Interdisciplinary Education: lessons from the Innovation Studio Program

Institute for Civil Infrastructure Systems' Second Annual Conference on Infrastructure Priorities July 2002

"Advancing Innovation: Educating Infrastructure; Professionals to Make a Difference"

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In 1857, a young architect and a park superintendent entered a competition for the design of a new park. In addition to their visions of pleasure grounds and public promenades, their entry included detailed planting plans and itemized budgets. Among other features, they proposed the transformation of some broken swampy ground into a visual amenity, and a road strategy that would not impair the city's service traffic. That summer, the design commissioners awarded Calvert Vaux and Frederick Law Olmstead the contract to execute their Greensward proposal on the basis of its broad vision and attention to detail. Olmstead would spend the next sixteen years organizing thousands of workers, wrangling political support, overseeing engineers and gardeners, and courting the media in order to realize Central Park.

Olmstead acquired the skills he exercised as the landscape architect (and superintendent) of Central Park in a haphazard way. In his early years he was possessed of a "a great curiosity and a lamentably short attention span."1 He spent a year in the merchant marine, seven years operating a farm, and worked as a newspaper correspondent and a book publisher. Each experience, in its way, prepared him to orchestrate the completion of Central Park.

Frederick Law Olmstead's unflagging vision, political acumen, organizational skills and technical knowledge are as necessary now as they were nearly one hundred and fifty years ago if we are to realize public works of great utility and aesthetic presence in our own day.

At the Rhode Island School of Design we have been introducing our students to the range of Olmstead's expertise through an ongoing experiment in interdisciplinary education. The Innovation Studio Program, as this experiment is known, brings together architects, landscape architects and industrial designers to work on large-scale environmental and infrastructural problems. While the promises of interdisciplinary work are hard won, and the obstacles significant, over the past three years we have identified the important features of an educational experience that imparts Olmstead's broad skills"

This paper will examine the features of that education through our experience of the Innovation Studio Program.

A Design Studio

Before turning our attention to the Innovation Studio, let me say a few words about design studios, for those of you unfamiliar with this pedagogical model.

"Studio" is the core of professional training at most design schools. Typically, students take one studio per semester, and contact time is intense_-averaging sixteen hours a week. In their junior and senior years (and 5th year if they are earning a professional degree) students choose from a variety of offerings. These upper level studios typically devote the majority of the semester to the resolution of a single problem, be it the design of an office, a helicopter interior or a waterway.

The standard architectural design "problem" is spelled out in great detail-with precise square footage requirements to be resolved in a limited area. Students resolve these requirements in an iterative process of design and revision that permits them to move from large scale planning issues (where does the parking lot go) to human scale design decisions (what should the door-handle feel like) and back again.

The Innovation Studio

The Innovation Studio's curriculum builds upon the conventional design studio, but is tuned to the particular hazards of a more diverse group of participants, the inherent challenges of technically complicated, large-scale projects and the difficulties of group work. Students participating in the Innovation Studio-in contrast to typical studios-are required to generate the programmatic requirements (and square footages) as they refine the project's needs.

Over three years we have tested these methods in three very different projects. The first year, working closely with Michael Singer students developed a proposal for an eco-industrial park for the city of Phoenix. Students identified manufacturing systems whose wastes could serve as the raw material for each other in order to create a closed loop facility. In 2000, the Studio proposed to reformulate Phoenix's waste collection system with a landfill mining operation, and new recycling and remanufacturing programs. This past fall (2001) the studio developed a proposal for the development (and ultimate de-commissioning) of a power plant in Ramapo New York.

In each of these projects students worked closely with a wide array of professionals, city officials, community activists, artists and designers to (1) evaluate the design problem, (2) identify the important economic, community and environmental concerns that effect said problem, and (3) develop comprehensive proposals that integrate those concerns into their design solution.

The Features of the Interdisciplinary Experience

The size and complexity of the problems that the students are asked to solve in the Innovation Studio has forced us to organize participants from different disciplines in order capitalize on their expertise. In the process we have identified ten features of a student's educational experience that facilitate the development of successful designs in an interdisciplinary atmosphere. Turning to those features may help us understand and discuss how to better; train the designers of this century's public works.

An Invitation to Experiment / Student-driven Inquiry

In the Innovation Studio, students are invited to participate_ in an open-ended experiment. At the beginning of the power plant studio, students were told that their design would have to generate, or conserve, 1100 Megawatts, the same amount of energy produced by a proposed plant. Defining the problem this widely (with only one parameter?) requires the students to take a more active hand in directing the studio's efforts. Although the students ultimately decided to build a gas-fired, combined cycle plant, they determined to make it as small as possible, and augment its lowered capacity with a network of sustainable energy sources and an enhanced, countywide conservation program.

The flexibility to accommodate these decisions rewards the student's application of their analytical skills, evaluative judgments and responsible initiative. In our experience, the students who select the studio want to be exposed to new ways of working and are socially or environmentally motivated. Generally students who identify environmental responsibility as a key design criteria possess good technical knowledge but are weak form-makers. To avoid their over subscription in the studio, - the course description makes clear that the work of the studio is to balance these concerns with "high design" in order to create model projects.

A Concrete Problem

Any design studio, by definition, is "problem-based." In the Innovation Studio our design problems are based on actual projects fraught with political and economic complications. In the case of the power plant, American National Power's proposal had been locked in the permitting process for more than 3 years. Discussing the delays with power plant developers and community activists impressed upon the students the difficulty of realizing aesthetically or technically pleasing designs that do not attend to the outside forces that ultimately determine their approval. Like the power plant developers, students would normally be inclined to ignore these forces. In the Innovation Studio we reframe the design challenge to include the needs of competing interests in the final design.

Research-directed

Because of those competing interests and the technical complexities of the programs, the Innovation Studio requires a good deal of research. In fact, we devote nearly a third of the semester to library time. In Civil Engineering Programs this may be more common, but in design schools analytical research is treated as a prelude to the real work of design.3 In such an environment, students aren't eager to spend their time examining apparently tangential topics, Only the resulting designs convince them, In the power plant studio, an analysis of the mating and migration patterns of the endangered, timber rattle snake, coupled with a more detailed understanding of the power plant's operations led the students to divide the facility into four units in order to reduce the building's footprint, and minimize its impact on the snake's migration paths.

A Real-World Site

For a landscape studio a real-world site is generally a given. Here we must take care to distinguish the site from the "problem" outlined above. Real-world sites bring physical complications to be solved. Unstable slopes, bad drainage and even rattle snakes all challenge the technically elegant solution.

In Ramapo, the developer's proposed location had all of the components for a "text-book" solution. The site was out of view, at the end of a road in a sparsely populated valley and the, necessary pipeline and transmission lines were nearby. Unfortunately, the site itself was sloped and required considerable blasting to accommodate a plant devised for a flat expanse of land. Examining the site in more detail and with more forewarning than the original engineers--the studio identified another location down slope. This new site had already been disrupted and placing the plant here would minimize new environmental damage and reduce the apparent height of the plant's cooling towers-both important community concerns.

A real world site and its attendant problems helps to ground student efforts, but care must be taken lest the students grow too attached to the existing conditions. The paradox of the Innovation Studio's attention to the site is that large-scale projects do require large-scale interventions and students must frequently be pushed to adjust the site to fulfill the program.

Access to Outside Experts

Outside participants are an integral part of design education. In the Innovation Studio we rely on outside professionals to a much greater degree to help resolve technical issues, or give insight into surrounding concerns. In their early research, the power plant studio visited with developers at the RW Beck Company in Boston and toured a generator in providence. In addition, tile Vice President of Environmental Affairs at PG&E National attended every review and served as a sounding board to student ideas throughout the semester. During the final phase of the studio Galen Colby, a structural engineer from the Oest Company, consulted on the redesign the studio's proposed plant.

This generous and active participation makes students take their own work more seriously. However, care must be taken in selecting and interacting with the professional community. The wrong participant, hardened by experience, can cow student enthusiasm. Professionals need to understand the

role they play in the design process, in this way critical evaluation may be delayed when the students need help brainstorming, but be applied before the design is too far along.

Team Based

Complex projects require teams to imagine and execute solutions. Design education commonly overemphasizes the role of the individual. In courses that do rely on teamwork, there is still a tendency to judge that collaboration on its products. While these products are surely important indicators, students do need to be taught how to collaborate. In the Innovation Studio we rehearse group skills throughout the semester. At regular intervals we organize teams to strategize design approaches, and every major decision is vetted by the entire class. In each of these decision-making sessions leadership, facilitator and scribe responsibilities are rotated so that each student can experience these roles.

While a necessary skill, group work is never easy. A bad group dynamic can undercut morale and productivity. To counter these potential difficulties each time a team is assembled it is made up of new members. When a group does work well together student enthusiasm and cooperation raise the levels of design and production profoundly.

Cross Disciplinary Collaboration

While teamwork and interdisciplinary work are closely identified practices they do not share all of the same features. Effective cross-disciplinary collaboration requires skills over and above those needed to organize a team. As we have added more participants to the Innovation Studio we have identified some techniques that contribute to substantive cooperation. They include: (1) early opportunities to work together on equal footing (as in the research phase), (2) the use of jargon free language, (3) identifying common criteria for success, and (4) emphasizing the importance of each participant's expertise.

Such techniques stimulate solutions that are shaped by the intelligence of all of the participating disciplines. For example, students from the Wagner School of Public Policy worked with us to outline the bureaucratic review processes required for the approval of a proposed plant. The aim was to identify different ways that designers might act. In a traditional studio, the "client" of a project is treated as a given. Brainstorming with the policy and planning students identified a range of potential clients, each requiring a different approach, and a different solution to what was ultimately the same problem. The session contributed to four alternate design approaches, each one geared to different stakeholders. The first approach was to redesign the proposed plant. The second proposal, aimed at local businesses, developed a distributed power production system. Another developed an appliance for the utility to provide customers to monitor their own consumption, and the fourth proposed a network of wind, water and solar generators throughout the county.

These alternatives would not have been explored without the initial study with the policy and planning students from the Wagner School. As we move into closer collaboration with NYU, our efforts will be directed at helping students value their disciplinary training without overestimating its usefulness.

Multi-Scalar Solutions

In the design disciplines scale refers not only to the size of a thing, but also suggests the interaction between its parts, its proportion, and an appropriate level of design attention. A door's size must relate both to its role; say as an entry way, and also to the overall mass of the building. For an individual, the ability to think across scales reveals mental agility and sophisticated thinking. The concept of scale helps students identify where appropriate decisions may be made. In group projects, scale may used to identify where to capitalize on different disciplinary expertise. In the Innovation Studio we strive to integrate that expertise, while giving students the opportunity to work outside of their normal arenas.

An industrial design student, for example, developed the distributed power proposal. He approached

the problem first from the design of the fuel cell the kind of project that he would normally be responsible for. But he also studied how the integration of this technology might alter suburban settlement patterns by creating new trails, etc...

In the Innovation Studio we encourage students to work outside of their experience in order to bring new ideas to the table, and to avoid pigeonholing particular disciplines at particular scales. But we also set up "in-house design consulting teams" to guide students through technical and scalar questions they would otherwise ignore when working outside of their field.

Assessment

The final feature of an enriching interdisciplinary experience is a clear method for assessing student effort. Too often group and experimental work is unintentionally penalized because the skills needed to accomplish them are, not reflected in grading criteria; Students need to understand that they will be rewarded for developing the skills and habits of mind to work together.

In the Innovation Studio we use a six-part rubric to evaluate every assignment and the student's overall participation. The performance criteria are divided into product, process and contribution to the studio. These criteria are discussed with the student at the beginning of the semester and reviewed as we evaluate their work at important benchmarks.

Identifying the criteria for success in the classroom helps students focus their efforts. Ironically, these assessments are just as important to the larger institution. Being able to articulate the values of interdisciplinary work are critical to lobbying for departmental and division-wide support. At RISD form-making is so valued that the Innovation Studio student's significant programming efforts were often overlooked. To counter this tendency we have begun to make finished presentation boards a requirement of every phase of work, representing their efforts in visually compelling ways helps to engage the larger faculty.

In all of our efforts the Innovation Studio struggles to root our student's efforts more deeply in the world without sacrificing the flights of imagination that bring unexpected solutions. In thinking about the tension between the practical and the visionary,1 am drawn to poet Jane Hirshfield's recent essay on subtlety. Hirshfield defines subtle thought as capable of "spacious outlook and "a suppleness of mind" in which concept does not dominate vision and imaginings are rooted in the possible.3 This musing on subtlety helps characterize the larger goal of the Innovation Studio: to teach our students the suppleness of mind needed to realize, beautiful and effective public works.

Frederick Law Olmstead's clear vision remains an important touchstone in these efforts. His parks, which seem so natural, so unaffected by design are in fact enthusiastic constructions that support the functional, physical and psychological lives of the communities in which they are located. Today's designers require Olmstead's diverse skills and enormous stamina if they are to create the civic and civil infrastructures that will sustain our cities and our children. 1 Witold Rybczynski, A Clearing In the Distance, Touchstone Books, New York, 1999, p. 41 2 At RISD, the studio course is the credit equivalent of two classes. Twelve to fourteen students meet Tuesday and Thursday from 9:30 am to 11:10 am and then again from 1 pm to 5 pm 3 Jane Hirshfield, Subtlety, Orion, Spring 2002, pp.36-37