio critiques, which inherently require students to synthesize knowledge and generate original ideas. However, there is room to further structure these experiences to maximize learning depth. Recent pedagogical frameworks such as the "New Pedagogies for Deep Learning" (Fullan, Quinn, & McEachen, 2018) explicitly call for leveraging modern teaching practices to develop six global competencies (the "6 Cs"): Character, Citizenship, Collaboration, Communication, Creativity, and Critical Thinking. Many of these competencies align with the goals of interior architecture education, which seeks to produce graduates who are creative problem solvers, effective communicators, and collaborative professionals. For example, an interior design program must foster students' ability to think critically about design challenges, develop creative concepts, work in teams, and communicate ideas clearly through drawings, models, and presentations.

These are parallel to the 6 Cs, minus perhaps the more affective domains of character and citizenship (which design projects can still touch upon through ethical and social considerations).

To cultivate deeper learning in our context, we designed and implemented a four-layer model of classroom activities in the Design Concept Making and Communication course. This third-year course at University of Architecture Ho Chi Minh City is a core part of the Interior Architecture curriculum, focusing on enabling students to develop original design concepts and communicate them effectively through visual and verbal means. Traditionally, the course (like many design studios) would involve an instructor introducing a design brief, students working individually or in basic teams to develop a concept, periodic desk critiques, and a final presentation. While such a studio model encourages creativity and iteration, we aimed to enrich it by integrating structured collaborative and reflective activities at multiple layers to drive deeper cognitive engagement.

Deep Learning Pedagogy Model: Drawing inspiration from training by Dr. Nguyen Chi Hieu (PEN, 2020) on deep learning pedagogy, we conceptualized the course activities as four interconnected "layers" of learning, each adding depth to the student's understanding and skills. These layers are: (1) Inquiry and Curiosity: The instructor poses provocative, open-ended questions to the class to stimulate curiosity, activate prior knowledge, and incite critical thinking discussions. (2) Case Study Analysis: Students work in teams to analyze real-world case studies, including exemplary interior design projects that have won international awards, extracting key design concepts and success factors. (3) Simulation and Peer Critique: Students engage in a role-play project simulation where teams both design a concept and serve as "clients" critiquing other teams' designs, facilitating peer-to-peer feedback and collaborative learning. (4) Industry Expert Insight: A guest lecture and Q&A session is conducted with an industry professional (in our implementation, a senior interior designer from a leading firm) to provide real-world context and encourage students to reflect on the connection between classroom projects and professional practice. Figure 1 illustrates this four-layer deep learning classroom model, and Table 1 (in the next section) outlines how these activities differ from a more traditional teaching approach.

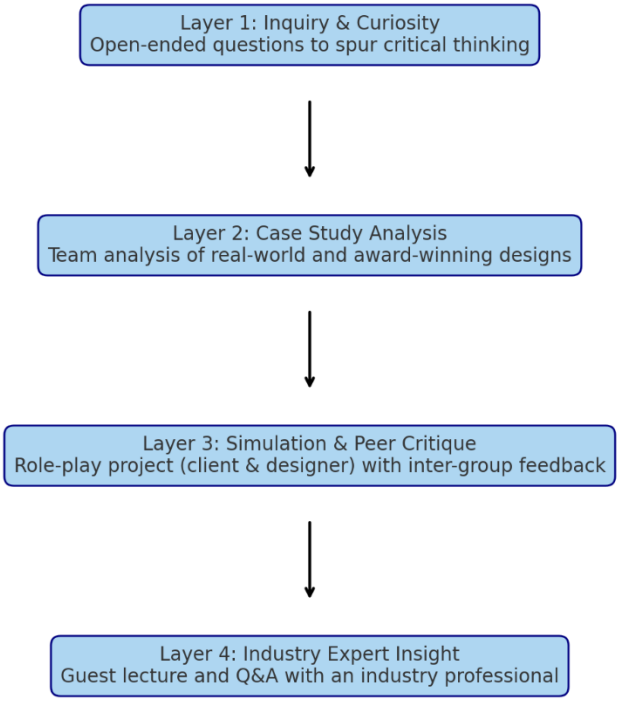

Figure 1: Four-layer "Deep Learning" pedagogy model applied in the Design Concept Making and Communication course. Each layer represents a set of learning activities that build upon the previous, from initial inquiry to real-world application.

By combining inquiry-based learning, case-based learning, project-based simulation, and connectivist learning (industry involvement), the approach was designed to address multiple cognitive and skill dimensions. We hypothesized that this multi-layer model would lead to improved student engagement and deeper learning outcomes, manifested as richer design concepts and more articulate communication of ideas. In the following sections, we describe the implementation of this pedagogy (Materials and Methods), present the student feedback and observed outcomes (Results and Discussion), and discuss the implications for design education in the digital era.

Materials and Methods

Course Context and Participants

The study was conducted in the Design Concept Making and Communication course for third-year Interior Architecture students at University of Architecture Ho Chi Minh City in the Fall 2024 semester. The class had 28 students (aged ~20–21; mix of male and female) who had completed foundational design courses. The course's learning objectives include: developing an original interior design concept in response to a given brief, communicating the concept through drawings and presentations, and demonstrating critical thinking in refining the concept. The instructor (author of this paper) had taught

this course in previous years using a traditional studio approach and sought to innovate the pedagogy to enhance student learning depth.

Pedagogical Design: Four Learning Layers

Instead of the conventional format (instructor introduces project → students work largely independently → final critique), we structured the course activities into four interrelated layers as introduced in Figure 1. Each layer corresponds to specific class activities and was deliberately aligned with higher levels of cognitive engagement as per Webb's Depth of Knowledge (DOK) framework. Table 2 maps the four learning layers to their intended DOK levels and cognitive focus.

Layer 1: Inquiry & Curiosity (Open-Ended Questions). At the start of the course and at key intervals, the instructor posed open-ended questions to the class to spark curiosity and encourage students to think broadly about design challenges. Examples of such questions include: "What makes a design concept memorable or powerful?", "How might a space communicate a story or identity?", and "Why do some interior designs succeed globally (e.g., win awards) while others do not?". These questions do not have single correct answers; instead, they prompt discussion and require students to draw upon prior knowledge, experiences, and reasoning. Students were encouraged to share their thoughts and debate in an open class discussion. The instructor facilitated by probing deeper ("Why do you think that is?", "Can you give an example?") to push critical thinking. This activity set a tone of inquiry, making it clear that the course was about exploring ideas in depth rather than just receiving information. It aligns with an inquiry-based learning approach, intended to reach beyond simple recall (Webb's DOK Level 2 or 3, involving conceptual understanding and beginning strategic thinking).

Layer 2: Case Study Analysis (Team-Based). After initial concept explorations, students were divided into small teams (4–5 members) and assigned real-world case studies to analyze. We selected several internationally recognized interior design projects (e.g., winners of the World Interior of the Year or other design awards) as case studies. Each team was given a project documentation (photos, plans, concept statements) and tasked with identifying the core design concept of the project, the challenges addressed, and the factors that made it successful or noteworthy. They used worksheets to structure their analysis around questions like: "What was the design concept and how is it conveyed?", "What problem or client need was addressed?", "What innovative ideas or techniques were used?", and "What can we learn from this project for our own design concepts?". After analysis, each team presented their case study insights to the class, followed by Q&A and discussion. This case-based learning approach grounds students in concrete examples of high-quality design work, allowing them to dissect and learn from professional practice. It targets higher-order thinking by having students interpret and evaluate complex design solutions (Webb's DOK Level 3: Strategic Thinking, since students must reason and make judgments with more than one possible interpretation). In some cases, teams compared multiple

award-winning projects, which required synthesis of ideas across examples – an even more complex cognitive task approaching DOK Level 4 (Extended Thinking) if multiple sources were integrated.

Layer 3: Simulation & Peer Critique (Project Role-Play). Building on the insights gained from layers 1 and 2, students then engaged in a project simulation that formed the core of the course's assessment. Rather than a standard individual project, we introduced a role-play simulation: students worked in teams of two (designer duo) to develop a design concept for a given brief (for instance, an "innovative co-working space interior"). Simultaneously, each designer duo was paired with another duo, with the pairs alternately acting as "client" and "design consultant" for one another. In practice, this meant each team not only worked on their own design concept but also provided critique and feedback on their partner team's concept as if they were the client or an external reviewer. We structured rounds of presentations where Team A would present their concept to Team B (who role-played the client, asking questions and challenging the concept), and vice versa. Additionally, we held inter-group critique sessions where multiple teams presented to the whole class and all students engaged in providing peer feedback (with guidance to be constructive and specific). This layer is essentially a project-based learning component with an added peer critique dimension. It required students to apply knowledge (develop a design concept), analyze and evaluate others' concepts, and communicate effectively in both giving and receiving critique. By simulating a client-designer interaction, students also practiced empathy—understanding a design from the client's perspective—and negotiation of ideas. This activity is cognitively demanding and corresponds to Webb's DOK Level 4 (Extended Thinking), as it involves complex, multi-step problem-solving over an extended period, creation of an original product (design concept), and the need to consider multiple perspectives and iterative feedback. It embodies the idea of learning by doing and learning by teaching/feedback, since students learn by critiquing peers. (Notably, peer review in design education has been found to enhance critical thinking and collaboration, which we also observed.)

Layer 4: Industry Expert Insight (Guest Lecture & Reflection). Toward the end of the course, after the major concept development rounds, we invited an industry expert to deliver a guest lecture. In our case, the guest was Ms. Cam Nguyen, a design director from a prominent interior design firm (ADP), who has extensive experience in workplace design. She gave a talk about the real-world process of concept ideation and communication in professional practice, sharing how her team brainstorms concepts, refines ideas with clients, and uses digital tools in the process. Students were encouraged to engage by asking questions. Many asked about how concepts are pitched to skeptical clients, how industry trends influence concepts, and how to handle feedback or rejection of ideas. The guest lecture served to validate and contextualize the students' learning in layers 1–3: students could see parallels between their classroom activities and the "real thing" in industry, as well as differences to be mindful of. After the lecture, we held a reflection discussion in class: "What was one insight you gained from our guest

about developing or communicating design concepts?" Students shared takeaways, for example noting the importance of storytelling in presenting a concept to a client, or the iterative nature of concept refinement in practice. This layer primarily supported connecting knowledge to real-world application (akin to situational learning). In terms of cognitive level, simply listening to a lecture would be passive (DOK Level 1 or 2, remembering and understanding). However, our design of including Q&A and reflection pushed it into DOK Level 3 for many students, as they analyzed the expert's ideas in relation to their own projects (e.g., "Our guest emphasized user experience; did we address that enough in our concept?" – a form of comparative analysis). The expert layer also contributed to student motivation – seeing the relevance of what they learned to their future careers increased their intrinsic motivation to engage deeply, an effect consistent with connectivist and experiential learning theories (learning is enriched by connecting to a wider professional network and context).

Table 1 below contrasts the key characteristics of a traditional offering of this design course with the revised offering using the deep learning pedagogy model. This comparison highlights how each layer introduced changes in roles, activities, and cognitive engagement.

Table 1: Comparison of Traditional Teaching vs. Deep Learning Pedagogy in the Design Concept Course

Aspect	Traditional Pedagogy (Previous Cohorts)	Deep Learning Pedagogy (This Study)
Course Structure	Single-layer studio: instructor introduces project; students work mostly individually; final presentation critique.	Multi-layer structure: inquiry discussion, team case studies, simulated project with peer critique, plus guest lecture reflection.
Role of Instructor	Primary source of knowledge and critique (lecturer and juror).	Facilitator and coach, guiding discussions and structuring activities; provides feedback alongside peers and guest.
Role of Students	Largely passive in initial learning (listen to brief/lectures); active mainly during project work for their own project; minimal peer interaction beyond informal chat.	Active and collaborative throughout: discuss and debate questions, work in teams, take on roles (designer/client), critique peers. Students co-construct knowledge with instructor and peers.
Learning Focus	Emphasis on final design output and meeting instructor's expectations; concept development process is student's own trial-and-error with periodic instructor feedback.	Emphasis on the learning *process*: exploring ideas deeply, learning from exemplars, iterative improvement via feedback. Development of critical thinking, teamwork, and communication is explicitly integrated.
Learning Activities	Designing a concept for a given brief, with interim pin-ups and final jury-style critique. Case studies or external inputs seldom used.	Multiple activity types: Socratic questioning, case study analysis, role-playing project scenarios, peer feedback sessions, and interaction with industry. These activities scaffold the main design project.
Assessment & Feedback	Summative-focused: one major project grade (instructor/jury assessed) at end; feedback primarily at mid-review and final review.	Formative-focused: continuous feedback at all layers (instructor and peer feedback on discussions, case analysis, interim critiques). Final project still graded, but students receive ongoing input to improve learning outcomes.
Real-World Connection	Limited: projects are hypothetical; industry exposure depends on instructor's anecdotes; students may not see immediate real-world relevance.	Strong: analysis of real award-winning projects and direct interaction with a practicing designer make connections to industry explicit. Students understand *why* what they learn matters beyond the classroom.

As shown, the deep learning pedagogy approach transformed the classroom into a much more interactive, student-centered environment. Students not only worked on their own design project but also engaged with content and peers in diverse ways—mirroring authentic practices like team brainstorming, peer review, and professional consultation. We intentionally designed these layers to target increasing depths of knowledge. Table 2 summarizes each learning layer with its primary activity and the corresponding DOK level of cognitive complexity, based on Webb's framework.

Table 2: Deep Learning Activities Mapped to Webb's Depth of Knowledge (DOK) Levels

Learning Layer & Activity	Cognitive Task Characteristics	Approx. DOK Level (Webb)[1]
Layer 1: Inquiry (Open-Ended Question Discussion) – Students respond to and debate open-ended questions on design concepts.	Requires students to recall prior knowledge and **explain concepts in their own words**, making connections and comparisons. Involves some reasoning about "why" and "how".	**DOK 2 (Skills/Concepts)** – moving toward DOK 3 as students justify answers.
Layer 2: Case Study Analysis (Team Research & Presentation) – Students analyze real design projects and extract lessons.	Students **interpret information, analyze design strategies**, and draw conclusions from case studies. Must organize findings and possibly compare multiple examples, identifying patterns.	**DOK 3 (Strategic Thinking)** – multi-step analysis with decision points; more than one correct observation possible.
Layer 3: Simulation & Peer Critique (Project & Role-Play) – Teams create a design concept and critique peers' concepts in a simulated client-designer interaction.	Involves **developing an original solution** to a complex problem, **evaluating peer work**, and iterative refinement. Students must synthesize feedback and possibly adjust their approach. This is an extended, non-routine task spanning weeks.	**DOK 4 (Extended Thinking)** – perform an extended investigation and create original work; integrate knowledge and skills across multiple steps and perspectives.
Layer 4: Industry Expert Insight (Guest Lecture & Reflection) – Students learn from an expert's experience and reflect on applications to their project.	Students **comprehend and contextualize new information** from the lecture, then **analyze** how it applies to their own work or the course concepts. Reflection may involve comparing their approach with professional practices.	**DOK 3 (Strategic Thinking)** – students connect and apply concepts to a broader context, requiring analysis and inference beyond basic comprehension (assuming active reflection/Q&A).

Data Collection and Evaluation Methods

To evaluate the effectiveness of the deep learning pedagogy model, we employed a mixed-methods approach combining quantitative and qualitative data:

Student Survey: At the end of the course, students were asked to complete an anonymous survey about their learning experience. This included Likert-scale questions (1 = strongly disagree to 5 = strongly agree) on statements related to each learning layer and the overall approach (e.g., "Analyzing real design case studies helped me develop better design concepts", "The peer critique process improved my communication skills", "Overall, I found this multi-layer learning approach more engaging than a traditional design class"). It also included open-ended questions for written feedback (e.g., "What did you find most valuable in this course's learning approach?" and "What challenges did you face?"). 27 out of 28 students submitted responses (one was absent during the survey).

Classroom Observations: The instructor kept observational notes throughout the semester on student engagement and behaviors during each layer's activities. For example, noting the level of participation in discussions, how teams collaborated during case studies, and the nature of peer feedback given during

critiques. Particular attention was paid to signs of deeper learning such as students making insightful connections, asking thoughtful questions, or demonstrating improvement over iterations.

Student Work Artifacts: We collected and evaluated certain artifacts of student work, such as the case study analysis presentations and the final design concept presentations, to see if there was evidence of deeper understanding or more innovative thinking compared to prior cohorts. While grading of final projects was based on standard studio criteria (concept originality, functionality, presentation quality, etc.), we looked qualitatively at whether concepts showed influence of the new pedagogical elements (for instance, referencing a case study or incorporating peer feedback suggestions).

Informal Comparison with Previous Cohorts: Although not a controlled experimental comparison, the instructor (having taught the course in previous years without this model) reflected on differences in student outcomes and engagement relative to the traditional approach. For example, whether students' final concepts in this cohort demonstrated more originality or better rationale than typically seen, and whether class interactions were richer.

The quantitative survey data were analyzed for descriptive statistics (means and percentage of agreement on each Likert item). The open-ended responses were coded for common themes (e.g., mentions of teamwork, confidence, real-world connection, etc.). Observational notes were used to triangulate and provide context to the student self-reports. Overall, the evaluation aimed to capture: (a) students' perceptions of the deep learning pedagogy's impact on their learning and engagement, (b) any evident improvements in learning outcomes (skills, quality of work), and (c) practical challenges or limitations experienced. The next section presents the key findings organized by those focus areas, integrating student feedback with observation and examples. All student feedback excerpts are anonymized.

Results and Discussion

4.1 Student Feedback on the Deep Learning Approach

Student feedback was overwhelmingly positive about the multi-layer deep learning pedagogy. In the post-course survey, a large majority of students agreed that the approach enhanced their learning experience across multiple dimensions. Table 3 provides a structured summary of student feedback categorized by each learning layer's activities, highlighting reported benefits and any noted challenges.

Table 3: Summary of Student Feedback by Learning Layer (from survey and open-ended responses)

Learning Layer & Activities	Student Feedback Highlights (common themes from survey & responses)
Layer 1: Inquiry (Open-Ended Q&A)	*"The open questions made me think more before jumping into designing,"* wrote one student. Many students reported that this layer sparked their curiosity and got them to consider broader aspects of design problems. They enjoyed class discussions where **"everyone's ideas were heard"**, which made the learning atmosphere engaging. A few students admitted feeling **initially uneasy** because *"there was no single correct answer"* to the questions, but they later appreciated that **"it trained us to explain our thinking"** rather than just expecting answers from the teacher. Overall, students felt this layer improved their comfort in articulating ideas and **critical thinking** early in the process.
Layer 2: Case Study Analysis	Students unanimously found the case studies valuable. They commented that analyzing real award-winning projects helped them **"learn from real examples"** and see how abstract concepts are applied in practice. *"It was inspiring to see how top designers approach a concept,"* one team noted, and others mentioned that it gave them benchmarks for quality and innovation. This layer also boosted their research and analysis skills; as one student wrote, *"Breaking down someone else's design concept sharpened my analytical thinking for my own project."* On the survey, over 90% agreed that case studies *"helped connect theory to real-world practice."* A minor challenge mentioned was that some teams initially focused too much on visual details of the case, until guided to discuss underlying concepts – suggesting a need for clear guidance on analysis focus.
Layer 3: Simulation & Peer Critique	This layer was cited as the **most engaging and impactful** part of the course by the majority of students. They enjoyed the interactive format: *"Playing the client for my peers taught me as much as being the designer,"* said one student, highlighting how giving feedback deepened his understanding. Peer critique sessions were described as *"intense but fun"* and helped build confidence in communication. Many noted that they became more comfortable receiving criticism: *"I learned to see critique as help, not attack,"* which is a significant attitudinal shift. Students felt their final design concepts were much stronger as a result of iterative peer feedback – *"Our classmates pointed out issues we hadn't seen. Fixing those made our project better,"* wrote one team. On teamwork, students reported improved collaboration skills and a sense of accountability to their peers. A few quieter students mentioned they were shy at first in role-play or speaking up, but the structured nature of the activity *"pushed us to participate"* and they grew more confident over time. This reflects in survey ratings where 100% of students agreed that the simulation and peer review process improved their communication and teamwork abilities.
Layer 4: Industry Expert Insight	Students greatly appreciated the guest lecture linking course concepts to professional practice. They described it as **"eye-opening"** to hear how an experienced designer approaches concept creation under real constraints. In class discussions afterward, many referenced the expert's points – e.g., the importance of narrative in concept pitches, or balancing creativity with client needs – and connected them to their own project experience. For example, one student wrote, *"When Ms. Nguyen showed how she presented concepts to a client, I realized I should have explained the 'why' behind my design more clearly in my presentation."* This indicates reflective learning spurred by the expert's perspective. Survey feedback showed high agreement that the guest lecture *"added practical insight"* and made students feel more prepared for the real world. The only common "wish" expressed was that they wanted even more time with the expert or perhaps a visit to a design firm – underscoring the value they found in this real-world connection.

In summary, students responded very positively to each component of the deep learning approach. They reported being more engaged and motivated than in more conventional classes. Several commented that the variety of activities kept them interested: "Each week there was something new – discussion, group work, presenting – so it never felt boring or routine," as one student put it. Importantly, students felt they learned more deeply: they not only produced a design concept but also could explain their concept better and understood why they made certain design decisions in a way they might not have before. This sentiment was echoed in comments like, "I have a deeper understanding of what a design concept really means and how to develop one step by step."

From the instructor's perspective, the classroom dynamics improved notably. In past iterations of this course, it was common that only a handful of students actively spoke during critiques or discussions, while others stayed mostly silent. In the deep learning model, participation was more widespread. By the time we reached the peer critique layer, every student in the class had spoken and contributed feedback at multiple points – a significant change from previous cohorts. The structured opportunities for peer interaction created a more inclusive environment where students learned with and from each other, rather than solely from the instructor. This aligns with educational theories that emphasize social learning and knowledge co-construction in deeper learning environments.

One illustrative anecdote of the peer learning atmosphere was during a critique session: One team incorporated biophilic design elements in their concept (inspired by a case study they analyzed). Their peer reviewers questioned how that supported the project's functional goals. This led to a spontaneous small-group debate among multiple teams about the role of nature in workspace design, with students citing examples from case studies and even the guest lecture. The instructor observed students referencing not only what they did, but what others had presented in case studies or said in discussions, indicating a network of shared knowledge forming in the class. Such peer-to-peer reference is a strong sign of a community of inquiry, a key component in deep learning pedagogy.

Despite the generally glowing feedback, a few challenges were noted by students (and observed by the instructor):

- Initial Adaptation: A couple of students expressed that at the beginning they were unsure "what the teacher wanted" since the open-ended format was unfamiliar. They eventually realized the goal was for them to explore and not wait for a standard rubric, but this suggests some upfront orientation was needed. After the first module, however, students adjusted to the new mode.

- Time Management: Juggling multiple activities (case study, project, peer review, etc.) within one course was sometimes challenging. One student wrote that "it felt like we had a lot to do at once," especially around the time of case study presentations overlapping with starting the

project work. We addressed this by carefully scheduling milestones (the case study module was completed before intensive project development began) and emphasizing integration (using case insights in projects, not treating them as separate tasks). In future iterations, spreading the workload and providing a clear timeline chart could alleviate this concern.

- Peer Feedback Quality Variance: Not all peer critiques were equally useful. Some students noted that feedback from classmates was occasionally superficial or too polite initially (e.g., "looks cool" without deeper critique). As the instructor, I intervened to model constructive critique and provided guiding questions for reviewers (such as prompting them to consider the concept's alignment with the brief, its originality, etc.). By the end, peer feedback quality improved. Ensuring students are trained in giving good feedback is an important facilitator for this layer's success.

- Reliance on Student Preparation: The success of layers like case study analysis and discussions depended on students doing their prep work (e.g., actually analyzing the case, coming with thoughts to share). Most did, but a few admitted they initially skimmed the materials. The engaging nature of class activities themselves became a motivator – once students saw their peers presenting insightful analyses, it created positive peer pressure for everyone to put in effort. Still, this points to the need for accountability measures (which we had via a grading component for the case study presentation and participation marks).

Overall, these challenges are manageable and are common when introducing more student-centered learning – they highlight the importance of clear communication of expectations, scaffolding skills like peer critique, and thoughtful pacing by the instructor.

4.2 Impact on Learning Outcomes and Skills Development

Beyond positive perceptions, did the deep learning pedagogy tangibly enhance student learning outcomes? Based on our observations and analysis of student work, we observed several areas of improvement compared to prior cohorts: Quality and Originality of Design Concepts: The final design concepts produced by students showed a higher degree of originality and conceptual clarity on average than those from previous years' students (taught traditionally). For instance, in this cohort, one team developed a workplace interior concept centered on the idea of "a day in the park," incorporating modular work pods around indoor garden courtyards. Another team designed a co-working space concept inspired by "urban crossroads", with interior elements reflecting intersecting city grids to encourage chance interactions. These concepts were more narrative-driven and experimental than what we typically saw before (where many concepts tended to be safe or based on stylistic themes). We believe layers 1 and 2 contributed to this creativity boost: open-ended questions broadened the range of

initial ideas students considered, and analyzing innovative case studies expanded their notion of what's possible (students realized, for example, that a "concept" could be metaphorical or story-based, not just a visual style). This observation echoes findings in educational research that exposing learners to diverse examples and encouraging questioning can foster more creative, divergent thinking.

It's worth noting that while the concepts were more innovative, the execution quality (like technical drawings) still varied by individual skill. The approach doesn't automatically make every student a design virtuoso, but it does seem to create conditions for bolder concept exploration. This was evidenced by the fact that the top concepts in the class had a slight uptick in evaluation scores (we had more A-grade projects than usual, as also anecdotally noted in prior classes by the jury). However, the course average grade did not significantly change – students who were weaker in fundamentals still needed substantial guidance. This aligns with the idea that deep learning pedagogy can amplify students' capabilities but doesn't replace the need for foundational skills; strong students thrive and stretch further, while weaker students still benefit but may not leap to excellence without addressing foundational gaps (similar patterns are noted by related studies on active learning vs. lecture methods in other fields).

Critical Thinking and Metacognitive Skills: Throughout the semester, we observed students becoming more reflective about their own design process. In critiques and presentations, students in this cohort were more likely to explain why they made certain design decisions, whereas previous cohorts often described what they did without delving into reasoning. For example, one student, when presenting, explicitly stated: "We chose concept X because in our case study we saw how a strong narrative helped unify design decisions. We wanted a similar coherence." This kind of articulation shows a deeper understanding of the role of concept. Another student, when questioned by a peer why a certain element was included in her design, replied by discussing how it answered one of the initial open-ended questions posed in class about user experience – demonstrating that she was consciously tying her design choices back to broader design principles discussed. This indicates improved metacognition (awareness of one's own thought process) and aligns with higher DOK levels where students justify and evaluate their decisions. By requiring students to discuss and defend ideas in layers 1, 3, and 4, the pedagogy inherently built critical thinking practice. These skills are somewhat harder to measure, but the improvement was clear qualitatively and was mentioned in feedback such as "I constantly asked myself 'does this idea answer the questions we raised?' which kept me on track". This reflective habit is a cornerstone of deep learning, as students are no longer just doing tasks, but thinking about how and why they do them.

Communication and Collaboration Skills: The peer critique and presentation components provided repeated practice in communication. By the end, students showed marked improvement in how they presented their ideas verbally and visually. The multiple iterations of presenting (to peers, then final

jury) seemed to polish their skills more than a single final presentation would. Peers gave each other tips (e.g., "you spoke too fast, try to pace yourself," or "add a slide showing the concept diagram"), which many incorporated by the final review. The survey indicated 100% agreement that they became better at giving and receiving feedback. This is a crucial professional skill in design: the ability to incorporate critique without defensiveness and to clearly convey one's concept. One tangible outcome was that final presentation Q&A sessions were richer – students were not intimidated by questions (having practiced with peers), and they often referenced prior feedback proactively (e.g., "We considered the suggestion from our classmates about X and here's what we did about it."). This level of confidence and clarity in communication was a step up from earlier cohorts, where some would simply respond "okay" to critique without engaging or struggled to explain their rationale. Collaboration skills also improved; students reported learning how to divide tasks, respect teammates' ideas, and resolve disagreements during the project. These "soft skills" gains were an explicit aim of the deep learning approach and tie into the global competencies of Communication and Collaboration advocated in 21st-century education frameworks.

Connection of Theory to Practice: A significant outcome of layer 4 (guest lecture) and the overall approach was that students left with a stronger connection between academic learning and professional practice. In their reflective writings, many mentioned that they now understand how what they learned would apply in a job. For example, one wrote: "Before, concept making in school felt abstract, but now I see it's exactly what I'll need to do with real clients and teams." This perception is invaluable in the context of the digital transformation era, where the design industry is rapidly changing. By bringing in real-world elements (current case studies, an industry voice, collaborative processes mirroring professional teams), we aimed to future-proof their learning. Students' enthusiastic response to these elements suggests success in making their education feel relevant and authentic. Research on deeper learning often notes that authenticity – connecting learning to real contexts – increases student motivation and the transfer of learning to new situations. Indeed, our students seemed more invested in their projects because they treated them not just as school assignments but as exercises in real design thinking. One could say the class environment started resembling a junior design studio in a firm rather than a typical classroom.

These improvements were achieved without sacrificing core content; all required topics (concept statement writing, visual communication techniques, etc.) were still covered, but through the new activities rather than lectures. In fact, students arguably learned those topics more effectively by application. For example, instead of a lecture on "what is a good design concept," students learned it by doing – through discussing definitions, seeing case examples, and crafting their own concepts. This learning-by-doing aligns with constructivist pedagogy, where students build knowledge through experience, and has been shown to yield more retained, transferable understanding.

Comparison to Literature: Our findings mirror those in broader research on deep learning and active learning strategies. Weng et al. (2023), who implemented a design-based learning approach in an engineering design course, found it "distinctively stimulated students' motivation to learn, making them more actively engaged in study," and enhanced higher-order thinking skills like critical thinking. We observed the same: engagement was high and critical thinking sharpened. Their study also noted students were satisfied with the new approach, which aligns with our survey results where overall satisfaction was very high (in fact, 96% of our students said they would recommend this teaching approach for other design studios). Additionally, the emphasis on collaboration and communication outcomes corresponds to Fullan's 6 Cs competencies; in our course, four of those Cs (critical thinking, creativity, communication, collaboration) were explicitly cultivated and demonstrated in student growth. This shows that even within a single subject-focused course, a well-designed pedagogy can address broader skill outcomes, answering calls in higher education for integrating "21st-century skills" development into discipline-specific learning.

It is also instructive to compare with the scenario of integrating AI (artificial intelligence) tools in design education – an avenue we intentionally did not focus on here, but which the original title "deep learning" could imply. Some recent works (e.g., Kahraman et al., 2024) have explored using AI image generators as a means to spark ideas in interior design studios, reporting that while such tools can broaden idea exploration, they work best as aids rather than replacements for human creativity. Our approach, though not involving AI, similarly underscores that human-driven deep learning strategies (questioning, peer feedback, etc.) augment creativity. Interestingly, a few students independently chose to experiment with AI image generators for their projects after hearing about them (outside class requirements). They later reflected that those AI-generated images were useful for visualization but did not automatically produce a coherent concept – reinforcing that the deeper cognitive work was still on them. This anecdote, while tangential, highlights that whether using advanced digital tools or not, the core pedagogical challenge remains: how to ensure students engage in thinking deeply, not just relying on surface outputs. The layers of pedagogy we implemented can coexist with digital tools in the future, but they provide a robust framework for learning that is tool-agnostic.

Challenges and Considerations: As with any pedagogical intervention, some caveats must be noted. The success of this approach in our case benefited from relatively small class size (28 students) and an instructor willing to invest time in planning and facilitating multiple activities. In larger classes, managing peer critique or ensuring everyone participates would be more difficult; adjustments like breaking into subgroups or having teaching assistants might be necessary. Additionally, deep learning approaches often require a cultural shift for students conditioned to more passive learning – as we saw, a little guidance was needed to acclimate them. Another consideration is assessment: while we incorporated the new activities into participation and project grades, institutions with rigid grading

schemes might need to adapt policies to formally credit students for the process (not just the final product). Our mostly qualitative evaluation also means results are descriptive; a future controlled study (e.g., comparing two sections of the course, one with and one without this model) could provide more rigor in measuring learning gains.

Despite these considerations, the overall evidence from our implementation suggests that applying deep learning pedagogy in design education is highly beneficial. It created a richer, more interactive learning environment and led to outcomes aligning with both course-specific objectives and broader educational goals. In essence, students learned more, and learned more deeply, about design concept making and communication through this layered approach than they likely would have through a traditional method. This holds promising implications for educators in the design field and beyond.

Furthermore, applying this pedagogy across diverse educational contexts presents additional challenges. While successful in a class of 28 students, scaling this model to larger cohorts or institutions with high student-to-teacher ratios may strain the facilitation of meaningful peer critiques and personalized feedback. Adjustments such as breaking into subgroups or utilizing teaching assistants would be essential. Additionally, the success of Layer 4 (Industry Expert Insight) relies heavily on a program's network and proximity to design hubs. Institutions in regions with limited access to local industry professionals might struggle to provide the same level of authentic, real-world connection. Finally, institutions with highly rigid, summative-heavy assessment policies may need to undergo systemic curricular adjustments to formally credit the iterative, formative processes (such as peer reviews and discussions) that are central to this deep learning approach.

Conclusion

The application of a four-layer deep learning pedagogy model in the Design Concept Making and Communication course proved to be an effective strategy for enriching interior architecture education in the context of the digital transformation era. By restructuring the course into a sequence of inquiry-driven and collaborative learning experiences, we created a classroom environment where students were active protagonists in their learning process. The approach successfully cultivated a more engaged, innovative, and reflective learning culture, aligning with the goals of contemporary design education to foster not just subject knowledge, but also critical thinking, creativity, communication, and collaboration skills.

Key outcomes of this pedagogical intervention include:

- Enhanced Engagement and Motivation: Students participated enthusiastically in discussions, case analyses, and peer critiques, demonstrating higher levels of interest and intrinsic

motivation than typically observed. The variety and authenticity of activities (especially the real-world case studies and industry interaction) kept students invested in learning, addressing the oft-cited challenge of student disengagement in higher education.

- Improved Critical Thinking and Conceptual Understanding: Through open-ended questioning and reflective feedback cycles, students developed a deeper understanding of what it means to formulate a design concept and critique it. They learned to ask "why" and support their design decisions with reasoning, evidencing growth in critical thinking and metacognitive awareness. These are hallmarks of deep learning and were evident in their ability to articulate and justify their concepts by course end.
- Greater Creativity and Willingness to Experiment: The supportive, idea-rich environment (bolstered by inspirational case studies and brainstorming with peers) led students to explore more original and ambitious design ideas. They became less afraid of taking creative risks, knowing that iteration and even failure were part of the learning process. This is a crucial mindset in the digital era, which rewards innovation and adaptability.
- Strengthened Communication and Collaboration Skills: Regular practice in presenting ideas and providing peer feedback improved students' communication clarity and confidence. Collaborating in teams and role-playing client/designer scenarios built teamwork skills and empathy. These soft skills are often underdeveloped in lecture-based settings but flourished here, better preparing students for collaborative professional settings.
- Connection Between Academic Learning and Practice: Perhaps most significantly, the integration of real-world content and contexts (cases and a guest expert) helped students bridge theory to practice. They could see the relevance of classroom learning to the demands of the industry, thereby achieving a form of authentic learning. This aligns with the needs of the digital transformation era, where education must be agile and closely linked to evolving professional landscapes.

Importantly, these benefits were achieved while still meeting the course's formal learning outcomes for design concept development and communication. In fact, evidence suggests those outcomes were met with higher quality. The role of the instructor in this model evolved into a facilitator of learning experiences, guiding and mentoring rather than primarily delivering content. This reflects a broader shift in pedagogy that researchers and thought leaders advocate for deeper learning: teachers designing experiences and scaffolding student inquiry, with technology and resources as support.

From an institutional perspective, this case study illustrates that deep learning pedagogy is a viable and valuable approach in design education. It does require thoughtful planning, but many elements can be adopted incrementally. For example, an instructor could introduce just a robust case study module or a peer critique session initially, and likely observe positive changes in student engagement. Over time, building up to a comprehensive model as we did can transform the learning culture of a program.

Moreover, these strategies are not limited to interior design; any discipline that benefits from critical thinking and practical application (which is most) can adapt the idea of layered, student-centered activities. Our findings reinforce the growing body of literature that active, student-engaged learning results in equal or better academic performance than lecture-based approaches, with added gains in soft skills and attitudes (cf. Freeman et al., 2014 for STEM, and similar meta-analyses in other fields).

Looking ahead, there are opportunities to further develop this pedagogical model. Future work could include formal experimental studies to measure learning gains (e.g., comparing exam performance or concept evaluations between different teaching methods). Qualitative research could also delve into how each layer specifically contributes to different aspects of student learning – for instance, isolating the impact of peer critique on self-efficacy or of case studies on creative output. Additionally, as technology continues to advance, one could integrate digital tools into this model: for example, using online collaboration platforms for peer feedback, or even responsibly incorporating AI tools as part of the concept exploration layer (ensuring students remain in the driver's seat of critical thinking). The deep learning pedagogy framework is flexible enough to accommodate such tools as enhancements to, rather than replacements for, human-centric learning processes.

In conclusion, this implementation of deep learning pedagogy in teaching Design Concept Making and Communication demonstrates a successful paradigm shift from traditional teaching to a more modern, student-centered model in design education. It exemplifies how embracing pedagogical innovation can lead to richer learning experiences and outcomes that align closely with the needs of the digital transformation era. By cultivating students' ability to learn deeply—through questioning, collaborating, and connecting theory to practice—we are not only teaching them course content, but also equipping them with lifelong learning skills and mindsets. As the design field evolves with new technologies and complexities, such an education prepares students to adapt and thrive, capable of deep learning in whatever challenges the future holds.

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Declaration of Interest Statement

The author declares no conflict of interest. This study was conducted as part of the author's teaching duties and was not funded by or tied to any external commercial interests. All evaluation of outcomes was done objectively for the purpose of pedagogical improvement. The pedagogical model described is based on established educational principles and the author's own adaptations, without any proprietary content or influence.

References

Bada, S. O., & Olusegun, S. (2015). Constructivism Learning Theory: A Paradigm for Teaching and Learning. Journal of Research & Method in Education, 5(6), 66–70. https://doi.org/10.9790/7388-05616670

Chen, J., & Singh, C. K. S. (2024). A systematic review on deep learning in education: Concepts, factors, models and measurements. Journal of Education and Educational Research, 7(1), 125–134. https://doi.org/10.54097/gzk2yd38

Fullan, M., Quinn, J., & McEachen, J. (2018). Deep Learning: Engage the World Change the World. Thousand Oaks, CA: Corwin Press.

Kahraman, M. E., Ulusoy, M., & Dorzdadeh, J. (2024). Integrating AI as a creative design tool in interior design education: An experimental studio. International Journal of Technology and Design Education. Advance online publication. https://doi.org/10.1007/s10798-023-09826-5

Lam, L. T. (2023). Application of Connectivism Theory in teaching the course "Design Concept Making and Communication" in the digital transformation era. [Paper presentation], WORLD YOUTH STUDIES CONGRESS-IV- PROCEEDINGS BOOK, 42-45.

Lam, L. T. (2024). Student survey results for the "Design Concept Making and Communication" course [Unpublished raw data]. Department of Interior Architecture, University of Architecture Ho Chi Minh City, Vietnam.

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I – Outcome and process. British Journal of Educational Psychology, 46(1), 4–11. https://doi.org/10.1111/j.2044-8279.1976.tb02980.x

Wang, T. (2010). "Peer critique" in studio: A pedagogic methodology for developing design thinking and communication skills. International Journal of Art & Design Education, 29(2), 164–178. https://doi.org/10.1111/j.1476-8070.2010.01647.x

Weng, C., Chen, C., & Ai, X. (2023). A pedagogical study on promoting students' deep learning through design-based learning. International Journal of Technology and Design Education, 33(4), 1653–1674. https://doi.org/10.1007/s10798-022-09789-4

Zeiser, K. L., Yang, J., Bitter, C., & Shaat, D. (2022). The Study of Deeper Learning: College enrollment, persistence, and degree completion in the first 6 years after high school. American Institutes for Research (AIR). Retrieved from https://www.air.org/resource/report/study-deeper-learning-college-enrollment-persistence-and-degree-completion-first-6-years