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Integration of Theory and Practice in Building Construction Course; A Case Study-Based Evaluation

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Drawing-based learning, building technology, application effectiveness, integration strategies, architectural education.

Abstract

Architectural education is inherently multidimensional, requiring the integration of design studios and technology-oriented courses. A persistent challenge noted in the literature is the weak alignment between technical knowledge taught in lectures and its application in design and practice. This study tests the hypothesis that aligning theoretical content with structured assignments strengthens theory–practice integration and improves course effectiveness. A case study was conducted on two sequential building construction courses (Building Construction I–II) delivered between 2022 and 2025 in a Department of Architecture in Turkey. Using content analysis, course syllabi and assignments were examined against four criteria: content relevance, integration level, application intensity, and active engagement. The analysis shows clear lecture–assignment synchronization and a progressive sequencing of core technical domains. At the same time, assignment deliverables are predominantly drawing-based, and experiential components (e.g., workshops, site visits, digital production) are limited, constraining the depth of practical engagement. Content coverage aligns with core technical domains but addresses contemporary technologies and sustainability only selectively. The study's scope—single institution, instructor-sourced materials—frames the findings as context-specific. Overall, results indicate that enhancing experiential learning opportunities and enriching content with contemporary technologies and sustainability strategies are promising directions for strengthening theory–practice integration and pedagogical effectiveness in building construction education.

Yapı Bilgisi Derslerinde Teori-Pratik Entegrasyonu: Vaka Analizi Temelli Bir Değerlendirme

Anahtar Kelimeler:

Çizim tabanlı öğrenme, yapı teknolojisi, uygulama etkinliği, entegrasyon stratejileri, mimarlık eğitimi.

Özet

Mimarlık eğitimi, tasarım stüdyoları ile teknoloji odaklı derslerin bütünleşmesini gerektiren çok boyutlu bir yapıya sahiptir. Literatürde sıkça vurgulanan kalıcı sorun, derslerde aktarılan teknik bilginin tasarım ve uygulama süreçleriyle zayıf biçimde hizalanmasıdır. Bu çalışma, teorik içeriğin yapılandırılmış ödevlerle eşleştirilmesinin teori–pratik entegrasyonunu güçlendirdiği ve ders etkinliğini artırdığı yönündeki hipotezi test etmektedir. Türkiye'de bir Mimarlık Bölümünde 2022–2025 yılları arasında yürütülen iki ardışık yapı bilgisi dersi (Building Construction I–II) üzerinde bir vaka analizi gerçekleştirilmiştir. İçerik analizi yöntemiyle ders izlenceleri ve ödevler dört ölçüte göre incelenmiştir: içerik uygunluğu, entegrasyon düzeyi, uygulama yoğunluğu ve aktif katılım. Analiz, ders anlatımı ile ödevler arasında belirgin bir senkronizasyon ve temel teknik alanların kademeli dizilimini göstermektedir. Bununla birlikte, çıktılar büyük ölçüde çizim temellidir ve atölye çalışmaları, saha gezileri, dijital üretim gibi deneyimsel bileşenler sınırlıdır; bu durum pratik derinliği kısıtlamaktadır. İçerik kapsamı çekirdek teknik alanlarla uyumlu olmakla birlikte, çağdaş teknolojiler ve sürdürülebilirlik temaları seçici biçimde ele alınmaktadır. Çalışmanın kapsamı—tek kurum ve eğitmen kaynaklı materyaller—bulguların bağlama özgü olduğunu işaret eder. Genel olarak sonuçlar, deneyimsel öğrenme olanaklarının güçlendirilmesi ile çağdaş teknolojiler ve sürdürülebilirlik stratejileriyle içerik zenginleştirmenin, yapı bilgisi eğitiminde teori–pratik entegrasyonunu ve pedagojik etkililiği artırmak için umut verici yönler olduğunu göstermektedir.

1. INTRODUCTION

Architectural education is not merely a design-oriented process but a multidimensional structure shaped by the interaction of various disciplines (Diri & Mayuk, 2019; Lekesiz & Gürer, 2022). Accordingly, curricula balance design, technical knowledge, theoretical foundations, artistic inquiry, and professional practice (Bilgiç & Konak, 2016; Deniz et al., 2017; Gül et al., 2013). The Architecture Accreditation Board (MİAK) defines this holistic structure through five core domains: design and creative thinking; history, theory, culture, and art; environment, city, and society; technology; and professional practice (MİAK, 2023; Yalaz, 2021). Parallel classifications in the literature emphasize that architectural education is structured around design, technology, theoretical knowledge, art, and professional application (ACSA, 2008; Salama, 2015; Teymur, 1992). These domains reflect international expectations that programs integrate design, technical knowledge, theoretical foundations, artistic inquiry, and professional skills into a cohesive curriculum. Likewise, the National Architectural Accrediting Board (NAAB) mandates evidence of design synthesis and explicit building integration in student work, requiring projects that fully incorporate structural systems, building envelope, environmental control systems, life safety, and other technical systems (SCIARC, n.d.). In sum, national and international standards position architects as both creative designers and technically competent professionals, underscoring the interdependence of technology and design (MİAK, 2023; SCIARC, n.d.).

Within this framework, the technology domain encompasses courses that address building production processes; building construction (often termed structural science) constitutes a fundamental component (Aziz, Fahmi & Bane, 2010; Bilgiç & Konak, 2016; Bodur, Koşan & Görmüş, 2020; Diri & Mayuk, 2019). The technology group comprises building construction, material science, construction systems, environmental control systems, building physics, and construction management, among others, and its pedagogy has evolved into a distinct field of inquiry (ACSA, 2008; Oxman, 2004; Özen & Pekdoğan, 2023; Yazıcıoğlu, 2013). These courses prepare students not only to design, but also to understand and address the technical requirements of design (Lökçe, 2002). Within this group, building construction courses provide essential knowledge on structural system types, building components, material properties, and construction techniques, establishing the basis for technically accurate and feasible design decisions (Lökçe, 2002; Özen & Pekdoğan, 2023; Yalaz, 2021).

Despite this intent, the literature and current practice indicate that theoretical knowledge delivered in building construction courses is often insufficiently integrated into practical applications and design studios (Aziz, Fahmi & Bane, 2010; Bodur, Koşan & Görmüş, 2020; Onur & Zorlu, 2017; Salama, 2015). In many cases, theoretical content receives superficial treatment in studio work, and structural decisions assume a secondary role in the design process (Oxman, 2004; Shareef, Rauf & Ukabi, 2024). Such patterns undermine the holistic character of architectural education and weaken professional competence. Strengthening the integration of theory and practice in building construction courses therefore becomes a critical requirement for improving educational quality (Shareef, Rauf & Ukabi, 2024).

Design studios—central to architectural education—provide an integrated environment where students synthesize knowledge from multiple courses within the design process (Lekesiz & Gürer, 2022; Yurtsever & Polatoğlu, 2020). Effective transfer of building construction knowledge into studio settings thus serves as a key indicator of course effectiveness (Oxman, 2004). Yet students frequently struggle to incorporate technical requirements into design decisions, with aesthetic considerations often prevailing, which signals a need for closer alignment between building construction courses and studio pedagogy and for more practice-oriented delivery (Bodur, Koşan & Görmüş, 2020).

The literature identifies recurring issues in this context: limited alignment of assignments with contemporary production processes; tasks that remain predominantly theoretical and offer little exposure to real construction practices; difficulties in transferring course knowledge to studio projects; and course content that is not regularly updated, alongside pedagogical approaches that do not sufficiently leverage innovative methods. At the core lies a predominantly static, transmission-based model that affords few opportunities for discussion and experiential learning (Diri & Mayuk, 2019; Gül et al., 2013; Oxman, 2004). As a result, the low emphasis on practical activity weakens students' capacity to integrate design and technical knowledge, constituting a significant shortcoming for professional competency (Bilgiç & Konak, 2016; Ünay & Özmen, 2006).

Integrating theoretical knowledge from building construction courses into design and practical processes thus represents a critical component of architectural education (Özen & Pekdoğan, 2023). When this integration remains weak, students struggle to develop decisions grounded in technical accuracy, structural requirements, and performance criteria, which in turn diminishes professional competence (Bodur, Koşan & Görmüş, 2020).

Establishing a strong linkage between theoretical content and practice-oriented assignments is therefore viewed as a key strategy for enhancing educational quality (Aziz, Fahmi & Bane, 2010; Bilgiç & Konak, 2016).

In this context, the study advances the following hypothesis: structuring building construction course content to integrate theoretical knowledge with practical assignments strengthens theory–practice alignment and enhances pedagogical effectiveness. The hypothesis is examined through a case study. The selected courses are analyzed to reveal the relationship between theoretical content and assignments and to assess how integration relates to student performance. The aim is to discuss a model for improving theory–practice alignment in light of empirical findings and observations.

The primary aim is to analyze the practical effectiveness of building construction courses within undergraduate programs and to reassess their role through the lens of theory–practice integration. Although these courses are designed to deliver fundamental knowledge on structural systems, materials, and construction techniques (Bilgiç & Konak, 2016), insufficient integration of this knowledge into design processes limits overall effectiveness. The study therefore determines the level of alignment between theoretical topics in the syllabi and practical assignments and evaluates existing integration strategies. To address this objective, a case study approach examines course content and pedagogical methods. The analysis focuses on course content and the mechanisms that link theoretical knowledge with practical applications; based on the findings, the study develops pedagogical recommendations to strengthen theory–practice integration. Within this scope, the syllabi and practical activities of building construction courses delivered in an architecture department are examined, and the degree of synchronization between theoretical content and practical assignments is systematically evaluated.

2. LITERATURE REVIEW

Architectural education operates as an interdisciplinary field that balances creativity with technical knowledge (Diri & Mayuk, 2019; Sönmez, 2018). The literature consistently identifies a persistent problem: theoretical knowledge often fails to transfer into practical settings and design processes (Aziz, Fahmi & Bane, 2010; Bodur, Emami & Buelow, 2016; Koşan & Görmüş, 2020; Oxman, 2004; Salama, 2015). Numerous studies document a pronounced disconnect between what architectural programs teach and what professional practice demands, a gap visible since the 1980s (Madan & Mathur, 2025; Samudro et al., 2025).

Although design studios and technical courses typically run in parallel, weak integration between them impedes students' ability to apply theoretical knowledge within design workflows (Alakavuk, 2016; Bodur, Koşan & Görmüş, 2020; Bozkurt, 2012). As a result, many students treat technical courses as secondary, and theoretical content remains superficial in studio projects (Diri & Mayuk, 2019; Emami & Buelow, 2016).

Policy and accreditation frameworks reinforce the need for closer alignment. The UNESCO–UIA Charter for Architectural Education (2004) requires students to acquire adequate technical knowledge in construction, materials, and structural systems and to integrate this knowledge into design as a condition of professional competence (Alakavuk, 2016). Likewise, bodies such as MİAK and NAAB frame the integration of technology courses with design pedagogy as a mandatory standard (Biggs & Tang, 2011; Bodur, Koşan & Görmüş, 2020). Despite these expectations, traditional teaching still centers on transmission of information, which limits the effective use of building-construction knowledge in studio contexts (Salama, 2015).

In response, educators propose pedagogical strategies that tighten theory–practice alignment. The literature highlights design–build studios, community/user-driven design (CUDE), research-based design, and interdisciplinary collaboration models (Akgün, 2016). These approaches provide authentic project experience, allow students to test technical knowledge in practice, and simulate professional conditions more closely (Dewsburry, Law & Wallis, 2014). Beyond technical transfer, they also help develop communication, problem-solving, and teamwork—competencies essential to professional formation (Samudro et al., 2025).

2.1. Integration of Building/Technology Courses into the Design Studio

The architectural curriculum typically includes design studios, technology courses, theoretical/historical courses, and art–aesthetic components (Diri & Mayuk, 2019; Salama, 2015). Within this structure, technology courses cover building technology, structural systems, material science, and building physics, thereby providing the technical foundation that supports design processes (Diri & Mayuk, 2019; Lökçe, 2002). In practice, however, these courses often run independently of design studios, which limits the effective transfer of theoretical knowledge into studio work (Alakavuk, 2016; Aziz, Fahmi & Bane, 2010; Bodur, Koşan & Görmüş, 2020).

The literature documents a range of approaches to address this weak linkage (Shareef, Rauf & Ukabi, 2024). A case study by Alakavuk (2016) shows that integrating a third-year building technology course with a studio focused on earthquake-resistant housing improves students' ability to carry technical knowledge into their projects. Likewise, Erbil (2008) reports that embedding practical exercises in building technology courses and aligning them with studio sequences enhances learning motivation and professional competence. These findings indicate that coordinating parallel courses in terms of content and schedule supports theory–practice integration (Bodur, Koşan & Görmüş, 2020). Nevertheless, many programs still lack such coordination, and students tend to treat building technology as an abstract requirement while prioritizing formal–aesthetic decisions over technical considerations in design development (Bodur, Koşan & Görmüş, 2020; Salama, 2015).

In response to these shortcomings, the literature highlights problem-based learning (PBL), design-build studios, and integrated curriculum models as effective means to bridge the gap between technology instruction and studio practice (Yalaz, 2021).

2.2. Proposed Approaches for Theory-Practice Integration

Recent years have seen a shift beyond traditional lecture-based delivery toward active learning strategies that aim to make building technology courses more effective (Diri & Mayuk, 2019; Emami & Buelow, 2016; Shareef, Rauf & Ukabi, 2024). Conventional methods are frequently criticized for positioning students as passive recipients and producing monotonous learning environments, whereas practice-based approaches are shown to increase motivation and knowledge retention (Aziz, Fahmi & Bane, 2010; Bodur, Koşan & Görmüş, 2020; Erbil, 2008; Mayuk & Coşgun, 2020). Building studios, scaled model making, site visits, workshops, and full-scale prototyping create direct links between theory and application, rendering learning more concrete and durable (Bodur, Koşan & Görmüş, 2020; Diri & Mayuk, 2019; Kavraz, 2021).

Within this pedagogical landscape, problem-based learning (PBL) situates technical instruction in the context of real design problems, thereby fostering active engagement and supporting the internalization of knowledge through applied work (Banerjee & De Graaff, 1996; Erbil, 2008). Design–build studios extend this logic by enabling students to construct their designs at full scale, which consolidates understanding of materials and construction techniques while introducing authentic professional experience into the curriculum (Akgün, 2016; Bodur, Koşan & Görmüş, 2020; Erbil, 2008; Folic et al., 2016; Şahin, 2013). A broader family of active learning techniques—including workshops, fieldwork, and prototyping—moves learners from passive listening to experiential participation, consistent with established models of experiential learning (Dewsbury et al., 2014; Erbil, 2008; Kolb, 1984). Complementing these methods, integrated curriculum models coordinate technology courses and design studios, align content with studio themes, and structure assessment criteria to reflect this coherence (Erbil, 2008; Oxman, 2004; Salama, 2015).

Collectively, these approaches recast technical knowledge from an abstract domain into an integral component of design practice, strengthening not only analytical competence but also creative problem-solving capacity (Bodur, Koşan & Görmüş, 2020; Samudro et al., 2025; Yalaz, 2021).

2.3. The Relationship Between Design Studio and Other Courses, and Integration Strategies

The design studio functions as the core platform of architectural education, where knowledge from diverse courses is synthesized and translated into application (Diri & Mayuk, 2019; Emami & Buelow, 2016; Nicol & Pilling, 2000). Weak linkages between theoretical/technical courses and the studio frequently produce fragmented and superficial learning experiences (Bodur, Koşan & Görmüş, 2020; Bozkurt, 2016). To address this issue, the literature outlines horizontal integration—connecting courses within the same semester through shared themes or projects—and vertical integration, which structures content progressively across academic levels (Bodur, Koşan & Görmüş, 2020).

In response, several institutions have adopted integrated practice studio models (Kavraz, 2021). These models assemble students from architecture, civil engineering, and interior architecture into collaborative teams that work on real-world scenarios, thereby embedding interdisciplinary collaboration, project management, and problem-solving into the educational process (Bodur, Koşan & Görmüş, 2020). By simulating the dynamics of professional practice within the studio, this approach provides a more authentic and holistic learning environment.

Despite such initiatives, integration in many programs remains limited. Evidence indicates the continued dominance of traditional teaching methods and the underuse of interactive, practice-oriented strategies (Samudro et al., 2025). More robust embedding of experiential learning opportunities, field studies, and

interdisciplinary project-based learning into curricula is identified as a critical step for strengthening the relationship between theory and practice (Hajirasouli & Banihashem, 2022).

3. MATERIALS & METHODS

Integrating theory and practice in architectural education constitutes a fundamental requirement for professional competence and design-based decision-making (Aziz, Fahmi & Bane, 2010; Diri & Mayuk, 2019). To evaluate this integration, the literature identifies assessment criteria that address both content structure and pedagogical delivery. Building on prior research, the study adopts four key parameters—content relevance, integration level, application intensity, and active participation—as its methodological framework (Table 1). These parameters provide a basis for assessing how effectively building construction courses link theoretical knowledge to hands-on architectural applications.

Content relevance examines alignment between course topics and contemporary technologies and practices, including sustainable design strategies, construction methods, and digital tools (Salama, 2015). Integration level evaluates the transfer and use of theoretical knowledge within design studio settings, where architectural ideas are expected to rest on technical rationales (Oxman, 2004). Application intensity captures the depth and quality of practical work—such as scaled technical drawings or prototype constructions—that supports conceptual understanding of construction systems (Bodur, Koşan & Görmüş, 2020; Kavraz, 2021). Active participation gauges the degree of student engagement through experiential and collaborative learning methods, informed by Kolb's (1984) experiential learning theory.

Taken together, these four criteria offer a structured lens for analyzing pedagogical coherence and the curricular integration of design and technology. They guide a case-based inquiry into the implementation of two sequential building construction courses within an undergraduate architecture program.

Table 1. Assessment criteria (Table created by the author).

Evaluation Criteria	Description	Key References
Content Relevance	Alignment of course content with current knowledge and technologies	Salama (2015)
Integration Level	Transferability of theoretical knowledge to design projects	Oxman (2004)
Application Intensity	Relation of assignments to material, detailing, and construction techniques	Mayuk & Coşgun (2020)
Active Participation	Students' engagement in practical learning and group activities	Kolb (1984)

The research employs a qualitative case study design to examine alignment between theoretical content and practical assignments in Building Construction 1 and Building Construction 2 and to consider implications for student learning. The dataset consists of course syllabi, drawing-based assignments, and instructor observations. The analysis first maps the structuring and sequencing of theoretical topics within syllabi, then evaluates assignments for thematic scope, technical depth, and relevance to contemporary architectural production processes. Content analysis and comparative interpretation techniques frame the results, which are contextualized with integration strategies identified in the literature. This approach clarifies current limitations and informs the development of pedagogical strategies for more effective theory–practice alignment.

The case study focuses on a Department of Architecture in Turkey, where the analyzed courses were delivered between 2022 and 2025 as part of a newly restructured curriculum. The restructuring responds to national accreditation objectives set by the Architecture Accreditation Board (MİAK). MİAK defines five core domains for accredited curricula—design and creative thinking; history, theory, culture, and art; environment, city, and society; technology; and professional practice. Within this framework, the technology domain includes courses such as building construction, material science, statics and strength, structural systems, environmental control systems, building physics, and construction management. The two courses examined - Building Construction 1 and Building Construction 2 - serve as core components of this domain and are designed to develop progressive understanding of structural logic, material selection, and technical detailing.

Although these courses are intended to support design studio objectives, they are delivered independently and are not embedded within studio workflows. Coordination in timing, content delivery, and thematic integration remains limited; structural and material decisions in student projects often appear at later stages rather than informing design from the outset. Within this case study, the relationship between construction courses and studio projects is therefore considered in a limited capacity, and broader systemic alignment is identified as a continuing need.

The findings reported here derive from course documentation and instructor observations collected across the examined academic years. This lens offers insight into pedagogical structure and instructional strategies but does not include direct assessment of student learning outcomes; student projects, evaluation data, and feedback mechanisms were not analyzed. Consequently, the study presents an instructor-centered evaluation rather than a comprehensive, student-focused analysis. Future research integrating student work samples and post-course evaluations would support a more holistic understanding of how technical knowledge is internalized and applied in architectural design education.

4. CASE STUDY; BRIDGING THEORY AND PRACTICE IN BUILDING CONSTRUCTION COURSE CONTENT

This case study examines two complementary building technology courses offered in the second and third semesters of an architecture program: Building Construction 1 (BC 1) and Building Construction 2 (BC 2). Positioned within the technology curriculum group, these courses aim to develop theoretical knowledge and practical skills in building components, structural systems, and construction techniques. Each course allocates two hours to theoretical instruction and two hours to practical sessions per week, and drawing-based assignments reinforce the theoretical content (Figure 1).

The courses follow a sequential, incremental learning model. BC 1 introduces basic building components and addresses excavations, foundation types, wall systems, floor systems, and roof solutions. The course familiarizes students with primary building components and the structural logic governing them. BC 2 continues this sequence by emphasizing superstructure elements and detailed construction solutions. Key topics include stair systems, roof types, exterior cladding, window and frame details, interior partitions, and performance criteria such as thermal and waterproofing solutions. By the end of the sequence, students develop a comprehensive technical foundation and understand the holistic relationships among building components.

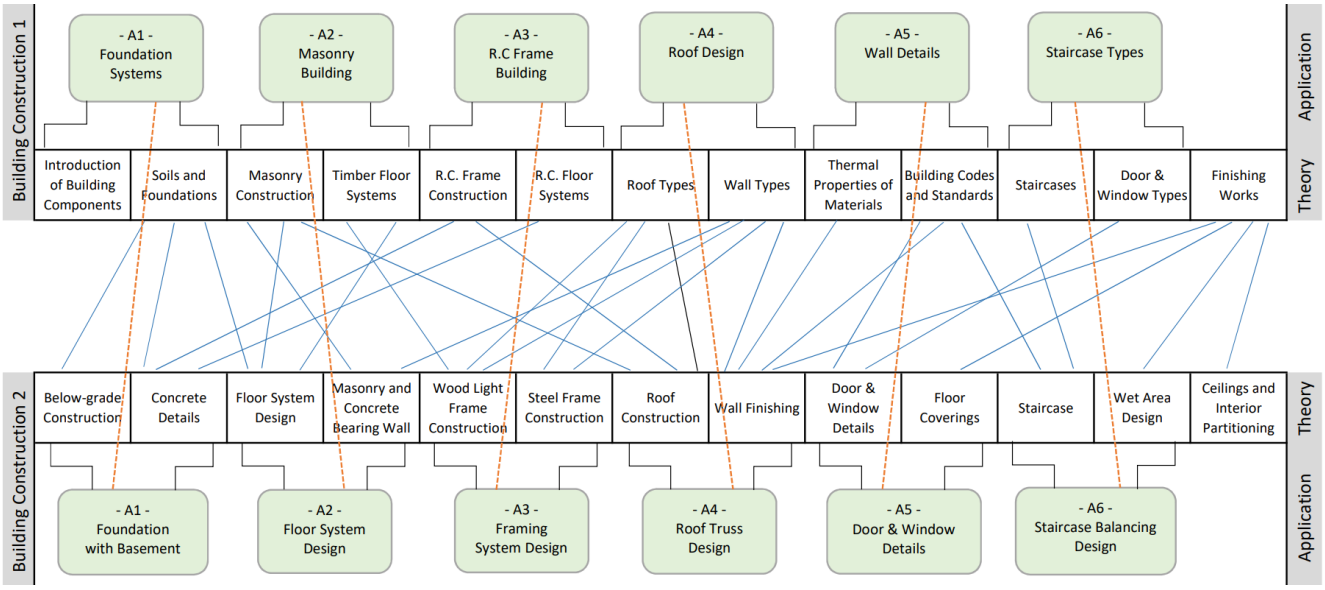


Figure 1. Theory-application integration map for BC 1 and BC 2 courses (Figure created by the author).

Figure 2 provides an overview of the six assignments in BC 1. Each assignment aligns directly with the weekly topics in the syllabus, establishing a progression from foundational concepts (e.g., soil and foundation systems) to more complex components (e.g., staircases and construction details). The assignments strengthen theory–practice integration through applied exercises while advancing technical drawing skills, deepening understanding of material properties, and fostering the integration of structural principles into the design process.

BC 1 constitutes the introductory stage of the integrated structure. At this level, students also take foundational courses such as graphic communication, and their drawing and representation skills continue to develop. Accordingly, BC1 assignments are distributed without predefined scales; students redraw them at appropriate scales on 35 × 50 cm sheets and use scale rulers. This practice cultivates drawing proficiency and builds scale literacy through hands-on work. To discourage a “copy–paste” approach, written exams include questions derived from these drawings, prompting deeper comprehension and critical engagement. This instructional strategy supports the acquisition of fundamental structural knowledge and conceptual awareness in BC 1.

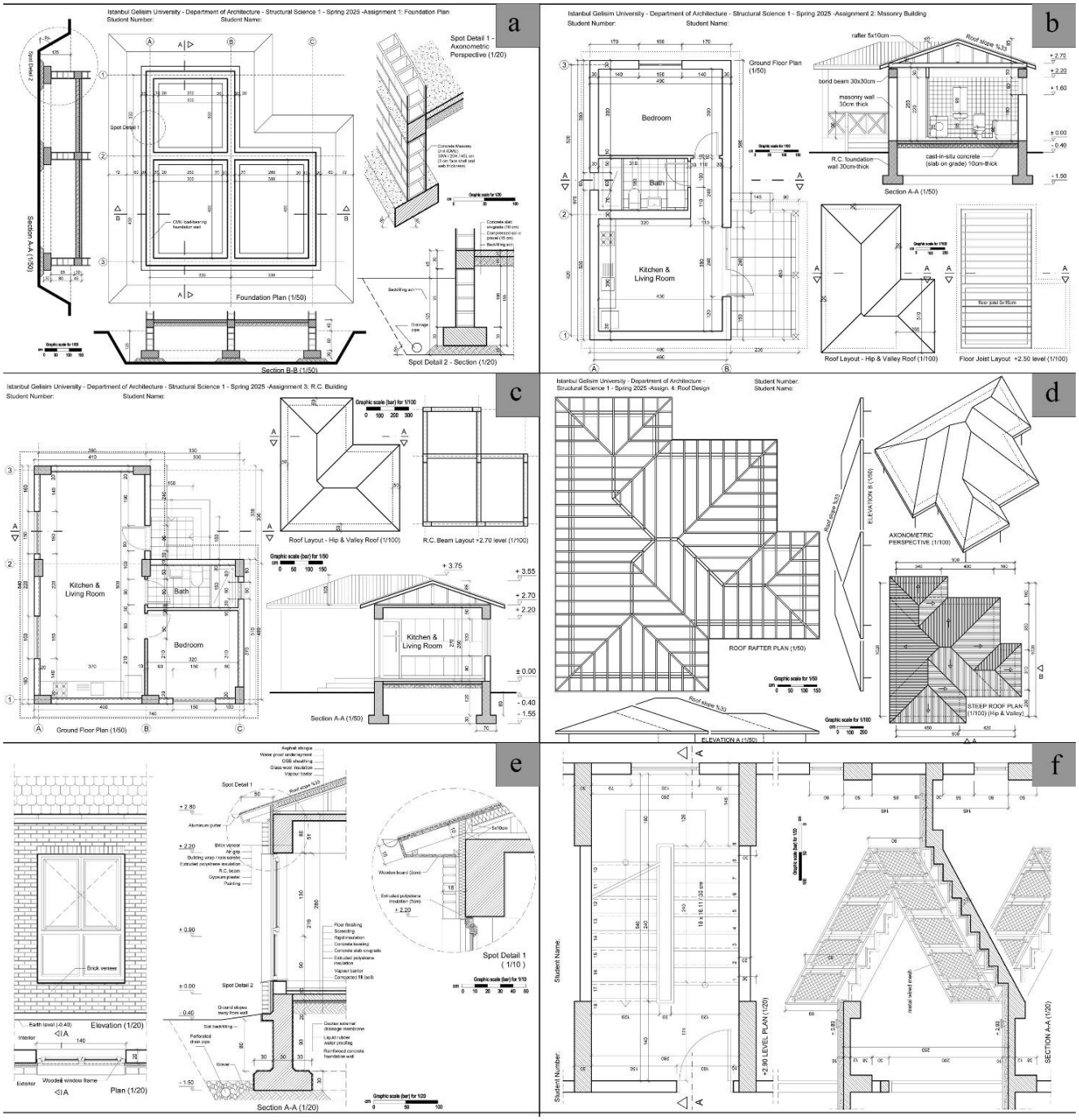


Figure 2. Overview of assignments in BC 1 (Figure and drawings created by the author).

BC2 adopts a distinct pedagogical approach (Figure 3). By this stage, students have encountered core construction topics, learned assignment preparation methods, and completed basic theoretical content with related practical activities in BC 1. Consistent scale use in BC 1 assignments provides experience with scaled representation, and combining multiple scales with three-dimensional construction details creates an intensive learning experience.

To avoid pedagogical redundancy, BC 2 advances the learning model. For practical assignments, the instructor supplies draft drawings that intentionally omit scale indicators, introducing higher complexity. Students determine missing dimensions and details independently, which prompts them to question, reconstruct, and consolidate prior knowledge. The approach cultivates problem-solving, analytical reasoning, and accurate interpretation of construction details within design contexts. As a result, BC 2 supports a more independent, solution-oriented learning process and elevates technical proficiency.

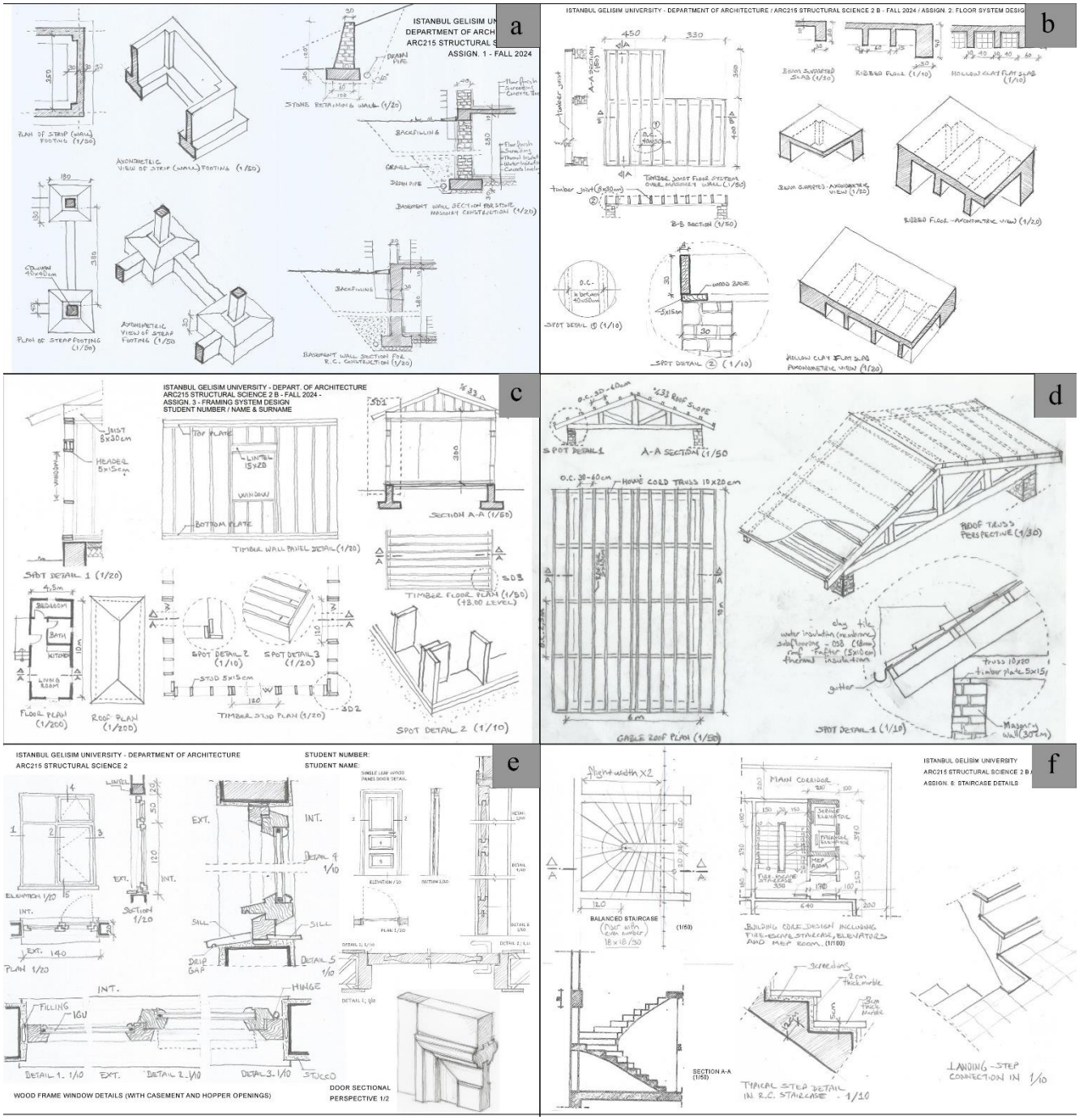


Figure 3. Overview of assignments in BC 2 (Figure and drawings created by the author).

Both courses include six assignments that connect theory to practice. Assignments track the syllabus topics directly: in BC1, a week on foundations leads to plan and section drawings of different foundation types; coverage of wall systems leads to detailed drawings of those systems. In BC 2, instruction on stair systems is followed by detailed plans, sections, and elevations for a staircase designed to accommodate specified level differences. This sequence ensures that theoretical knowledge translates into applied outputs.

At the beginning of each semester, the course syllabus is communicated to students with explicit emphasis on theory–practice integration. This integration functions as a core pedagogical principle and shapes assessment and evaluation (e.g., written exams, assignments). Students receive clear guidance that missing the synchronization between theory and application can hinder deep comprehension and affect achievement of learning outcomes.

Continuity between the two syllabi is reinforced by revisiting selected topics in different contexts, which supports retention and prepares students to resolve more complex construction details. In this context, aligning theoretical content with practical assignments provides a suitable basis for testing the study's hypothesis.

The case analysis evaluates syllabi and assignments against the four criteria defined in the Materials & Methods section—content relevance, integration level, application intensity, and active participation. A systematic review grounded in instructor observations organizes the analysis and reports the current state of these courses within the framework of these parameters.

4.1. Content Relevance

Content relevance evaluates how the building construction course topics align with contemporary architectural production processes, technological developments, and professional standards. A review of the syllabi shows that both courses address core knowledge domains within the technology group of architecture curricula. The theoretical content concentrates on structural systems, building materials, building physics principles, and the detailing of primary building components.

Table 2 displays the distribution of emphasis across core knowledge domains over the semester for both courses. BC1 places early emphasis on structural systems and material knowledge, then introduces building physics and foundational principles of detailing in later weeks. BC 2 follows a more advanced sequence, with broader integration of detailed design and building physics. Figure 4 (radar chart) compares the overall coverage of architectural technology domains between the two courses.

Table 2. Comparative content coverage for BC 1 and BC 2 courses based on a 5-point Likert scale, reflecting the instructor's observations (Table created by the author).

	Knowledge Domains											
Weeks	Struct. Systems		Mater. Knowl.		Build. Physics		Detail Design		Contemp. Tech.		Sustainability	
	BC 1	BC 2	BC 1	BC 2	BC 1	BC 2	BC 1	BC 2	BC 1	BC 2	BC 1	BC 2
1	5	5	3	4	2	2	2	3	1	2	1	1
2	5	5	4	4	2	3	3	4	1	2	1	1
3	4	5	4	4	2	3	3	4	1	2	1	1
4	4	4	4	4	2	3	3	4	1	2	1	1
5	5	5	4	4	2	3	3	4	1	2	1	1
6	5	5	4	4	3	3	3	4	1	2	1	1
7	4	4	3	3	3	3	3	4	1	2	1	1
8	Mid-term Exam											
9	4	4	3	3	3	3	3	4	1	2	1	1
10	3	3	3	3	4	3	3	4	1	2	1	1
11	3	3	3	3	4	4	3	4	1	2	1	1
12	4	4	3	3	3	3	4	4	1	2	1	1
13	3	3	3	3	3	4	4	4	1	2	1	1
14	3	3	3	3	3	4	4	4	1	2	1	1

The classification of structural systems constitutes the organizing framework in both courses. BC 1 focuses on substructure and basic structural components—such as foundations, wall systems, and floor types—whereas BC 2 extends to steel and timber frame systems, complex roof solutions, and stair details. Material knowledge and performance characteristics are addressed through reinforced concrete, steel, timber, and solid wall systems, and performance parameters—fire resistance, thermal conductivity, and moisture control—are incorporated into the content. Building physics topics—thermal insulation, vapor balance, and mitigation of thermal bridges—are articulated through exercises on façade and roof details. Drawing-based assignments addressing foundations, slabs, walls, roofs, and stairs (see Figures 2 and 3) link theoretical content to applied outputs.

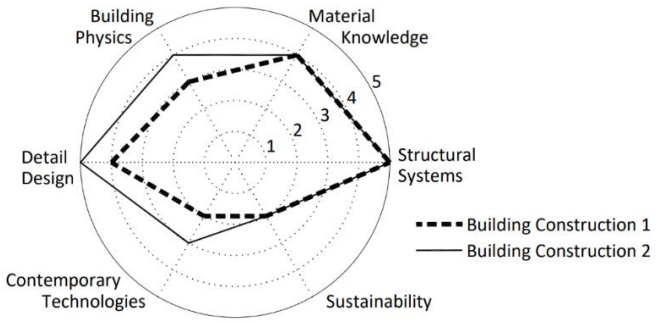


Figure 4. Content relevance analysis for BC 1 and BC 2 courses based on a 5-point Likert scale, reflecting the instructor's observations (Figure created by the author).

Overall alignment with the technical knowledge domains outlined in the UNESCO–UIA Charter for Architectural Education (2004) and related accreditation standards is observed in the syllabi. At the same time, the syllabi include limited coverage of contemporary technologies and sustainability, as reflected in Table 2 and Figure 4.

4.2. Integration level

The integration level evaluates the alignment between theoretical content and practical assignments and the extent to which this relationship is reflected in students' design processes. The analyzed syllabi are structured to synchronize theory and practice; in both courses, assignments are scheduled immediately after the related theoretical topics.

The clearest indicator of this alignment is the direct parallel between assignment topics and lecture themes. For example, after the lecture on foundation systems, students prepare drawings of different foundation types; following the lecture on roof systems, they produce roof plans and sections. Figures 2 and 3 visualize this pattern, showing high consistency between practical assignments and theoretical content in both courses. In addition, the comparative content coverage in Table 2 documents how this synchronization is sustained across the semester.

From a temporal perspective, the integration timeline in Figure 5 depicts weekly alignment between theoretical modules (horizontal bars) and their corresponding assignments (A1–A6). This schedule illustrates a structured sequence in which applied tasks follow immediately after content delivery.

At the same time, integration remains predominantly drawing-oriented, with limited incorporation of experiential activities such as workshops, site visits, or digital fabrication. Case study observations also record instances where technical decisions - e.g., material selection and detail development - are treated at a superficial level within student projects.

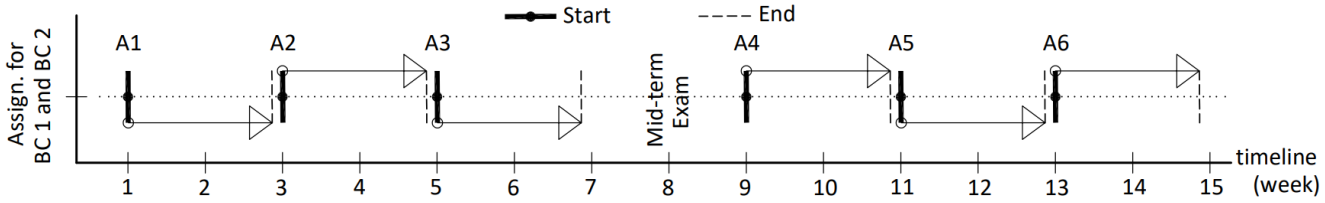


Figure 5. Integration timeline of assignments for BC 1 and BC 2 courses (Figure created by the author).

4.3. Application Intensity

Application intensity evaluates how closely the assigned tasks relate to the theoretical content of the building construction courses, their connection to material knowledge and construction techniques, and their contribution to students' practical skill development. In the reviewed syllabi, practical activities are predominantly organized around technical drawing and detail production. In both BC 1 and BC 2, tasks are assigned immediately after the corresponding theoretical sessions, enabling the conversion of conceptual topics into concrete outputs.

During weeks devoted to structural components - such as foundations, slabs, roofs, and stairs - drawing-based exercises reinforce topic comprehension. Figures 2 and 3 illustrate this structure, showing the alignment between assignments and theoretical coverage. For example, lectures on foundation systems are followed by detailed drawings addressing different soil conditions; lectures on roof and stair design are followed by plan, section, and elevation drawings. This sequencing supports the reconstruction of technical knowledge through drawing and develops structural thinking.

Table 3 provides a comparative view of the pedagogical dimensions of the assignments based on instructor observations. In BC 1, assignments emphasize drawing complexity, while integration of material knowledge and construction logic appears limited. In BC 2, assignments include more intricate details and multiple component relationships, indicating increased integration of construction principles and materials. For both courses, contribution to real-world context is low within the observed tasks.

Overall, the intended learning outcomes and the practical tasks display strong alignment; nevertheless, most activities remain drawing-centered. The absence of workshop-based activities, material experiments, model-making, digital fabrication processes, and site visits is noted as a constraint on the pedagogical depth of application intensity. This pattern is reflected in design studio work, where connection detailing, material selection, and building-physics-related decisions are in some cases addressed at a superficial level.

Table 3. Application depth matrix for BC 1 and BC 2 courses based on a 5-point Likert scale, reflecting the instructor's observations (Figure created by the author).

Courses	Assignments					
	A1	A2	A3	A4	A5	A6
BC1	3	3	3	5	5	4
BC2	4	4	4	5	5	5

4.4. Active Participation

Active participation assesses the extent to which students incorporate knowledge from building construction courses into the design process and how this incorporation influences design decisions. The syllabi indicate strong synchronization between theoretical content and practical assignments; however, transfer of this knowledge to design studio projects appears limited.

Case-study findings show that students are familiar with structural systems, floor types, and stair solutions, yet often do not employ this knowledge in early design stages. Structural and technical decisions tend to emerge after formal or aesthetic considerations, indicating weak timing of integration between course content and studio development.

A review of student projects reveals notable variation in integration levels. In stronger examples, structural strategies introduced in the courses are embedded during initial design phases, material selections align with performance criteria, and details are developed through a coherent, system-wide approach. In weaker examples, structural choices are added superficially near the end of the process, building-physics requirements are omitted, and detail development remains incomplete. Overall, the evidence points to a moderate level of active participation.

5. CONCLUSION & RECOMMENDATIONS

The study tested the hypothesis that aligning theoretical content with structured assignments strengthens theory–practice integration and improves course effectiveness in building construction education. The case evidence supports this claim: across BC 1 and BC 2, syllabus design establishes clear lecture - assignment synchronization, enabling progressive reinforcement of core technical domains. At the same time, several gaps limit the transfer of knowledge to authentic contexts and to the design studio.

Using a three-year corpus (2022–2025) of syllabi, assignments, and instructor observations from a single architecture department, the analysis mapped course content, timing, and outputs against four parameters - content relevance, integration level, application intensity, and active participation. Findings confirm comprehensive coverage of structural systems, materials, and detailing, but reveal limited attention to contemporary technologies and sustainability; strong weekly "theory → assignment" alignment, yet weaker extension into studio decision-making; high reliance on 2D drawing deliverables with few experiential components; and uneven early-stage incorporation of technical reasoning in students' design processes. On this basis, the following recommendations are advanced.

Content relevance (Section 4.1) calls for enriching course content with contemporary technologies - especially digital fabrication workflows - and aligning topics more explicitly with current professional practices, expanding and embedding sustainability and energy - efficiency themes (including sustainable materials) across both courses rather than treating them as isolated units, and conducting periodic content reviews against UNESCO–UIA (2004) and accreditation standards to maintain currency.

Integration level (Section 4.2) emphasizes preserving the weekly lecture–assignment cadence while adding an experiential layer - such as workshops, site/construction visits, and digital production sessions - and making time - and theme - based coordination with concurrent studios explicit so that weekly building construction tasks directly inform studio problems.

Application intensity (Section 4.3) would benefit from balancing drawing-centric outputs with materially grounded activities—such as material experiments, scaled models/prototypes, and short in-situ exercises - while deepening the BC 1→BC 2 progression by increasing material/construction logic in BC 1 and using small build/disassembly tasks in BC 2 to consolidate multi-component relationships; it may also be strengthened by introducing transparent rubrics that assess material knowledge, constructability, real-world applicability, and detail accuracy.

Active participation (Section 4.4) could be enhanced by connecting studio briefs to building-technology agendas to prompt earlier technical reasoning, and may be further supported through strengthened cross-course coordination and interdisciplinary interaction, as well as by systematizing workshops, on-site observations, and simulated production activities to promote earlier and more consistent transfer of course knowledge into studio work.

Future research develop standardized instruments to measure theory–practice integration and compare integration models (e.g., design-build studios, problem-based learning). The four parameters used here - content relevance, integration level, application intensity, and active participation - were derived from instructor observations; quantitative measurement through student feedback (surveys, rubric-based scoring, longitudinal tracking of studio work) would provide a stronger evidence base for curriculum improvement. Comparative analyses across multiple architecture schools would also broaden external validity and illuminate the diversity of curricular strategies.

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The author declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

ACSA (2008). ACSA Report for the Accreditation Review Conference. *Architectural Education & Accreditation*, 1-12.

Akgün, Y. (2016). Bütünleş-ik Mimarlık Eğitimi ve Pratiği. *Ege Mimarlık, 1*(93), 10-11.

Alakavuk, E. (2016). Integration of Building Construction Courses in the Architecture Education Programme. *SHS Web of Conferences 26*, 01036.

Aziz, A.A., Fahmi, M.M. & Bane, L.T. (2010). Integration of Structural Knowledge in Design Studio Project: Assessment Study of Curriculum In Architecture Course in University Of Malaya. *Journal of Design and Built Environment, 7*(1), 1-11.

Biggs, J., & Tang, C. (2011). Teaching for Quality Learning at University. *The Society for Research into Higher Education (SRHE) and Open University Press.*

Bilgiç, D.E., & Konak, N. (2016). The Effect of Descriptive Geometry, Technical Drawing and Perspective Lessons to the Architectural Education's Intellectual Infrastructure and Prof. Dr. Yılmaz Morçöl. *Architecture and Life, 1*(1), 1-11.

Bodur, A., Sevim Koşan, N., & Görmüş, Y. (2020). Model in Architectural Education: A Sample Building Construction Lesson Practice. *The Journal of International Social Science Education (ISSEJ) 6*(2), 128-145.

Bozkurt, E. (2016). Integration of Theory Courses and Design Studio in Architectural Education Using Sustainable Development. *SHS Web of Conferences 26*, 01102.

Deniz, Ö., Eren, Ö., Ekinci, S., Başarır, B., Zakar, L., Arslan, G., & Aksel, H. (2017). Mimari Detaylandırma Eğitimi Bağlamında "İnce Yapı Bilgisi" Dersinin Analizi. *Tasarım + Kuram Dergisi, 23*, 52-82.

Dewsburry, Law & Wallis, (2014). Learning-by-Making in Building Science Education. *48th International Architectural Science Association Conference 2014*, Genoa, Italy.

Diri, B.Ş., & Mayuk, S.G. (2019). Türkiye' de Z Kuşağı ile Mimarlık Eğtiminde Yenilikçi Yöntem Arayışları; Yapı Bilgisi Dersleri Örneği. *Contemporary Educational Researches: Theory and Practice in Education Conference*, 49-65, Frankfurt, Germany.

Emami, N., & Buelow, P. (2016). Teaching Structures to Architecture Students Through Hands-on Activities. *Canadian International Conference on Advances in Education, Teaching & Technology*.

Erbil, Y. (2008). Learning by Building/Doing in Architectural Education. *e-Journal of New World Sciences Academy, 3*(3), 579-587.

Folic, B., Kosanovic, S., Glazar, T., & Fikfak, A. (2016). Design-Build Concept in Architectural Education. *Architecture and Urban Planning, 11*(1), 49-55.

Gül, L.F., Çağdaş, G., Çağlar, N., Gül, M., Sipahioğlu, I.R., & Balaban, Ö. (2013). Türkiye'de Mimarlık Eğitimi ve Bilişim Teknolojileri. *7. Mimarlıkta Sayısal Tasarım Ulusal Sempozyumu,* İTÜ, 11-16.

Hajirasouli, A., & Banihashem, S. (2022). Augmented Reality in Architecture and Construction Education: State of the Field and Opportunities. *International Journal of Educational Technology in Higher Education, 19*(39), 1-28.

Kavraz, M. (2021). Application Process of Construction Project with Examples in KTÜ Architecture Department. Journal of *Yalvaç Akademy, 6*(1), 38-48.

Kolb, D.A. (1984). Experiential Learning: Experience as the Source of Learning and Development. *Prentice Hall*, NJ.

Lekesiz, G., & Gürer, E. (2022). An Overview of the Architectural Design Studio in the Conceptual Framework of Complex Systems. *Journal of Computational Design, 3*(2), 1-26.

Lökçe, S. (2002). Integrating Technology into the Architectural Curriculum. *Journal of the Faculty of Engineering and Architecture of Gazi Universiy, 17*(3), 1-16.

Madan, A., & Mathur, M. (2025). The Evolving Relationship Between Architectural Practice and Education-1980s to 2020s: A Review. *Journal of the Institution of Engineers (India): Series A,* 1-25.

Mayuk, S.G., & Coşkun, N. (2020). Learning by Doing in Architecture Education: Building Science Course Example. *International Journal of Education in Architecture and Design (IJEAD), 1*(1), 2-25.

MİAK (2023). MİAK Akreditasyon Koşulları. Mimarlık Akreditasyon Kurulu, retrieved June 1, 2025, from https://www.miak.org/?p=sayfalar&sayfa_id=84

Nicol, D., & Pilling, S. (2000). Changing Architectural Education: Towards a New Professionalism. *Spoon Press,* London.

Onur, D., & Zorlu, T., (2017). The Relation Between the Training Methods Applied in Design Studios and the Creativity. *The Turkish Online Journal of Design, Art and Communication – TOJDAC,* 7(4), 542-555.

Oxman, R. (2004). Think-Maps: Teaching Design Thinking in Design Education. *Design Studies, 25*(1), 63-91.

Özen, G., & Pekdoğan, T. (2023). Building Construction in Architectural Education: Analysis of "Building Technology and Science I" Course. *Bilecik Seyh Edebali University Journal of Science, 10*(2), 395-407.

Salama, A. (2015). Spatial Design Education: New Directions for Pedagogy in Architecture and Beyond. *Ashgate Publishing Limited,* England.

Samudro, H., Bahar, M.A., Firmansyah, A.Y., Yulianto, Darma, M.A.S. (2025). Enhancing Architectural Learning: Integrating Building Technology with Innovative Pedagogy. *Edukasi: Jurnal Pendidikan dan Pengajaran, 12*(1), 18-37.

SCIARC, (n.d.) NAAB Program and Student Criteria. Retrieved May 25, 2025, from https://www.sciarc.edu/academics/learning-outcomes/student-performance-criteria

Shareef, S.S., Rauf, H.L., & Ukabi, E.B. (2024). Reconsidering Teaching Construction in Architectural Education. *Journal of Philology and Educational Sciences, 3*(1), 43-57.

Sönmez, M. (2018). Mimari Tasarım Eğitiminde Yapı Teknolojisi Derslerine Slternatif Bir Yaklaşım: TOBB ETÜ Mimarlık Bölümü 1. Sınıf Yapı Teknolojisi Dersleri. *4. Ulusal Yapı Kongresi ve Sergisi: Yapı Sektöründe Yenilikçi Yaklaşımlar*, Antalya.

Şahin, A. (2013). A Studio Method in Architectural Education: Design-Build Studio. *MSc. Thesis*, Istanbul Technical University, Istanbul, Turkiye.

UNESCO (2004). Charter for Architectural Education, UNESCO/UIA. Retrieved May 20, 2025, from http://www.mo.org.tr/UIKDocs/charterforarchitecturaleducation.pdf

Ünay, A.İ., & Özmen, C. (2006). Building Structure Design as an Integral Part of Architecture: A Teaching Model for Students of Architecture. *International Journal of Technology and Design Education, 16*, 253–271.

Teymur, N. (1992). Architectural Education: Issues in Educational Practice and Policy. *London: Question Press.*

Yalaz, E.T. (2021). Evaluation of Active Learning Methods Used in Architectural Education on Building Construction II Course. *Journal of Social and Humanities Sciences Research, 8*(68), 942-953.

Yazıcıoğlu, F. (2013). A Model Proposal for Architectural Technology Education as a Component of Holistic Architectural Education. *MSc. Thesis*, Istanbul Technical University, Istanbul, Turkiye.

Yurtsever, B., & Polatoğlu, Ç. (2020). "Active Studio" Experiences in Architectural Design Education. *MEGARON, 15*(3), 412-429.