

# **An Undergraduate Introduction to Practical BIM: A Pedagogical Trial Based on Industry Survey**

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Building Information Modeling (BIM) is continuing to revolutionize the business of commercial construction. As traditional construction management methodologies are quickly being displaced by innovative BIM processes supported by ground breaking technologies, companies are finding it difficult to internally develop the skills and knowledge necessary for the adoption of BIM. As a result, many in the AEC industry are turning to academia to help prepare the next generation of virtual construction professionals. Anticipating the need, a handful of the more progressive construction programs have been working to include BIM for years. Some have even created BIM courses as a stand-alone offering at the graduate level while others are adding BIM topics to already existing undergraduate classes. Contrary to how BIM is currently being used by the construction professionals, many still believe that an introduction to BIM is about modeling or the ability to use the authoring software. This research utilizes the author's experience as a construction BIM specialist and his position as an adjunct instructor for the Construction Management Program at the University of Houston to develop and test a pedagogical strategy based on an industry survey for the systematic adoption of BIM at the undergraduate level. To determine what specific skills and knowledge that are currently being used to manage commercial construction BIM deliverables, a semi-structured interview process was employed on 3 current and 4 recently completed BIM projects. 9 interview questions were developed from 5 preliminary interviews to determine the demographics related to the BIM team's roles and responsibilities along with any previous and or current BIM training received in preparation for each project. Next, the participants were asked to list specific skills and knowledge that are deemed essential to managing a BIM project. Of the 17 interviews conducted, 13 rated the ability to quickly access the information or data contained in a BIM model using mobile technology for the purpose of communicating as the most important skill on a BIM project. This addresses an ability to interact with the model using a mobile user interface. And 11 of the 17 listed a fundamental understanding of construction assemblies to visually assess compliance and quality as the primary key functional knowledge for the utilization of BIM on their projects. Interestingly, only 2 of the 17 mentioned the ability to use authoring software as a requisite to managing BIM requirements. To measure the validity of the interview data, a similar survey was posted to an industry discussion group. Although the results from the online questions are still being collected, the initial trend appears to be similar to that of the interviews. From the outcome of the applied methodology, the author has designed a pedagogical trial focusing on familiarizing the students with a virtual 3D environment to address both the communication and functional knowledge issues. To implement the trial, the author has incorporated a project into his Estimating II class currently being taught at the University of Houston. The deliverables consist of developing a 3D virtual construction assembly, a written cost bio describing both the material and labor cost associated with the focus component, and a class presentation. This particular trial was designed not only to address the needs of the industry, but to show that BIM integration at the undergraduate level is possible if incorporated to enhance the individual course subject matter. By utilizing the visual benefits of the virtual 3D environment, students can develop BIM skills and at the same time, become familiar with the associated technologies being used on today's commercial construction projects.

**Key Words:** Building Information Modeling, Construction Management Program, Undergraduate, BIM