

BIM Goes to School

As BIM adoption grows in the building industry, so does the use of BIM in educational curricula. This white paper focuses on how BIM is being leveraged within several universities around the world and how students who have access to this way of working are accelerating their design thinking and their studio work - and laying the foundation for dramatically advancing their industry in the future.

BIM in the Architectural Curriculum

Technology has become inexorably integrated into the practice of architecture, from creation of design information with digital tools to collaboration through the Internet. In response, architecture schools have incorporated technology in their core curricula, equipping students to contribute more effectively and more quickly once they move into practice. The use of technology in the architectural curriculum serves a dual purpose: students are able to better design, document, and present their course work and, at the same time, gain familiarity with tools that will give them an advantage in the working world.

A purpose-built BIM solution like Revit® Architecture software can be applied across the spectrum of building design and documentation: conceptual design, detailed design, building analysis, construction documentation, visualization, etc. As such, using BIM as an educational tool helps students learn about the whole building - from idea to materiality. It encourages students to think beyond design, to consider cost, constructability, environmental impact, and so forth. It gives students a solid grounding in building technology, not just the manipulation of form in software.

Below are summaries of four different universities on four different continents and a brief examination of how they are using BIM and Revit Architecture in their architectural curriculum.

Savannah College of Art and Design, USA

The Savannah College of Art and Design (SCAD) is the largest art school in the United States. Its main campus is in Savannah, Georgia. The School of Building Arts has about 1,100 students, spread among architecture, interior design, and historic preservation, and offers a fully accredited five-year Master of Architecture program. SCAD places a strong emphasis on state-of-the-art computer technology, especially in the Master of Architecture program.

“Our curriculum is designed to mimic the real world of design,” says Huy Sinh Ngo, Director of Electronic Design at SCAD, explaining their reasoning for including BIM in their

program. "For young architects just starting their training, it's especially important to understand how to design at the whole-building level," says Ngo. Traditionally, their architect students designed in 2D first, and then moved to 3D. "Using Revit, our students think in 3D, design in 3D, work in 3D," reports Huy. "Then, from the 3D model, they can easily extrapolate all the necessary 2D information."

And whenever a student changes anything, Revit Architecture automatically updates all the 2D information - such as floor plans, elevations, and detail drawings. Everything is connected. "Students appreciate that a lot," says Huy. "It saves them a tremendous amount of time and lets them focus on design instead of on tedious manual tasks,"--a sentiment echoed loudly by their professional counterparts!



Image supplied by Kyle Benedict; 5th year architecture student, SCAD.

Figure 1:

BIM helps architect students to design at the whole-building level.

Northumbria University, UK

At Northumbria University's School of the Built Environment, over 1,600 students learn a wide variety of disciplines, including Architecture, Architectural Technology, Building, Building Services Engineering, Building Surveying, Estate Management, Housing, Project Management, and Quantity Surveying. Located in Newcastle, the school's BS in Architectural Technology was introduced in 1998 in response to a growing need for specialists to bridge the gap between design and construction, having the skills to resolve design and technical issues and ensure optimum building performance and efficiency.

In 2004, the Architectural Technology degree program was extended to include BIM. To give students practical experience, the school purchased Revit Architecture. According to Senior Lecturer, Margaret Horne, "The software works the way the students should think - in terms of the entire building, rather than individual sections and floor plans." It provides more accurate and complete information, giving them a clear overall vision of a project and better design insight, which helps them to work faster and more thoroughly." Horne reports that students begin to design with Revit much more quickly than with traditional CAD software. "The interface is very logical and the software is easy to learn." Similar to the student experience at SCAD, the Northumbria students have more time to focus on the building design instead of learning the software.

Revit Architecture also helps the Northumbria students learn to design greener buildings - using the building information model to investigate the thermal characteristics of building elements and the effect of façade design. Linking Revit with IES Virtual Environment, a program designed to simulate real environmental conditions on a building model, they found that modifications to the design could be made quickly in response to the thermal analysis output.

RMIT University, Australia

RMIT University began as the Working Men's College in Melbourne in 1887. The university has grown to become one of the largest in the country and has built a worldwide reputation for excellence in vocational and technical education and research.

Melbourne-based architect practitioner and RMIT lecturer John Young uses BIM both professionally and as an effective aid for teaching his building design students at RMIT. Young chose Revit Architecture as his BIM solution for its 3D modeling benefits, its documentation advantages, its employment of design options for exploring alternative designs, and its ease of use.

The 3D visualization capabilities of Revit have been of particular benefit in assisting students to understand how a building is put together. Revit helps students view their designs in 3D, enabling them to clearly identify and solve design problems at an early stage. Rendering capabilities within Revit include sectional perspectives, color-fills, hidden-line and shaded views, vectorial shadows, capped section boxes, and silhouette edges. "Working on projects in 3D develops students' ability to think and design in 3D. This approach to their work results in creative projects that are practical in real life as well as on paper," reports Young.

The Revit model can also be used in conjunction with Autodesk® VIZ or Autodesk® 3ds Max® software products. Students can import Revit-produced 3D AutoCAD® DWG files (including non-graphic information such as materials and camera views) to quickly and easily create photorealistic interior and exterior renderings of their designs.



Image source: Autodesk. Renderer:: Autodesk 3ds Max.

Figure 2:

Rendering software allows students to quickly and easily create photorealistic images of their building information model.

University of Port Elizabeth, South Africa

The University of Port Elizabeth (UPE), with the biggest campus in the southern hemisphere, is no stranger to state-of-the-art technology. The policy of its Department of Architecture is that students should work only on the most recent versions of building design and visualization software. In addition, academic staff members prepare a curriculum that is flexible enough to include new technologies as they become available.

Students are introduced to a variety of design tools and technology, from CAD to BIM. "Because of the broad-based training we give our students, we encourage the introduction of new design technologies such as Revit Architecture into our curriculum," states senior lecturer, Mark Hardman. He believes that the use of BIM will require a paradigm shift for those students that are familiar with CAD and object-CAD applications.

"To further our objective of teaching students to effectively communicate their ideas using a graphic medium, we need to operate more than one program." The department retains a core of Autodesk technology, including AutoCAD, AutoCAD® Architecture, and Revit Architecture. "With six million users, Autodesk software is found in organizations everywhere. By training on Autodesk software today, architecture students are building the skills sets that will form the foundation of their professional careers," states Hardman.

Image supplied by Michelle Deer; 4th year architecture student; SCAD.



Figure 3:

Autodesk is committed to equipping the next generation of architects and designers with powerful and cutting-edge information and design tools such as Revit Architecture.

BIM - an Investment in Education

Autodesk's purpose-built BIM solution, Revit Architecture, is being used in over 80 colleges, universities, and high schools in the United States alone. Autodesk is committed to equipping the next generation of architects and designers with powerful and cutting-edge information and design tools. One example of this commitment is Autodesk's Invest in Education Program, a software grant program aimed at connecting commercial customers with local education institutions in order to develop industry relevance, build the future talent pool and enable customers to give back to their communities.

As Northumbria's Margaret Horne puts it, "The emergence of a new generation of students with leading-edge building modeling skills will help to meet the needs of a profession concerned with technological advances and complexity."

About Revit

The Revit platform is Autodesk's purpose-built solution for building information modeling. Applications such as Revit Architecture, Revit® Structure, and Revit® MEP built on the Revit platform are complete, discipline-specific building design and documentation systems supporting all phases of design and construction documentation. From conceptual studies through the most detailed construction drawings and schedules, applications built on Revit help provide immediate competitive advantage, better coordination and quality, and can contribute to higher profitability for architects and the rest of the building team.

At the heart of the Revit platform is the Revit parametric change engine, which automatically coordinates changes made anywhere — in model views or drawing sheets, schedules, sections, plans... you name it.

For more information about building information modeling please visit us at <http://www.autodesk.com/bim>. For more information about Revit and the discipline-specific applications built on Revit please visit us at <http://www.autodesk.com/revit>.



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