Negotiating Disjunction / Methods and Strategies for Digital Teaching

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Abstract This Paper is intended to expand on previous reflections about Digital Design teaching and its implementation as it has been carried out at our school. The preceding accounts of didactic experiences both in Architectural Computer Graphics teaching and Digital Design education focus on the pursuit of reconciliation of a disjunctive state between traditional design processes and its counterpart digital processes. But the time has come to face the eminent disruption between traditional design practices and the emerging realm of digital design and to break ground for a digital studio methodology.

Precedents At least since 1962 when the Conference on Design Methods took place at the Department of Aeronautics, Imperial College, London, there have been not few initiatives toward a change in the way we educate new designers. Yet, wandering through school studios, chatting with students both at the computer lab or at their leisure time, one often finds that they are being taught much in the same ways apprentices were in the middle ages: the student is taken through an endless series of tasks, described namely as creative but, in many senses, repetitive and non reflexive ones.

At the same time the disciplines offered at our computer labs have undergone a slow but steady evolution from simple CAD training towards a more methodic approach devised to tackle the progressive disjunction between studio practice and lab training.

So far, this evolution can be summarized as a three steps process:
1 CAD training;
2 CAD as a design tool, and
3 Parametric and BIM designing.

Extensive reports of this evolution were presented in preceding papers and shall receive no further consideration here. [2006, Nardelli, Vincent]

Objectives We are in search of a new pattern of architectural design education which would help us bring our students to a higher level of comprehension both of design and production issues in the digital era.

Until now, we have cherished no expectations of merging architecture studios and computer labs into a digital studio. But the emergence of new tools – generative and parametric, as well as performative specialist software -, will soon lead us further into a disruptive state.

The very nature of those software brings to surface design process issues which have been treated as ‘black boxes’ so far, and we suspect that most studio lecturers are at least aware of design methods, whereas the same cannot be said of their awareness of digital design theories and practice.

The pursuit of design strategies derived from software usage has put in evidence this “condition of lack of clarity with respect to the methodological nature and contributions of digital design methods.” [Oxman, 2006:235]

Although we are still trying to find ways to cope with this so called disjunction, searching along with the students for a process awareness during their computer lab training, the time has come to propose a model for a digital design studio.

Methodology It should be said that although digital revolution has brought this ‘design process awareness’ issue into an upfront position this is
far from being a novelty. Rejoining from methodologies We have resorted to graphic representations of the design flows to clarify probable interchanges between architect and client, as well as architect and other contributors to the design process, leading the student’s comprehension of design cycles as related to outside demands. These are Critical Path diagrams, onto which the students are encouraged to plot the current design development stage. It is somehow easier to compare different examples of design development, since many offices employ this method as a production prediction, control and evaluation tool.

Further yet, another set of diagrams is being used to put in evidence some of the internal flow of ideation during design stages. Now this hasn’t been necessary before we started using Architectural Desktop and Revit, both being rather rudimentary BIM software. But to have the students to overcome their initial tendency of merely using those software as representation tools and to start employing them as design tools, the very design process has to be made explicit and explicated.

The main pitfall in this strategy is the almost complete lack of design process examples from any of the significant architects studied in our curricula. The educational approach to the study of great architects is focused on the observation of built work and perspective sketches and plans. Very seldom one would find a series of sketches where the formation and evolving of an architectural idea is evidenced and, even so, the sketches will depict form solution alone.

Process CAD training will soon be abandoned in favor of Digital Design education. Yet, the time slot allocated to the discipline is tight, leading us into collaboration with a design studio discipline.

The course begins with a series of short exercises, ranging from formal 3d modeling – Surfaces, Solids and NURBs – in software as varied as AutoCAD, Rhino3d and 3dsMAX, and formal-functional problem solving modeling – space planning – in Architectural Desktop and Revit.

After the first exercises, where design tools are employed in rather simplistic ways – a strategy to conquer students into the subject –, a lecture on digital design practice is given. The argument that digital tools are re-shaping design processes into what might be now called Digital Design [Oxman, 2006] is a strong one and not easily grasped by all students.

Recurring to Oxman schema has proved a sound choice, both during the exercises, to illustrate what is at stake, and in the methodology lecture, when fundamental concepts are recovered in preparation for subsequent design development.

All along the exercises, lab practice is synced to the demands at the design studio (Figure 1)

![Figure 1. On the left column, studio tasks; on the right, lab instruction.](image_url)
Some of the typical issues and strategies are:

1. Issue: Legal requirements and restrictions on a given site. Strategy: Mass representation of constraints and unfolded area analysis (Revit);

2. Issue: Solar incidence requirements and constraints. Strategy: Mass modeling and quick renders for evaluation (Revit);

3. Issue: Floor zoning and public-private distribution. Strategy: bubble diagram and space planning tool (ADT);

The exercises are not plain examples of Digital Design, barely related to what performative and generative software would permit. Yet, students are fed with examples which relate their own experimenting with design issues to the potentials foreseen in more sophisticated programming.

This collaboration should facilitate the pursuit of architectural problem solving that students investigate using software, but it hinders further development of those solutions, since the evaluation of proposals is carried on in the studio by lecturers unaware of the potentials and limitations of each of the software employed by the students.

In the first attempts to integrate studio and lab work, we strived to cope with the more traditional studio demands and approaches, following the studio schedule.

This approach has proved inefficient, since the software employed clearly favor more immersive design development, faster formation-evaluation cycles, which the students cannot fully reproduce when presenting their findings in the studio.

In fact, as most of production is now being carried in the lab, in their laptops or home computers, less influence is exerted by studio coaches onto the creative processes. This means that, being away when students form ideas, sort, evaluate, recycle and re-formulate them, they cannot grasp real design intent nor interfere with their process, least to say to suggest different approaches.

Finally, the evaluation of students production is made primarily upon their presentation drawings and renderings which seldom meet traditional studio standards. The evaluation focus is shifted from design critic to representation judgment.

Conclusions CAD training will soon be abandoned in favor of Digital Design education. Yet, the time slot allocated to the discipline is short, leading us into collaboration with a design studio discipline.


Keywords. Digital design, Design education, Design Method