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BIM in Academia

Peggy Deamer

To begin, it will be helpful to describe the common scenario for architectural education in the U.S. in order to indicate what the tensions are when we bring Building Information Modeling (BIM) into the equation. In most M.Arch or even B.Arch curricula that have eighteen points of credit per semester, usually nine points (or half) are devoted to studio; the other nine points are scattered between things like structures and systems integration, history and theory, environmentalism, fabrication, and professional practice. Besides this hierarchical division that privileges studio, there is as well the distinction between courses which are required—which is to say, essential—and those that are not—the electives. Below this are the offerings—workshops—that are not considered “credit worthy” because they are tools, offering skills but not knowledge. This is where software instruction usually resides.

Enter BIM. It looks like a software issue, which is to say, it will either be offered as a non-credit workshop, or if it furthers knowledge of a more traditional kind, it can be tucked into that course objective. It might be placed in the “technology”/structures area, where its link to building construction information makes it an important tool. It might be appropriate in environmental courses, which will benefit from the integrative knowledge BIM allows. It has a place in fabrication courses for its facility with parametric modeling. It also has a place in professional practice, not as a skill tool, but as an example of methods that will be required of a graduate in most offices. But BIM in each of these is an awkward intruder on courses that, usually assigned three credits (a third of that of studio), are already pressed, pre-BIM, to prove their value in a limited venue. In these areas, the time taken to teach BIM is just too demanding in and of itself.

Or maybe it is not software, not a professional organizational method, and not a support for “secondary” courses but, rather, a new way to *practice design*, legitimately placed and taught in studio. If so, where? The logical place is in the advanced studios, where students already sophisticated with design

fundamentals can take on the new modes of design deployment provided by BIM. But the fact that advanced studios are elective choices with no guarantee that anyone will either offer or take a “BIM” studio makes this answer problematic. The pedagogical statement is that BIM is available but not necessary.

Putting BIM in the early, core studios where it can be tackled head on, early on, and by everyone, then makes sense. But here, again, obstacles arise. Not only are there so many pre-BIM design fundamentals that need to be covered—form, composition, spatial hierarchy, and so on, but also, and more fundamentally, the intimacy of the design process, which the studio has traditionally upheld, is shaken by a software whose main attribute is precisely the doing away with that intimacy.

Two things are obvious. First, that BIM threatens all of the hierarchies we have established in academia, between the divisions that we have made between disciplines, between the primacy of the studio and the secondary nature of all of the other courses, and within our concept of design. And second, that it is not merely a case of determining whether you think of BIM as a software tool, as a professional organizational method, or as a form of design practice. *Any* and *all* of these designations find a curriculum structure that is unreceptive to BIM. Three conceptual categories of solution can be imagined.

- 1 We don't really change anything that we are doing now, which is to say, we sprinkle BIM education in different, mostly elective or workshop contexts and thereby claim either that a) it is the profession's, not the academy's, responsibility for educating its employees and footing the bill for it; or b) that we are suspending judgement and curricular adjustment until we know more about what will and will not emerge professionally.
- 2 We in academia see it as our responsibility to offer this education, but as an “add-on,” making it an advanced-degree program that students can enter into after receiving their un-BIMed architectural education. In this, we are admitting that a) students, already stretched economically, would need to fork out even more money; and b) that this is not essential to a professional degree, but an option for those who want to specialize.
- 3 We restructure our M.Arch (or B.Arch) curriculum to accommodate something that is identified as necessary

for the first professional degree student, adjust the curriculum accordingly, and admit that the tuition paid by the students for a professional degree will cover what they need to function in the profession. If we do the latter, it will be necessary to reconsider the hierarchies that have been described. Two obvious adjustments come to mind.

- 1A That BIM enters studio education at a pre-advanced studio level, which would be a rethinking of the intimacy with which we have always approached this act. I think personally that this intimacy needs to be challenged—this is the work of Phillip G. Bernstein's and my book *Building in the Future of 2009*, but this thought sits right beside my belief that formal skills are and always will be essential. We might want to send out students who are entrepreneurial, collaborative, and interdisciplinary, but we want to make sure that they will put not just smart but good-looking objects out there in the world.
- 2A That we restructure an education that currently puts studio at the apex and, instead, let design reside equally in other areas of the curriculum, one or more of which would include and teach BIM; that is, we both desilo design's singular home and de-mythologize the studio as design anointer.

If BIM is to be taken seriously in academia—which is to say, that it is both required and design focused, and teaches collaboration as a technique and introduces knowledge that is not foreign to design but integral to it (economic, environmental, constructional)—then BIM and the academy will need to emphasize not its efficiency, but its exploration of the unknown; not its effect on the marketability of its graduates, but its effect on their own willingness to embrace the risks of the marketplace. The tension between practice and the academy should not in any way go away; rather, the academy should embrace its traditional role as a challenge to the profession, to lead it, not follow it. If many of us here believe that BIM is an opportunity for architecture to recapture its rightful place in the building industry, some of us also think that academia should seize it as an opportunity to reclaim its rightful place in the education of the designer.

To end, here is a speculative model for a three-year M.Arch program: a first year that concentrates on 2D, which is to say, composition, or the manner in which architectural visualization fluctuates between 2D and 3D ambiguity; a second year that

concentrates on 3D, which is to say, emphasizes the spatial and tectonic dimensions of architecture; and a third year that emphasizes 4D, which is to say, how the making of architecture exists in the temporal realm, where BIM becomes the design environment. In all of these years, history and theory, structures, environmentalism, and fabrication would embrace the speculative as well as practical thinking that accompanies each of these environments. Design is not sacrificed; it is, rather, spread into another dimensional context.

BIM: Practice Context and Implications for the Academy

Philip G. Bernstein

Professor Peggy Deamer and I structured our Yale symposium on the pedagogical implications of the broad term “Building Information Modeling” (BIM) to highlight the inherent challenges created for the teaching of architecture by the rapid digitization of design and construction. The changes both created and implied by BIM are being felt most keenly in practice, and the academy has been moved only recently to examine its implications and engage in the discourse. Deamer positions BIM from the stance of the architecture curriculum; in this discussion I will examine the practice and market contexts within which we must find our pedagogical way as teachers of architecture.

While it originated as a technical proposition meant to improve the quality and integration of technical documentation in design, BIM is now a proxy for the broader transformation in the means of representation in the building industry, which has been beholden to orthographic, 2D notation for centuries. Elaboration of design was once a combination of maquettes in 3D (sketch models) and 2D projections in the form of plans, sections, and elevations, elaborated in successive levels of detail as the building design was refined. Replacing these projections of the designer’s intent with a digital prototype of the design (defined at full scale and resolved in 3D) has inspired a series of profound questions about the nature of the design process, its relationship to the act of building, and, by implication, the role of the architect.

First and foremost is the question of the basic epistemology of the design process. The architecture profession has traditionally been disinterested in creating organized theories of knowledge that might be of use in the training of future architects. “Knowledge” is organized and depicted with text and graphics. Under BIM, those conventions of drawing are supplanted by tools and knowledge structures asserted by the implementation and capabilities of the software platform. The loose rules that typify orthographic design representation are replaced by a theory of knowledge about the nature and organization of building that is