# Immersive Learning in Construction Education: A 12-Day European Study Abroad Model

## Abstract
This study evaluates a faculty-led 12-day immersive study abroad program in the Netherlands and Belgium designed for U.S. undergraduate students as a general elective named as "Global Construction". While tailored to construction students, the course was open to all majors and included participants from architecture, engineering, and marketing. Through daily site visits and structured reflections, we assessed impacts on cultural competency, professional identity, and contextual understanding using pre- and post-trip surveys and journals. Results revealed transformative learning: 88% of students strongly agreed that firsthand experiences provided insights unattainable in traditional classrooms. Students gained significant cultural awareness, deeper appreciation for how local history shapes the built environment and reported notable shifts in professional outlook. Qualitative analysis identified enhanced cultural competency, professional identity development, and enriched contextual understanding through comparing European and American practices as major themes. Students highlighted embodied learning, real-time mentorship, and collaborative interactions as profoundly beneficial. Findings suggest that thoughtfully designed short-term immersive experiences can achieve outcomes comparable to longer programs, with important implications for integrating transformative pedagogy into construction curricula.

## Keywords
Construction education, Immersive Learning, Study Abroad, Experiential Learning, Cultural Competency

## 1. Introduction

Construction education faces challenges in preparing students for a globalized industry, as traditional classroom methods often fail to convey the tacit and cultural dimensions inherent to construction and design practices. Conventional lectures and labs effectively transfer technical knowledge but provide limited exposure to context-specific factors influencing regional building methods, sustainability, and intercultural collaboration. Historically, construction pedagogy shifted from apprenticeships toward a more theoretical, decontextualized model; a "decoupling of practice and theory" (Forster et al., 2017). Current trends now seek to recouple curricula with real-world contexts to better equip students for the dynamic nature of construction.

Immersive learning, including high-tech approaches (e.g., virtual reality simulations) and high-touch experiences (e.g., study abroad, project-based studios), presents a promising solution. Virtual reality (VR) can enhance student engagement and develop spatial skills, yet physical immersion offers unique advantages that VR alone cannot replicate (Garshasby et al., 2024). Being physically on-site allows students to gain embodied, tacit knowledge—such as nuanced understanding of materials, scale, and cultural norms—impossible to fully experience digitally. Indeed, studies indicate virtual methods "fail to substitute for embodied spatial experiences" provided by actual built environments. (Cabrera-Duffaut et al., 2024; Forster et al., 2017)

Within experiential education, short-term study abroad has emerged as an effective immersive method. Unlike semester-long programs, short faculty-led trips (1–4 weeks) intensively immerse students while being more affordable and schedule-friendly. Although critics question the effectiveness of short programs, transformative learning theory suggests that intentionally designed, reflective experiences can produce substantial perspective shifts even in limited durations (Strange & Gibson, 2017). Research by Strange and Gibson (2017) indicates that short-term programs (~3 weeks) can yield transformative outcomes comparable to longer stays, provided they incorporate active engagement and guided reflection. Additionally, a large-scale study by Gibson et al. (2023) emphasized the crucial role of faculty-led cultural mentorship and reflection in maximizing intercultural competence.

Responding to these findings, we implemented a 12-day study abroad program, "Global Construction," immersing students in distinct European built environments. The program targeted three learning outcomes: (1)

increased cultural competency, (2) strengthened professional identity, and (3) enriched contextual understanding of how local factors shape construction, architecture, and urban design. This paper evaluates the program's effectiveness through surveys and journals analyzed via embodied cognition and transformative learning frameworks. Our objective is to demonstrate how short-term immersive experiences effectively complement traditional and online educational approaches and offer recommendations for integrating such experiential practices into construction curricula.

## 2. Literature Review

### 2.1 Modalities in Construction Education

Construction education has traditionally combined didactic classroom instruction with labs or studios, representing a shift away from the historic apprenticeship model (Forster et al., 2017). While classroom methods effectively impart foundational technical knowledge, students often graduate without adequate exposure to authentic construction sites or real project workflows. To bridge this gap, experiential learning elements like internships, cooperative education (co-ops), and site visits are increasingly integrated into curricula. These experiences, aligned with Kolb's experiential learning cycle; concrete experience, reflective observation, abstract conceptualization, active experimentation—significantly enhance students' practical skills and job readiness (Abdelaty & Shrestha, 2019).

Recently, online and hybrid modalities have expanded, accelerated by the COVID-19 pandemic. Online courses offer flexible access for students, including working professionals, and can approach face-to-face satisfaction levels when active learning and regular instructor interactions are incorporated (Garshasby et al., 2024 & Karimi et al., n.d.). However, purely online formats struggle to replicate the depth of hands-on learning and in-person mentoring essential to construction education. Students typically prefer hybrid approaches, blending online content delivery with critical in-person components like labs, studios, site visits, and discussions. Emerging technologies (e.g., BIM, simulations, augmented reality) increasingly enhance courses but should augment rather than replace real-world experiences.

### 2.2 Immersive Learning, Embodied Cognition, and Transformative Pedagogy

Immersive learning theory suggests deeper learning occurs when students fully engage senses, emotions, and intellect within authentic contexts. Rooted in embodied cognition; where physical interactions significantly shape understanding; this approach is highly effective in construction education. Students better grasp spatial and material concepts when physically experiencing sites, for example, by feeling the scale of structures or directly interacting with materials. Research (Fedewa, 2024; Tarrant et al., 2014; Vande Berg et al., 2023) supports that embodied experiences improve learning outcomes, spatial comprehension, and knowledge retention compared to traditional abstract instruction.

Transformative learning theory further frames how immersive experiences facilitate deep perspective changes. Mezirow (1991) highlights that disorienting dilemmas—experiences contradicting prior assumptions—can shift students' worldviews through guided critical reflection. Study abroad programs commonly generate these dilemmas, prompting students to question previously held cultural and professional assumptions. Gibson et al. (2023) stress the importance of faculty-led mentorship and structured reflection, finding these elements more impactful on intercultural growth than program duration alone. Similarly, Strange and Gibson (2017) report that intensive short-term (2–3 weeks) programs with guided reflection achieve transformative outcomes comparable to longer stays. Overall, the literature strongly supports integrating immersive, experiential approaches—whether through international or domestic experiences—to foster essential skills like cultural competence, adaptability, and nuanced understanding of global construction practices.

## 3. Methods

### 3.1 Program Design and Context

The "Global Construction" program was a 12-day faculty-led study abroad experience in the Netherlands and Belgium, focusing on construction, architecture, and urban design. Two faculty members led nine undergraduate students majoring in construction management, engineering, architecture, and marketing. The small group size (9 students, 2 faculty) fostered intensive mentorship and interaction. This study was approved by the Office of Research Compliance and Security at Mississippi State University (IRB-23-312). All participants provided informed consent. Pre-departure meetings provided cultural orientation and learning objectives, but detailed content was left to be discovered on-site to maximize immersive impact.

### 3.2 Itinerary & Learning Activities:

The itinerary included four cities, each with a distinct built-environment emphasis:

- **Amsterdam**: Historic infrastructure and urban design, including 17th-century canal systems, flood-control structures, and the Rijksmuseum. Students explored how water management shaped architecture and urban planning, such as narrow canal houses on pilings.
- **Rotterdam**: Post-WWII reconstruction and contemporary architecture, including visits to Rotterdam Central Station, cube houses, and modular housing sites. Activities highlighted innovative design and prefabrication techniques for urban renewal.
- **Brussels**: European institutional architecture and Art Nouveau heritage, with visits to the EU Parliament complex and the Horta House Museum. Students observed how historical preservation coexists with modern urban development under Belgian heritage policies.
- **Arnhem**: Vernacular architecture and water infrastructure, including an open-air museum of traditional Dutch buildings and a North Sea dike and pumping station. These visits illustrated how geographic and climatic factors uniquely shape construction practices.

The daily schedule combined experiential learning with structured reflection aligned with Kolb's (2014) cycle: concrete experiences (site visits), reflective observation (evening discussions, journaling), abstract conceptualization (faculty-led theoretical connections), and active experimentation (student proposals on applying insights in U.S. contexts). Figure 1 shows students and faculty engaged in discussion in Amsterdam. A final comparative team presentation reinforced learning by integrating observations across locations. Figure 2 shows students and faculty engaged in discussion in Brussels. Faculty facilitated evening reflections linking observations to theory—e.g., connecting Rotterdam's circular economy buildings to sustainability concepts. Students regularly journaled their observations, integrating experiences through a final comparative presentation highlighting key insights. Figure 3 depicts one of the students' final presentation.

**Figure 1**. Students and faculty engaged in discussion in Amsterdam

**Figure 2**. Students and faculty engaged in discussion in Brussels

**Figure 3**. Student presenting their analysis and findings during final presentation

**3.3 Assessment Methods:**
A mixed-methods approach combined quantitative surveys, qualitative journals, faculty observations, and student presentations:

- **Pre/Post Surveys**: Online surveys administered before and after the program assessed students' expectations, prior knowledge, perceived growth, and satisfaction. Likert-scale questions measured changes (e.g., comfort with international environments, cultural competency), complemented by open-ended reflections on the experience's impact and memorable events. Responses (8 of 9 students completed both surveys) were summarized descriptively due to sample size.
- **Daily Journals**: Students maintained reflective journals (approximately one page per day) guided by faculty prompts, recording candid observations, reflections, and learning moments. These served as qualitative data capturing the evolution of student thought processes.
- **Faculty Observations**: Faculty recorded observations on group dynamics, engagement, and critical learning incidents, providing contextual validation of student self-reports and emergent themes.
- **Final Presentations**: Student teams presented comparative analyses between European and U.S. practices, highlighting the concepts they internalized. Presentations acted as informal focus groups, revealing student perceptions and reinforcing thematic findings.

**3.4 Data Analysis**
We employed an inductive qualitative analysis for the open-ended survey responses and journals, supplemented by qualitative thematic analysis, supported by basic quantitative summaries from surveys, identified emergent themes. Open-ended survey responses and journal entries were independently coded, then grouped into broader themes aligned with cultural competency, professional identity, and contextual understanding. Pre- and post-trip comparisons identified shifts in perceptions and learning. Triangulation between journals, surveys, and faculty observations enhanced credibility. Quotes presented in results sections are anonymized for student privacy, lightly edited for clarity, and selected to illustrate key thematic insights.

## 4. Results
Results are presented in three main areas: (1) Transformative Learning Outcomes (cultural competency and professional identity), (2) Immersive Learning Advantages, and (3) Regional Construction Insights. Quantitative findings from pre/post surveys are integrated alongside qualitative student responses for depth.

**Table 1.** Pre-Trip vs. Post-Trip Survey Highlights (n=8 students)

| Survey Item | Pre-Trip Responses | Post-Trip Responses |
|---|---|---|
| Familiarity with European construction | Low ("slightly" or "not at all," avg. 2.1/5) | High (5 of 8 "extremely comfortable") |
| Belief that culture impacts construction practices | 6 of 8 agreed (5 strongly) | 7 of 8 agreed (6 strongly) |
| Belief that immersive learning exceeds classroom instruction | 8 of 8 agreed (6 strongly) | 8 of 8 agreed (7 strongly) |
| Understanding of international construction differences | 3 of 8 had some understanding; others unsure/disagreed | 7 of 8 strongly agreed they gained deeper contextual understanding |
| Overall program satisfaction | N/A | 7 of 8 "very satisfied," 1 "somewhat satisfied" |
| Likelihood to recommend program | N/A | 8 of 8 would recommend (7 "extremely likely") |

**4.1 Transformative Learning Outcomes**
Students demonstrated marked increases in cultural competency, reporting greater comfort navigating unfamiliar environments (from average self-ratings of "slightly familiar" pre-trip to most feeling "extremely comfortable" post-trip). Participants described an enhanced appreciation for how cultural context shapes construction and architecture practices, recognizing nuanced influences of history and policy in the European built environment. One student reflected: "Seeing Amsterdam's integration of water management and cycling infrastructure firsthand provided deeper insights than any class." Significant shifts in professional identity were also evident. Initially uncertain, students

emerged from the experience with broader perspectives and aspirations—e.g., an architecture student noted how the program “fully changed my design thinking, enriching my future career approach.”

### 4.2 Immersive Learning Advantages

The embodied, sensory-rich nature of the program was unanimously cited as superior to traditional classroom methods. Students reported lasting impacts from firsthand exposure, noting that physical presence on-site deepened their retention and understanding of construction concepts. One participant summarized: “Engaging all senses on-site enhanced learning tenfold.” Faculty mentorship and structured reflection sessions also significantly enhanced learning outcomes. Students highlighted real-time faculty guidance during site visits, noting the immediate contextualization of unfamiliar practices. Collaborative peer learning within the small cohort further reinforced insights, fostering deeper discussion and collective reflection.

### 4.3 Regional Construction Insights

Students acquired detailed, context-specific knowledge of Dutch and Belgian construction practices. Observations in the Netherlands focused strongly on water management and urban planning integration, such as dikes and flood-control structures, with students appreciating geographic influences on construction. In Belgium, insights centered on heritage preservation, Art Nouveau architecture, and cultural attitudes towards historic buildings, deepening students' understanding of how policy shapes architectural preservation. Overall, the targeted, immersive approach successfully fostered a nuanced comprehension of regional construction practices and encouraged students to critically assess these practices in relation to their own cultural context.

## 5. Discussion

### 5.1 Efficacy of Compressed Immersion Programs

Our 12-day program demonstrates that short-term immersive experiences can produce transformative learning outcomes comparable to longer programs. Despite concerns about limited duration, students showed significant growth in cultural competency, professional outlook, and contextual understanding (Nguyen, 2020; Strange & Gibson, 2017). Intensive scheduling and structured reflective practices effectively condensed months of exposure into a brief yet impactful period. This approach aligns with transformative learning theory, suggesting quality of experience matters more than length alone, especially when coupled with deliberate faculty mentorship (Tarrant, 2010). Although short-term programs inherently offer fewer opportunities for deep cultural assimilation (e.g., language proficiency), targeted objectives such as global construction insights and professional identity can be effectively addressed. Given constraints such as curriculum structure and finances, short immersive programs offer a practical, scalable alternative for expanding global competencies in construction education.

### 5.2 Cohort Size and Faculty Mentorship

The small cohort size (9 students, 2 faculty) significantly contributed to program effectiveness. Individual attention, intensive mentorship, and structured reflections facilitated deeper learning, mirroring traditional apprenticeship dynamics (Vande Berg et al., 2009). Students frequently highlighted faculty support and direct mentorship as crucial, noting it enhanced their ability to interpret unfamiliar contexts and encouraged active participation. Gibson et al. (2023) similarly emphasize faculty-guided reflection as essential for intercultural development. Importantly, our findings suggest that cohort size and mentorship quality might surpass duration as determinants of transformative learning. For programs unable to maintain small cohorts, breaking larger groups into mentored subgroups could similarly enhance engagement and outcomes. Future research should further compare small intensive programs with longer, less structured exchanges to clarify the relative influence of these factors.

### 5.3 Regional Depth versus Breadth

Focusing deeply on two regions—Netherlands and Belgium—proved more beneficial than superficially sampling multiple countries. Students developed nuanced, contextualized knowledge about local construction practices and cultural influences, such as Dutch water management and Belgian heritage preservation. Consistent thematic exposure allowed students to integrate observations meaningfully, avoiding superficial impressions common in broader tours. Regional depth also provided methodological frameworks for students to approach new contexts critically, emphasizing observation, historical inquiry, and analysis of cultural values. Although regional focus naturally excludes diverse global contexts, this approach can be balanced within a curriculum by offering multiple region-specific modules or introducing global case studies into coursework, ensuring comprehensive comparative exposure.

**5.4 Implications for Construction Education Reform**
Findings highlight the potential of integrating immersive learning models into construction curricula, addressing gaps left by traditional methods focused heavily on technical skills. Short-term programs can democratize global education opportunities, being more accessible and financially feasible than semester-long exchanges. Administratively, scaling these programs involves training faculty facilitators and developing international partnerships for logistics and educational content. Moreover, principles of transformative pedagogy and structured reflection successful in study abroad contexts could also enhance on-campus instruction, cultivating graduates who possess not only technical proficiency but cultural sensitivity and adaptability. Future longitudinal research should assess long-term career impacts of immersive learning and explore complementary methods such as virtual reality for students unable to participate in physical travel. Overall, the evidence strongly supports embedding well-structured, short-term immersive experiences into construction education, aligning closely with industry demands for globally competent and culturally aware professionals.

## 6. Conclusions

This study evaluated a 12-day immersive study abroad program designed to enhance cultural competency, professional identity, and contextual understanding in construction education. Despite its brevity, the program demonstrated substantial transformative impacts, yielding three main conclusions:

**6.1 Compressed Immersion Enables Transformative Learning:**
A strategically designed short-term program effectively produced outcomes comparable to longer international experiences. Students reported notable gains in cultural awareness and professional perspective, shifting from limited familiarity to considerable confidence navigating European construction contexts. Intensive engagement, structured reflection, and intentional faculty mentorship were key factors, emphasizing experience quality over program duration alone. Short immersive courses thus offer practical avenues for construction programs aiming to internationalize curricula and develop students' soft skills.

**6.2 Importance of Small Cohorts and Mentorship:**
The intimate cohort size (9 students, 2 faculty) significantly enhanced the immersive experience. Personalized mentorship and close faculty-student interaction fostered immediate learning, deep reflection, and robust group cohesion. Faculty acted as facilitators and cultural interpreters, bridging theory and practice in real time. Our findings underscore the value of maintaining smaller cohorts and prioritizing mentor engagement in program design, highlighting the critical role of human interaction.

**6.3 Regional Depth Enables Deeper Contextual Understanding:**
Focusing on two countries rather than a broad "European tour" enabled students to develop a nuanced understanding of local practices—such as water management in the Netherlands and heritage preservation in Belgium—and the cultural, historical, and policy drivers behind them. This depth helped students articulate not only what is done differently but why, avoiding over-generalization and strengthening their global competency. We recommend future programs similarly prioritize depth over breadth, whether through immersive regional modules or integrated case studies within courses.

Overall, these results advocate for integrating immersive, short-term experiences into construction education. Such programs address gaps in traditional approaches and prepare graduates for a globalized industry where adaptability and cultural competence are as vital as technical skill. As the construction sector continues to evolve internationally, providing opportunities for transformative, real-world engagement will be key to producing well-rounded, future-ready professionals.

## 7. Limitations

This study's findings should be considered in light of several limitations. The small sample size (n=9) limits the generalizability of results and precludes robust statistical analysis; while rich qualitative data provided valuable insights, larger cohorts would strengthen confidence in observed trends. The study's duration (12 days) while intentionally designed to test compressed immersion, restricts the assessment of longer-term impacts on students' professional development and retention of learning. Additionally, the participant group was limited to students from a single institution and a specific set of majors, potentially narrowing the range of perspectives captured. Finally, as with most self-report methodologies, there is the possibility of response bias in student journals and surveys, which may reflect social desirability or recall limitations.

## 8. Future Work

Future research should build on these findings by employing larger and more diverse student cohorts to enhance the validity and generalizability of outcomes. Longitudinal studies are recommended to track the sustained influence of short-term study abroad experiences on graduates' career trajectories, intercultural competence, and professional identity. Comparative studies examining different program lengths, cohort sizes, and disciplinary mixes would help identify optimal structures for immersive learning in construction education. Additionally, exploring the integration of virtual reality or domestic immersion modules could expand access and test the synergy between physical and digital experiential learning. Finally, quasi-experimental designs with control groups (e.g., students in traditional courses) would allow for more rigorous isolation of the specific impacts of immersive study abroad programs.

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