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Darmstadt Design Theory Through Peripheral Learning in Interior Sketching: Cross-Cultural Student Perspectives

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ABSTRACT

The rapid advancement of digital technologies has significantly transformed architectural and interior design education, particularly in the use of software-based design tools. However, an overemphasis on technical proficiency risks diminishing students' theoretical understanding and critical design thinking. This study investigates the implementation of Darmstadt Design Theory through a peripheral learning approach in interior sketching studios, focusing on students' perspectives in a cross-cultural learning context involving Balinese and Timor Leste students. Employing a mixed-methods research design, the study integrates a comprehensive literature review with a perception survey administered to 39 purposively selected respondents, supported by observations and document analysis. The findings indicate that peripheral learning effectively bridges the gap between architectural theory and design practice by embedding theoretical principles organically within studio activities, critiques, and iterative sketching processes. Students reported enhanced conceptual understanding, improved critical thinking, and stronger professional and ethical awareness, as theory was perceived not as abstract knowledge but as a practical guide for design decision-making. The results further demonstrate that the integration of Darmstadt Design Theory fosters holistic, culturally responsive, and coherent design outcomes, particularly within cross-cultural educational settings. This study concludes that embedding architectural theory through peripheral learning offers a pedagogically effective strategy for strengthening conceptual depth, professional identity, and cultural sensitivity in contemporary interior design education.

Keywords: Darmstadt Design Theory; Peripheral Learning; Interior Design Education; Digital Design Pedagogy; Cross-Cultural Design Learning; Architectural Theory

INTRODUCTION

In the contemporary era marked by rapid technological progress and digital transformation, the disciplines of architecture and interior design have undergone significant changes in both professional practice and educational approaches. Digital tools have become integral to the design process, enabling architects and designers to achieve higher levels of accuracy, efficiency, and creative exploration. Recent studies emphasize that digitalization has reshaped how architectural ideas are generated, developed, and communicated, particularly by advanced design software (Kolarevic & Duarte, 2023). Software applications such as AutoCAD and SketchUp are now widely recognized as essential instruments in the architecture, engineering, and construction (AEC) industries, as they support both technical documentation and visual representation throughout the design process (Eastman et al., 2024).

These tools facilitate the translation of abstract concepts into precise technical drawings and three-dimensional visualizations, allowing designers to communicate their ideas more effectively to clients, consultants, and stakeholders. According to Choi and Kim (2024), three-dimensional digital modeling enhances spatial understanding and design clarity while reducing errors during the early design stages. Moreover, the ability to simulate design alternatives digitally allows potential technical and spatial issues to be identified before construction begins. Consequently, proficiency in digital design software has become a fundamental requirement for students who aspire to build professional careers in architecture, civil engineering, interior design, or other related fields (Setiawan et al., 2025).

Despite the undeniable advantages offered by digital tools, the growing reliance on software should not overshadow the importance of theoretical knowledge in architectural and interior design education. Technology, regardless of its level of sophistication, functions primarily as a medium through which ideas are expressed rather than as a substitute for conceptual thinking. Without a strong theoretical foundation, students risk producing designs that are visually impressive but conceptually weak, culturally detached, or functionally inadequate. Recent educational research highlights that excessive focus on software skills may limit students' ability to develop critical and reflective design thinking (Salama, 2023).

Architectural theory provides an intellectual framework that guides design decision-making, helping students understand the underlying principles of form, space, proportion, materiality, and human experience. Theory also plays a vital role in fostering critical thinking, enabling future professionals to evaluate their design outcomes not only in terms of aesthetics but also in relation to social, cultural, historical, and environmental contexts (Till, 2024). Through theoretical engagement, students learn to question design conventions, respond to contextual challenges, and develop meaningful architectural narratives that go beyond surface-level visual appeal.

The integration of theory and practice is therefore essential in shaping competent and responsible design professionals. While digital tools enhance technical skills and visual communication, theory ensures that design outcomes are meaningful, contextual, and grounded in established architectural values. Recent studies in architectural pedagogy emphasize that students who successfully integrate theoretical knowledge with digital skills demonstrate stronger problem-solving abilities and higher design coherence (Alawadi & Khan, 2023). Such students are better equipped to respond to

complex design challenges in professional practice, where functional, aesthetic, and social considerations must be addressed simultaneously.

Furthermore, students who possess both technical proficiency and theoretical understanding can justify their design decisions more effectively and adapt to diverse project requirements. This balance between digital mastery and theoretical awareness is particularly important in an era where technological innovation continues to evolve rapidly, influencing design methodologies and professional expectations in unpredictable ways (Oxman, 2024). As a result, architectural education must prioritize not only skill-based training but also conceptual and theoretical development.

One architectural theory that has gained renewed attention in discussions of design education is the Darmstadt Design Theory, which is closely associated with the architectural and artistic movements that emerged in Darmstadt, Germany, particularly in the early twentieth century. Contemporary scholars have revisited the Darmstadt School, also known as the Darmstadt Artists' Colony, to highlight its relevance to modern interdisciplinary design education (Schneider, 2023). The movement played a significant role in the development of modern design principles by emphasizing the unity of art, architecture, and craftsmanship.

Darmstadt Design Theory advocates for a holistic approach to design, in which buildings and interiors are conceived as integrated works of art rather than isolated functional structures. Architecture, interior elements, furniture, and decorative details are designed cohesively to create harmonious and meaningful spaces. According to Müller (2024), this integrated design philosophy aligns closely with contemporary sustainable and user-centered design approaches that emphasize coherence between form, function, and experience.

The theory places strong emphasis on artistic expression, clarity of form, and the relationship between function and aesthetics. Designers are encouraged to consider not only the external appearance of a building but also the quality of interior spaces and their psychological impact on users. In this theoretical framework, design is understood as a cultural and artistic endeavor that reflects societal values, identity, and aspirations (Schneider, 2023). Consequently, designers are expected to be sensitive to context, tradition, and innovation simultaneously. This perspective aligns well with current architectural education models that increasingly stress contextual awareness, human-centered design, and cultural responsiveness (Salama, 2023).

For students of architecture and interior design, understanding Darmstadt Design Theory provides valuable insights into how theoretical principles can inform practical design decisions. By studying this theory, students learn to approach design as a comprehensive process that integrates structure, function, aesthetics, and craftsmanship. When combined with digital tools such as AutoCAD and SketchUp, theoretical knowledge enables students to move beyond mere technical execution toward the creation of conceptually rich and coherent designs (Oxman, 2024). Digital software can thus be used not only for drafting and modeling but also as an exploratory medium for testing spatial relationships, materials, and design narratives that align with theoretical intentions.

Furthermore, the application of architectural theory in digital design practice helps students develop a professional mindset. In real-world projects, architects and designers are often required to explain and defend their design concepts to clients, consultants, and regulatory authorities. A strong theoretical foundation enables them to articulate the rationale behind their design choices clearly and convincingly (Till, 2024). It also fosters ethical and professional responsibility, as designers become more aware of the social, cultural, and environmental implications of their work. In this sense, theory

functions as a moral and intellectual compass that guides professional practice in the digital age.

The application of Darmstadt Design theory in education in fact is not yet explored in Indonesia, especially Bali which is known for its culture which is good for developing students' professional competence, ethical awareness, and critical thinking skills when working with people from different countries Through well-designed teaching strategies such as peripheral learning, theory can be meaningfully integrated into digital practice, preparing students to become reflective and responsible designers capable of addressing the complex demands of contemporary architectural practice.

Peripheral learning has gained renewed relevance in contemporary higher education, particularly in design-based and digitally mediated disciplines. As an extension of situated and experiential learning theories, peripheral learning emphasizes the gradual acquisition of knowledge through observation, participation, and contextual engagement rather than through direct instruction alone. In recent educational discourse, peripheral learning is understood as a strategy that enables students to internalize complex theoretical concepts by engaging with them implicitly within authentic learning environments. According to Hernández-Sellés, Muñoz-Carril, and González-Sanmamed (2023), *"learning becomes meaningful when students participate in shared practices where knowledge is constructed socially and progressively through engagement"* (p. 412).

In digital design education, peripheral learning is particularly effective because learning environments are inherently interactive, collaborative, and iterative (Tomé et al., 2024). Rather than positioning architectural theory as a separate or purely conceptual subject, peripheral learning embeds theoretical principles into studio activities, design critiques, and digital workflows. Students are exposed to theoretical reasoning through instructors' feedback, peer discussions, and design evaluations, allowing them to absorb conceptual frameworks organically. As Zhang and Fong (2024) note, *"the integration of theory into practice-oriented learning contexts supports deeper cognitive engagement and bridges the gap between abstract knowledge and professional application"* (p. 76).

The digital studio environment further enhances peripheral learning by enabling continuous observation and participation. Students learn not only by producing their own designs but also by reviewing peers' work, analyzing feedback, and reflecting on iterative design processes. This aligns with recent findings by Kwon and Park (2023), who argue that *"learning at the periphery of professional practice encourages reflective thinking and supports the gradual development of disciplinary identity"* (p. 189). Through repeated exposure to theoretical discourse embedded in practical tasks, students begin to understand theory as a functional guide for decision-making rather than an external academic requirement.

Moreover, peripheral learning contributes significantly to the formation of professional ethics and responsibility. By engaging in theory through real or simulated design challenges, students become more aware of the social, cultural, and environmental implications of their design choices. Recent research emphasizes that such contextualized learning fosters ethical sensitivity and critical awareness in design education. As Till and Schneider (2025) state, *"theory embedded in practice serves as an ethical framework that shapes how designers respond to societal and environmental responsibilities"* (p. 58). Peripheral learning thus ensures that theoretical values are continuously reinforced through practice. Based on this phenomenon, investigating students' perspective on implementing Darmstadt Design Theory through Peripheral Learning becomes focus on this study.

METHOD

This study employs a mixed-method research approach, combining qualitative and quantitative techniques. The primary method of data collection is a literature review, which involves a systematic examination of academic books, peer-reviewed journal articles, and relevant policy documents to establish a comprehensive theoretical and empirical foundation for the analysis (Wicaksana, Suprihatin, & Mar'an, 2024; Wicaksana, Cahyono, Sudrajat, & Suprihatin, 2025). This phase was conducted over a period of four months. To complement the qualitative findings, a perception survey was conducted to thirty-nine respondents, selected using purposive sampling, as they were considered to have relevant knowledge and experience related to the research topic. In addition, direct observations and document analysis were employed to obtain contextual and empirical insights from real-world settings. The research instruments included a structured perception questionnaire, observation guidelines, and document analysis sheets. The validity of the instruments was ensured through content validity, which was established by expert judgment, and data triangulation across literature review, survey results, observations, and document analysis. Furthermore, cross-validation among multiple data sources was applied to enhance the reliability and credibility of the research findings (Wicaksana et al., 2025).

Cross validation involves comparing information derived from diverse sources to identify consistencies and discrepancies. This methodological approach helps mitigate potential biases, ensuring that the conclusions drawn are well-supported by evidence (Diadi, Nurdin, & Gunawan, 2023). By relying on literature review as the primary method, the study benefits from the wealth of knowledge that has already been established in the field. Academic books provide theoretical frameworks and foundational concepts, while prior research findings offer empirical evidence that supports or challenges existing theories. In addition, perception survey is also conducted by using Likert Scale from 1 – 5. Furthermore, relevant documents, such as reports, policy papers, and institutional records, add contextual depth to the analysis, enabling the researchers to draw well-informed conclusions. To comprehend the result, the analysis of perception is implemented by using Koyan (2012) perception table here.

Table 1 Koyan's Perception Theory

Score	Category
Mi + 1,5 SDi M < Mi + 3,0 SDi	Extremely high
Mi + 0,5 SDi M < Mi + 1,5 SDi	High
Mi – 0,5 SDi M < Mi + 0,5 SDi	Average
Mi – 1,5 SDi M < Mi – 0,5 SDi	Low
Mi – 3,0 SDi M < Mi – 1,5 SDi	Very Low

Mi is Ideal mean calculated using the formula 1/2 (ideal maximum score - ideal minimum score) which means Mi is ½ (5 – 1) and the score of Mi is 2. Meanwhile, SDi is Ideal standard deviation calculated using the formula: 1/6 (ideal maximum score - ideal minimum score) which means SDi is 1/6 (5 – 1) and the score of SDi is 0.67.

RESULTS AND DISCUSSIONS

The discussion further reveals that peripheral learning plays a crucial role in bridging the longstanding gap between architectural theory, in this case Darmstadt Design theory and design practice. Rather than introducing Darmstadt Design Theory through direct lectures, theoretical values were embedded in sketching exercises, studio critiques, peer observation, and instructor feedback. This approach allowed students to absorb theory organically while engaging with digital and manual sketching workflows.

Consistent with Hernández-Sellés et al. (2023), the findings confirm that learning becomes more meaningful when students participate in shared practices where knowledge is constructed socially and incrementally. Students reported that observing peers' sketching strategies and listening to critique discussions helped them understand how theoretical principles influenced spatial composition, proportion, and interior articulation. As a result, theory was perceived not as an academic burden but as a design guide that informs decision-making.

Moreover, the studio environment amplified the effectiveness of peripheral learning. Through iterative sketching and modeling processes, students were able to test theoretical concepts visually and spatially. This supports Zhang and Fong's (2024) claim that embedding theory within practice-oriented learning contexts enhances cognitive engagement and strengthens the connection between abstract concepts and professional application. In this sense, digital tools functioned as mediators rather than replacements of theoretical thinking, reinforcing Oxman's (2024) view of digital media as generative platforms for conceptual exploration.

Figure 1. Sketching with Darmstadt Design Theory

Criteria	Average Score
Knowledge	4.525
Teaching Method	4.45
Answering Question Ability	4.475
Creativity	4.5
Students' Care	4.45
Average	**4.48**

The descriptive statistical results demonstrate consistently important levels of teacher performance across all evaluated dimensions. The Knowledge criterion obtained the highest average score ($M = 4.525$), indicating a strong level of subject-matter

expertise among the teachers. This is followed by Creativity (M = 4.500) and Answering Question Ability (M = 4.475), suggesting that teachers can deliver instructional content in varied and engaging ways while effectively addressing students' inquiries. The dimensions of Teaching Method and Students' Care, each with an average score of 4.450, further illustrate positive perceptions of teachers' pedagogical techniques and their attentiveness to learners' needs. Collectively, the overall mean score of 4.48 reflects a remarkably high and relatively uniform distribution of performance across all indicators based on Koyan's perception table (2012), demonstrating minimal variability and indicating that the teachers exhibit consistently strong competencies in cognitive, pedagogical, and affective domains.

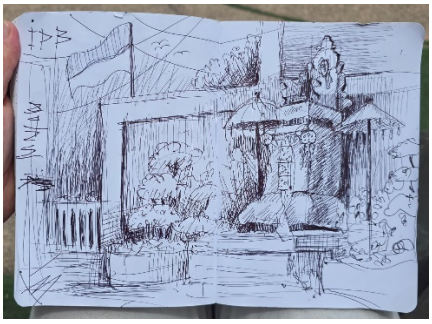

Figure 2. Sketching Result with Darmstadt Design Theory

Another significant finding concerns the development of students' critical thinking and professional awareness. Peripheral learning enabled students to reflect on why certain design choices were made, rather than focusing solely on how to execute them technically. Students demonstrated increased ability to articulate design rationales grounded in theoretical considerations, such as spatial harmony, user experience, and cultural coherence.

This outcome supports Till's (2024) argument that architectural theory serves as an ethical and intellectual foundation for responsible design practice. By engaging in Darmstadt Design Theory through real design tasks, students became more sensitive to the social and cultural implications of interior design. This was particularly evident in cross-cultural learning contexts, where Balinese students connected theoretical principles with local values of harmony, while Timor Leste students interpreted them through their emerging design identity.

Kwon and Park's (2023) notion of "learning at the periphery of professional practice" is also reflected in these findings. Students gradually developed a sense of disciplinary identity by participating in studio culture, observing professional norms, and engaging in reflective critique. Peripheral learning thus contributed not only to cognitive understanding but also to the formation of professional ethics and responsibility.

The findings highlight the strategic value of implementing Darmstadt Design Theory through peripheral learning in cross-cultural design education. Bali, with its strong cultural philosophy and artistic traditions, provides a fertile context for integrating holistic design theories. Meanwhile, the collaboration with Timor Leste students enriches the learning environment by introducing diverse perspectives and design interpretations.

This cross-cultural interaction reinforces Salama's (2023) assertion that contemporary design education should emphasize contextual awareness and cultural responsiveness. Peripheral learning enables such responsiveness by allowing students to

negotiate theory through lived experiences rather than rigid doctrinal instruction. As a result, theory becomes flexible, dialogical, and culturally inclusive.

Referring to any institutional perspective, the findings suggest that architectural and interior design programs should reconsider how theory is positioned within the curriculum. Rather than allocating theory exclusively to lecture-based courses, embedding it into studio practice through peripheral learning can enhance students' engagement, understanding, and long-term retention. This approach is particularly relevant in the digital era, where excessive emphasis on software skills risks overshadowing conceptual depth.

CONCLUSIONS

This study concludes that the implementation of Darmstadt Design Theory through peripheral learning provides a meaningful and effective pedagogical strategy in interior design education, particularly within digitally mediated and cross-cultural studio environments. The findings demonstrate that embedding theoretical principles implicitly within sketching activities, studio critiques, peer observation, and instructor feedback allows students to internalize architectural theory more naturally and contextually than through conventional lecture-based approaches.

The results indicate that peripheral learning successfully bridges the gap between architectural theory and design practice. Students were able to apply Darmstadt Design Theory not merely as an abstract conceptual framework but as a practical guide for decision-making related to spatial composition, proportion, interior articulation, and user experience. Theory was perceived as supportive and functional rather than burdensome, reinforcing its role as an integral component of the design process.

Furthermore, consistently remarkably high perception scores across all instructional criteria, knowledge, teaching method, creativity, responsiveness, and student care highlighting the effectiveness of the teaching approach in fostering an engaging and supportive learning environment. These findings suggest that instructors' ability to integrate theory seamlessly into practice plays a critical role in enhancing students' cognitive, effective, and professional development.

Another significant conclusion is that peripheral learning contributes to the development of students' critical thinking, professional awareness, and ethical sensitivity. Through repeated exposure to theoretical reasoning embedded in real design tasks, students demonstrated improved ability to articulate design rationales grounded in cultural, social, and aesthetic considerations. This was particularly evident in the cross-cultural context of Balinese and Timor Leste students, where diverse cultural perspectives enriched the interpretation and application of Darmstadt Design Theory.

Overall, the study affirms that combining Darmstadt Design Theory with peripheral learning is a viable and innovative approach for contemporary interior design education. It supports the integration of theoretical depth, digital proficiency, and cultural responsiveness, preparing students to become reflective, responsible, and conceptually grounded design professionals in the digital era.

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