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Guidelines for Optimizing Space Resources to Support Teaching and Learning: A Case Study of Adaptive Reuse and Reconfiguration at the Faculty of Architecture, Khon Kaen University

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Abstract

Space resource management is a critical determinant of teaching and learning efficiency, especially in design-focused disciplines like architecture, where the physical environment directly impacts creativity and collaborative outcomes. This research investigates the escalating challenge of space scarcity at the Faculty of Architecture, Khon Kaen University, a constraint that undermines its capacity to accommodate diverse modern teaching methods and the rapid growth in student enrollment.This study employs a qualitative case study methodology, involving a comprehensive survey of instructional spaces and an analysis of usage patterns to develop a utilization plan for both formal and informal learning areas. The primary outcomes include a diagnostic problem assessment and a strategic framework outlining approaches for adaptive reuse, space reconfiguration, and optimizing the use of existing architectural infrastructure.Key findings confirm the necessity of transitioning from fixed-function spaces to flexible, multi-modal environments. Strategic recommendations include implementing "Super rooms," transforming traditional computer labs into flexible learning spaces, and upgrading open or transitional areas (such as under-building spaces, corridors, and halls) into small, multi-purpose, or informal learning zones. The study concludes that sustainable spatial flexibility can be achieved through innovative physical management and design thinking processes, offering a more viable and scalable alternative to costly building expansion or new construction within the context of resource-limited educational institutions.

Keywords: *Space Management, Architectural Education, Learning Environment, Adaptive Reuse.*

Introduction

The Critical Role of Space in Design Learning

The physical environment serves as a "third teacher" (Gandini, 1998), playing a vital role in shaping the learning process and the quality of student outcomes. This influence is particularly significant in architectural and design education, which is characterized by a "Studio Culture" – a primary pedagogical approach requiring specialized spaces such as large drafting rooms, wall areas for presentations and critiques, model-making zones, and workshops with specialized tools (Schön, 1987).

Contemporary architecture and design curricula increasingly integrate diverse learning formats, including computational design, virtual reality (VR) modeling, social service projects, and cross-disciplinary collaboration, all of which demand flexible and adaptable physical spaces (Salama & Wilkinson, 2009). However, many design schools worldwide, especially in developing economies, face a paradox: increasing student enrollment and curriculum diversity alongside static or limited physical infrastructure (Temple, 2008). This spatial constraint thus becomes a direct bottleneck to implementing modern teaching strategies.

Case Study: Faculty of Architecture, Khon Kaen University

The Faculty of Architecture at Khon Kaen University, located in Northeastern Thailand, operates within this challenging context. The faculty has experienced continuous growth in student numbers and program offerings since its establishment, yet the building footprint has remained relatively fixed. The

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primary institutional challenge identified is the insufficient availability of specialized teaching spaces and a lack of flexibility. This limitation hampers the faculty's ability to transition from traditional lecture-based teaching towards studio-based design, diverse laboratories, and the integration of modern technology.

This study, therefore, aims to examine the specific challenges faced by the institution, moving beyond mere facility maintenance to explore and propose physical enhancements guided by "Architectural Intelligence" – the core expertise of the faculty itself – to address its own spatial constraints.

Research Objectives The main objectives of this study are:

1). To conduct an evidence-based survey of both formal and informal learning spaces within the Faculty of Architecture.

2). To analyze spatial requirements based on current teaching formats, such as lectures, design studios, digital tool usage, design reviews, project presentations, exhibitions, etc.

3). To develop and propose a set of strategic management, adaptive design, and space reconfiguration guidelines to maximize utility and enhance teaching and learning outcomes.

Theoretical Framework

This study is grounded in two main concepts:

The Ecology of Campus Environments: Drawing from Strange and Banning (2001), a university environment is not merely a collection of buildings but an integrated system combining physical, human, and organizational elements. Effective space management must therefore consider both physical dimensions (building layout, furniture) and behavioral dimensions (interactions among students and faculty within spaces).

Spatial Affordance: Building on Gibson's (1979) theory of affordance, the value of an educational space is not defined by its designated function but by the "potential actions" it affords users. Successful learning environments must afford flexibility, collaboration, critique, and spontaneous interaction. The central management challenge is to expand the range of simultaneous actions possible within a single space, supporting the principles of adaptive reuse (Carson Parr, 2024).

Research Methodology

This research was conducted as a qualitative case study, summarized in the following steps:

3.1 Survey of the physical condition of learning spaces, both formal (lecture halls/studios) and informal (corridors/under-building areas).

3.2 Analysis of the alignment between spaces and their usage, studying student numbers relative to room quantity and size.

3.3 Synthesizing problem data and needs to formulate space resource management guidelines.

3.4 Concluding with a conceptual framework for managing space to transition from fixed-function areas to flexible, learning-supportive environments.

Findings and Results

Diagnostic Inventory of Existing Spaces The space audit confirmed that usable learning areas are limited and predominantly configured in traditional layouts. Table 1 summarizes the details of the space inventory.

Table 1: Summary of Teaching/Learning Spaces and Usage

Space Type	Capacity Range (Seats)	Quantity	Key Identified Constraints
A. Traditional Lecture Halls	70 (Large)	6	Fixed seating hinders active learning methods.

Space Type	Capacity Range (Seats)	Quantity	Key Identified Constraints
	30-40 (Medium)	2	Suitable for small classes but infrastructure lacks flexibility.
B. Design Studios	70 (Large/Shared)	1	High utilization but often reserved for specific courses.
	20-30 (Small/Specialized)	1	Total studio capacity in-sufficient for concurrent design courses.
C. Specialized IT Spaces	70 (Fixed Computer Lab)	1	Very low utilization outside dedicated CAD/BIM class hours.
D. Specialized Workshops	Varies by material type	4	Essential but often idle when no production activities scheduled.
E. Informal/Collaborative Spaces	5-15 (Seminar rooms)	10	Typically booked for specific meetings, limiting student access.
	Under-building areas/corridors	Adaptable	Currently unorganized, lacking adequate power/data connections.

Key Finding: The usage analysis revealed peak congestion during midday and early afternoon, especially in studios and large lecture halls. In contrast, the fixed computer labs (Type C) had utilization rates below 30% outside computer class hours, representing a significant underutilized asset.

Strategic Guidelines for Space Optimization Based on a synthesis of teaching needs and spatial constraints, the following strategic guidelines are proposed for the Faculty of Architecture and similar institutions:

Guideline 1: Creating Adaptable "Super Rooms"

- **Action:** Systematically upgrade existing large lecture halls (70-seat) by replacing fixed lecture chairs with versatile desks suitable for drafting, model-making, etc. (Figure 1).
- **Outcome:** Transforms single-purpose (lecture-only) spaces into **multi-modal spaces** supporting lectures, collaborative studio work, formal critiques, and design reviews, increasing scheduling density and pedagogical options.

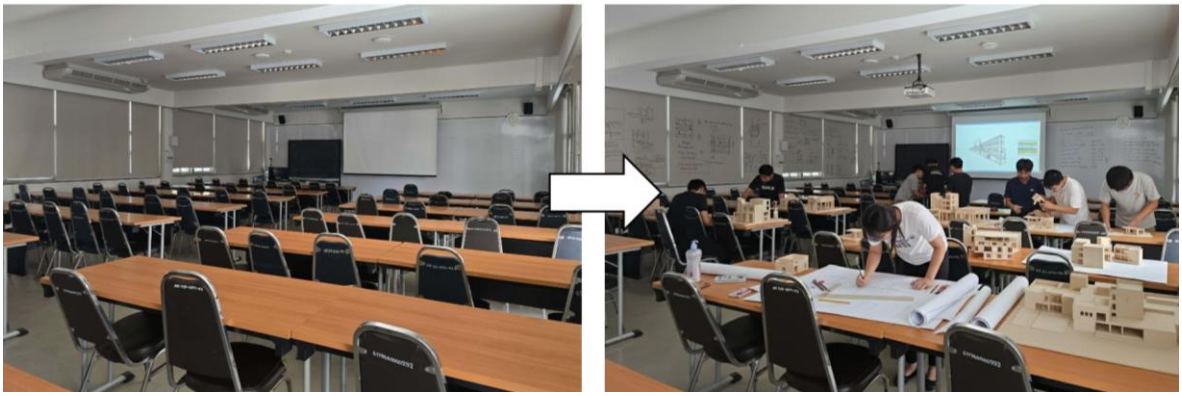

Figure 1: Adapting a lecture hall for design work.

Guideline 2: Enhancing Flexibility of IT and Production Resources

- **Action:** Decommission the fixed central computer lab (Type C) and repurpose the space for flexible use. Implement a Bring Your Own Device (BYOD) policy supported by investment in high-performance Wi-Fi and data infrastructure.
- **Outcome:** The freed-up space can immediately serve as a second design studio, a flexible presentation area, or a temporary exam hall, significantly increasing the supply of flexible space. Access to expensive specialized software can be managed via licensing models, decoupling software from physical room constraints.

Guideline 3: Upgrading Residual and Transitional Spaces into Educational Zones

- **Action:** Re-envision previously unorganized spaces—wide corridors, stairwell landings, and especially under-building areas—as **flexible learning zones**. Furnish them with durable, movable outdoor furniture, install power access points, and provide suitable shading/protection (Figure 2).
- **Outcome:** Addresses the need for informal and social learning (Snyder, 2009). These low-cost areas reduce congestion in formal spaces and serve as breakout points for group work, model assembly, or large-project presentations outside the main studio.

Figure 2: Adapting Corridors or Atria into Learning Areas.

Guideline 4: Implementing Integrated Use of Specialized Workshops

- **Action:** Adopt flexible scheduling systems to allow specialized workshops (e.g., ceramics, textiles, furniture) to be used for general teaching when no production activities are scheduled.
- **Outcome:** For example, a materials lecture gains efficacy if delivered *in situ* within the workshop, integrating theoretical knowledge with material reality, creating a powerful hybrid learning environment that maximizes the return on high-cost specialized equipment.

Guideline 5: Utilizing Design/Build Pedagogy to Extend Spatial Capacity

- **Action:** Institute an annual design-build project where students design and construct low-cost, modular, temporary studio structures using sustainable local materials like bamboo or reclaimed wood (Figure 3).
- **Outcome:** Provides an immediately adaptable solution for peak demand periods (e.g., end-of-semester reviews) by leveraging the faculty's own pedagogical expertise, simultaneously transforming a management problem into a hands-on learning exercise.

Figure 3: Example Of a Design-Build Project Within the Faculty Grounds.

Discussion

The study confirms that the Faculty of Architecture, Khon Kaen University, like many institutions globally, faces problems stemming from "inflexible architecture" (Oblinger, 2006). Traditional fixed-function spaces resist the evolving demands of contemporary, project-based architectural pedagogy.

The adaptive strategies proposed in this framework shift the role of facility management from a "reactive maintenance model" to a "proactive design strategy." The emphasis on **creating flexibility** (Guideline 2) and **versatility** (Guideline 1) connects physical infrastructure with contemporary studio pedagogy, which prioritizes fluidity and cross-group collaboration over isolation (Kevan, 2012).

Furthermore, **elevating informal spaces to formal learning status** (Guideline 3) acknowledges extensive research showing that creativity, social learning, and professional identity formation often occur in "third places" or through serendipitous encounters outside scheduled classrooms (Oldenburg, 1999). Repurposing previously neglected under-building areas aligns well with the culture and climate of the Southeast Asian context.

Conclusion

This study proposes effective, teaching-supportive space resource management guidelines for the Faculty of Architecture, Khon Kaen University. It demonstrates that spatial challenges are essentially "design problems" solvable through strategic adaptive reuse and reconfiguration, rather than relying solely on capital-intensive building expansion.

The proposed five-part strategic framework—promoting versatile space design, flexible technology use, activating transitional areas, integrated workshop use, and capacity extension through Design-build—provides an evidence-based roadmap that can significantly enhance teaching flexibility, learning outcomes, and organizational sustainability.

Future research should focus on the implementation phase, particularly post-occupancy evaluation (POE), to quantitatively measure the impact of spatial adaptations on scheduling efficiency, student density, and most importantly, indicators of student engagement and creative output.

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