BIM Transforms University Curricula in AEC Disciplines

The Rise of an Educational Imperative

A recent study conducted at the University of Southern California (USC) and Virginia Tech found that most university-level AEC programs began offering BIM courses between 2006 and 2009, with architecture programs leading the way.

Dr. Burcun Becerik-Gerber, assistant professor in the Sonny Astani Department of Civil and Environmental Engineering at USC and study facilitator, says, “That is not surprising considering the visual nature of the architectural education and the rapid increase in 3D modeling technology usage since the late 1990s.”

The survey indicates BIM is comparatively new in university engineering programs and construction management programs. Dr. Becerik-Gerber says, “About 86% of the construction management programs polled began offering BIM courses during the 2006-2009 timeframe.” The survey asked how many courses AEC programs would integrate into the curricula per the future plan. The majority said they would have at least one course on BIM in the next two years.

Orchestrating Collaboration

It is unreasonable to expect university students to achieve a deep understanding of all design and construction knowledge domains during their tenure in an academic program. Instead, it is critical that students develop a focused set of skills, and then learn how to collaborate with others to participate in interdisciplinary design teams effectively. BIM provides the opportunity to facilitate and accelerate collaboration and information sharing.

We recently implemented two courses at Penn State that provide a significant focus on orchestrating collaboration between students across disciplines. The first course is a model of a virtual “Collaborative BIM Studio” where teams of students across six different disciplines—architecture, landscape architecture, construction, structural, mechanical and lighting/electrical engineering—design a project using BIM for data collection, analysis, design development, data coordination and project presentations.

The second is a capstone design course in Architectural Engineering (AE), which focuses on integrating mechanical, structural, lighting and construction engineering students within AE with BIM as a foundation technology. These integrated design studios make learning more engaging through an experiential approach, provide the opportunity to learn from fellow team members, and provide students with the opportunity to learn about leadership, team dynamics and group management.

Dr. John Messer
Associate Professor of Architectural Engineering
The Pennsylvania State University
International Collaboration with BIM at its Core

The first American-China undergraduate construction education thesis class brought together students from the McWhorter School of Building Science at Auburn University and the College of Civil Engineering at Tongji University (JTU), Shanghai, China to understand the global advantage of BIM.

Teaching Virtual Design

Auburn University’s Master of Design Build program prepares architects and construction managers to work effectively in an integrated design and construction milieu. We take collaboration as a point of departure and ask how best to manage the process in order to arrive at the best solutions.

Virtual design and construction is key to this process. BIM is not just a “tool,” but the shop and the medium simultaneously: a virtual project environment that is integral with the actual process of designing, managing, and building a project among people in the physical world.

The ethical, environmental, and economic imperative of building better buildings requires collaboration, and collaboration is enabled by technologies such as BIM.

Josh Emig
Assistant Professor
Auburn University

Stanford’s BIM/PD Microcosm

Stanford University houses all the key players in the integrated project delivery (IPD) process in its Civil and Environmental Engineering Department. Therefore, architectural design, structural engineering, building science (mechanical, electrical and plumbing disciplines), atmosphere and energy, and construction management students all live together under one roof and share the same studios and classes. In effect, we have created a little microcosm and testing ground for the IPD process. The fundamental tool at the core of our IPD process that we all use to share and communicate is now BIM.

Students routinely use the Autodesk® BIM Portfolio in our teaching clusters and studies for their design and planning projects so that the technology becomes a second language that students will use to communicate and test their ideas in future courses.

We also have a phenomenal integrated AEC studio where students collaborate with multi-disciplinary teams from all over the world to experience the work process from conceptual design through detailed analysis and construction planning, while using BIM tools at every stage.

Because of BIM and IPD, our students do not think of themselves in terms of one particular discipline. Rather, they focus on the common thread—their shared love of the building process—and learn to appreciate the various roles and ultimately choose the role that fits them best. We are molding students and graduates who can fluidly design, communicate, test and plan using BIM models in an integrated project delivery framework, which is really the key to realizing the full promise of this revolutionary process change.

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