

# Places, Spaces, and Faces: Teaching Sustainable Design Through Cross-Disciplinary Studio Integration

ROBERT WHITEHEAD  
Iowa State University

LYNN PAXSON  
Iowa State University

CARL ROGERS  
Iowa State University

## EDUCATIONAL MOTIVATIONS

Thirty years ago, Iowa State University created an interdisciplinary College of Design to facilitate collaborative instruction and learning across design departments, yet the proximity of design diversity has produced a limited-range cross-disciplinary design collaboration. This relative isolation of different professional “silos” has mimicked and perpetuated the traditional, outdated models of design thinking and practice as an individual design venture obligated to accommodate the tertiary influences of other disciplines.

However, in response to the complexity and breadth of sustainable environmental design issues, professional business practice models have shifted toward a more collaborative approach to an integrated design practice. Design practice has always been a collaborative venture to a point, yet contemporary integrated practice models tend to immediately involve a diverse set of experts across disciplines (many times including experts from outside traditional design disciplines) in a cooperative design effort, as opposed to the conventional practice model where “consultants” are asked to provide technical support to an established architectural design idea.

To a certain degree, accredited educational facilities are tasked with preparing our graduates for professional practice, but this emerging model of integrated design is not always easily translated to the traditional pedagogical model of a design studio. Large institutions are notoriously resistant to change for many reasons: There may be administrative impediments to collaboration related to staffing or facilities, core curricular requirements that cannot be easily amended, or even a lack of opportunity to collaborate if students are taught in isolation from other design disciplines.

Many students are introduced to the possibilities of integrated design in their education, but rarely in a hands-on learning environment like a design studio. Frequently, design students are asked to collaborate as a design team within their own studio, but it would be a mistake to equate this collaboration with an integrated design model.

Differences between traditional educational formats and emerging practice models which favor collaboration are certainly not solely “architectural” issues. These changes affect a broad range of design, research, and environmental science fields of study and have become a central consideration in the redesign of pedagogical formats and facilities nationwide. Because of our extensive cross-disci-

plinary educational, research, and practice backgrounds, the authors of this paper saw an opportunity to more effectively teach the complex, critical, and evolving curricular issues of sustainable environmental design through an integrated design model for studio<sup>1</sup>.

### FOUNDATIONAL CONSIDERATIONS FOR INTEGRATION

For the last three fall semesters, the third-year architecture and landscape architecture design studios in Iowa State University's College of Design have combined students, faculty, and facilities into an integrated pedagogical model. This paper will outline the fairly commonsense strategy for teaching this fully collaborative team approach to sustainable design. We present sustainability as a necessary design practice that considers technological, ecological, social, and cultural viewpoints in an integrated manner. We feel that the very structure of our studio, project selection, and teaching methodologies needed to model these lessons, and by doing so, show the importance of developing a broad range of expertise across disciplines by engaging in meaningful, productive, and trusting collaborations with others outside of one's profession.

Depending on enrollment, we combine nearly 100 students from both professions into mixed design teams of 6 to 8 members, locate them within a consolidated and often mixed studio atmosphere for the semester, and teach them in a relatively "open teaching" structure of faculty between both departments (Figure 1).<sup>2</sup>



Figure 1. View of collaborative studio environment, Iowa State University Armory, 2009.

These circumstances expose students to an expanded base of knowledge and resources, allowing for us to create studio projects that require a more intense and complex research and design integration of sustainable design principles into design studio projects. Teaching an integrated design studio means more than teaching across topics; it also means teaching students the inter-personal skills necessary to be productive collaborators. These lessons of "teamwork" directly affects our working relationships as a faculty, demanding that we not only trust in this relatively un-tested teaching process, but also that we personally model the appropriate behaviors we are trying to teach.

As one might imagine, this approach has certainly faced difficult challenges even as it has produced creative and developed integrated studio projects. This approach has been modified and improved based on our assessments not only of student work and student feedback, but also our tactical teaching strategies and project design circumstances. Further, changes have sometimes occurred due to some basic constraints imposed by curricular, faculty, facilities, and administrative issues. Finally, there are basic day-to-day challenges both faculty and students face directly related to the realignment of a traditional pedagogical studio model.

### CONCEPTUAL CONSIDERATIONS

The foundational concept that guided our decisions about how to best craft the studio structure, teaching strategies, learning objectives, and lesson plans was that students (and teachers) would benefit from this collaborative approach in both the short and long term. The process was not without difficulties, as to be expected.

The first step toward integration was learning from each other about the common, specific learning objectives required by different departmental, collegiate, and accreditation committee standards that could be more effectively taught together. For architects, this is the semester that concentrates on the relationship between buildings and their site. Both departments have been increasing the emphasis on "green" issues and foundational design principles and both require their students to start incorporating similar skill sets into their studio projects: the manipulation of contours, site analysis methodologies, and sustainable site planning strat-

egies. Each department, of course, had more specific requirements for student learning objectives, which could be satisfied through the development of particular project parameters. We found that by focusing on the application of sustainable design principles to the design of a “community” and by integrating the studios, students would be able to test their thoughts about the sustainable relationship between buildings and sites and be able to get input from professors from both departments to challenge this work.

We intentionally based this integrated design approach within the design studio because design projects inherently require a certain amount of integrated and synthetic thinking about design. Students already recognize studio as an environment that fosters innovation and collaboration, and through design students are allowed to test and expand their ideas about the qualities of sustainable design. While there are multi-disciplinary electives offered in senior studios, our intent was to introduce this at an earlier point in their studio work. Even though the studio is “integrated” it isn’t intended to be a capstone or comprehensive project as it is still relatively early in the studio education. It is instead intended to promote foundational skills and develop a design methodology that they can use later in their educational and professional careers.

We knew that physical separation and isolation between studios would not only send the wrong message about collaboration but would greatly hinder students’ work. We needed all of the studios to be next to each other physically, so teams are able to easily get together during and after traditional studio hours. This even allows the possibility for all team members to be consolidated into one studio location. Fortunately the College of Design has an open-studio facility able to accommodate enough space for all the studios, work rooms, and review spaces for this collaborative effort.

### **PROJECT CREATION AND INTEGRATED CHALLENGES**

While switching to an integrated design model was partially motivated by changes found in practice, this studio was not intended to “role-play” traditional practice contractual hierarchies of architect to consultant, but was intended to make the students question the very foundations of this practice

model. We encouraged students to feel comfortable designing outside of the traditional boundaries of their major. By asking them to be curious about what they do, what others do, and why they do some things and not others in design, students would learn important lessons about collaboration not currently evident within our fields.

Students are asked to envision sustainable design strategies that contribute to the enduring prosperity of all living things. Specifically we ask them to apply this research into the design of communities, buildings, and natural environments that contribute to this vision. Because of the integrated teaching and design approach, we were able to craft more complex, non-traditional project programs and require more detailed research, documentation, and holistic design development from the teams. The research topics, lesson plans, group lectures, and design project parameters were intentionally selected by both architecture and landscape faculty to give students a broad vision of sustainable design principles. To reinforce this, the following project goals were issued to the entire design team with no clear delineation of who would be responsible for address these issues:

- Tie the overall design into the larger systems of the area, in order to anchor and connect the site to the surroundings.
- Deal with circulation paths of all scales (car drives, parking, walking paths, etc) and planning issues, traffic flow, connections and public and private issues of use.
- Address the vegetative structure of the land (natural, agrarian, formal, etc.) and the hydrological structure (grading, water run-off, etc.).
- Look at methods for interior and exterior “place making” (not just about making buildings but the spaces between buildings and around buildings).
- Test your ability to generate and test a “program” for the site (how does the program respond to land use, or how is land use informed by ideas of building program/use?).
- Design a series of buildings (physically and conceptually) that are connected to the landscape and land use.
- Demonstrate knowledge of sustainable building and site planning principles. Building designs are to incorporate sustainable design principles (ventilation, materials, day-lighting, carbon

emissions, flexibility in use, water efficiency, etc.) and to contemplate not only the materials but also the methods of construction.

We created design programs that were structured in a way that requires students to participate in both group and individual work in the design for a “sustainable community.” We require that specific “places” within this overall community plan be developed by landscape architects and specific community buildings would be developed by the architecture students. We leave a certain amount of wiggle room in the design programs so students can help craft the specific issues they believe need to be addressed in the project’s design. Each team member is able to develop their own individual work within the larger context of design they already established with their team. Linear progress of designs from general to specific is not the goal; in fact, students are expected to allow their more specifically developed ideas to influence and amend the larger plan (Figure 2).



Figure 2. Early design scheme presentation, 2009.

The design team plans the entire site, linking the land use programs with the required circulation systems (pedestrians, cars, and bikes), corresponding buildings, and the larger ecological infrastructural issues. There are buildings which correspond with the different land uses (community/nature center, chapel, recreation building, and production facilities related to the agricultural component) which are developed by architectural students.

Each of the community building programs intentionally have a direct functional and visual relation-

ship to “outdoor” space that necessitates design interaction, collaboration, and, at times, compromises between the architecture and landscape students. The building programs are also selected to make sure they aren’t simply open follies in a field, but working structures that require both public and private access points, again requiring coordination and cooperation between disciplines.

### PROJECT CHALLENGES AND EVALUATIONS

Instead of repeating the same projects each semester, we have taken stock of our learning objectives and student results and have changed the programs to best address these concerns. Although the sites have varied between a 500-acre rural farm in Iowa, an arboretum in Ames, and brown-field site in Denver, there are certain project qualities that we have repeated each semester. Usually these sustainable communities need to accommodate a “composite-use landscape” consisting of agricultural land, a natural preserve, space for a community park, and any related infrastructural components (vehicular or ecological).

One of the difficulties in establishing the project parameters is determining the correct length of time for each project component. At the beginning of each project there are delays often caused by learning curves related to working in teams (interpersonal issues between team members, variations in nomenclatures and working methodologies, etc). These sorts of delays in communication set some teams back and delay progress but this is used as a teaching opportunity. Students learn that forming consensus and resolving conflicts through design is a messy business that often requires conflict and compromise, and certainly demands a reiterative approach to design schemes. Instructors each specifically try to deflate the myth that good design projects are a simple amalgamation of different individual ideas crammed together. Coherence and clarity in design necessarily requires compromises and consolidation.

Interestingly, the teams which really engaged in critical discourse often find themselves further along at the end of the project even though they have often done several revisions and reiterations. Additionally, individual work seems to proceed faster than usual in these groups because the students have already established a rich fabric of back-



Figure 3. Iowa State University campus re-design competition, 2008.

ground work that they use to support and inform individual decisions. Students consult team members for insightful criticism and support for their decisions. It is not uncommon for students from different disciplines to share presentation drawings and models to best represent the synergistic relationships between the architecture and landscape that they had envisioned (Figure 3).

Each semester studios have “alone time,” working within their own studio and not collaborating with each other. This can be anywhere from a 2 to 4 week portion of the semester where each studio instructor can make sure specific educational themes or units are fulfilled, or even just as a means of seeing what each student can do when left on their own. This is beneficial not only for our assessment

of the student’s abilities, but it gives the students a real appreciation for what they are missing when they aren’t working with an interdisciplinary team. Giving them breaks from each other is remarkably effective method for helping them understand just how hard holistic sustainable design is to produce on their own.

### TEACHING “TEAM”

Because we saw the benefits that truly integrated project teams received, we recognized that more students could benefit if we also attempted to teach them to be curious, critical, helpful, and productive collaborators. We try to facilitate integration by incorporating regular collaborative exercises into lesson plans: initial meet-and-greet, team-building exercises, informal student-to-student desk crits during the “alone time” portion of the semester, a combined group field trip, encouraging a physical move of desks to a consolidated location that provides more proximity to each other, and assigning combined research projects and site analysis to get them comfortable working together before the “design” begins. At the end of each semester, students are given an opportunity to evaluate each other’s contributions to the team effort.

Finally, and perhaps most importantly, as teachers we try to model the same behaviors that we encourage. We do this with the open teaching structure previously discussed but also by being respectful and interested in each-other’s opinions as instructors. We encourage students to seek input not only from “their” professor, but other professors within and outside of their major. Professors were encouraged to teach “across each other,” frequently delivering desk-crits to complete project teams without the presence of their assigned professor. This openness gives the students access to a broad base of experience, expertise, and diversity in personality and teaching styles. Breaking the traditional pedagogical model of direct oversight and development between professor and students has not been without complications, but like all conflicts in design, we tried to make these difficulties into teaching opportunities<sup>□</sup>.

For instance, we don’t teach that constant consensus of opinion is desirable or reasonable to expect and to that extent there are often disagreements between teachers about the best direction for a

project's design that are voiced in front of the students. These disagreements allow us to encourage more development in the project to help resolve any real or perceived differences in opinions held by the instructors or team-members. Students are encouraged to test these different ideas through development of drawings and models (either on the spot with tracing paper or scrap materials or after a certain amount of time alone to explain to their team-mates what they were trying to convey. Often it is at these stages of project development where the most conflict AND progress seem to occur. This complication of teamwork thankfully reinforces the "talk is cheap" lesson of project-based education that at times is difficult to convey to individuals alone.

### ASSESSMENT

Over the last two years, the Department of Architecture has sponsored juried design competitions at the end of each semester to evaluate student work (typically nominating 8 projects for 2 prizes). In the last two years, 3 out of the top 4 awards have been given to students that have participated in the integrated studio arrangement, (Figures 6 & 7). But beyond student design award recognition, many of these former students (now fourth- and fifth-year architectural students) continue to practice the same set of design skills necessitated by integration. In a series of selective interviews, former students discussed how they more easily seek out input from others and are more comfortable discussing and resolving initial problems in their project design. In reviews these students have developed a broader skill set in communicating their design intent to others graphically and verbally. It is perhaps the fact that the studio structure itself is so unique to many students that when it is over they revert back to more traditional design considerations in remaining non-collaborative studios.

There were difficulties with faculty adjusting to teaching and assessing the work of larger teams, effectively teaching a broader studio content, properly modeling productive integrated design behavior, and giving up the sole authority/control of the one-teacher approach. Over the last three years, faculty members have been continually adjusted in both departments in attempt to find the best matches between faculty expertise and enthusiasm in supporting this alternative approach to stu-

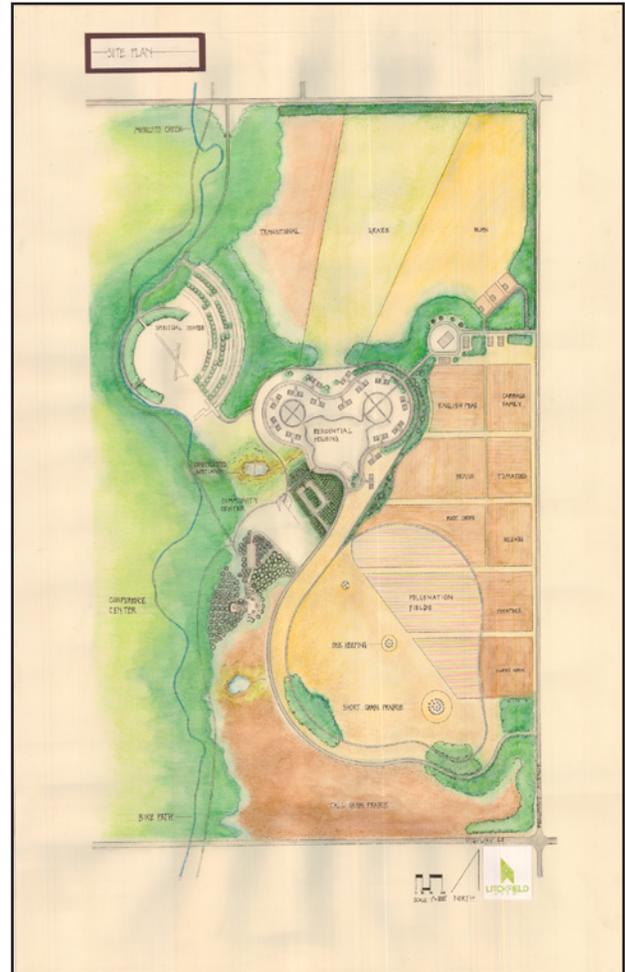


Figure 4. Hansen Prize Competition runner-up, Justin Oldenhaus, Kevin Wagner, Dylan Jones, Jerritt Rouse, Brandon Losey and Pat Mason, 2007.

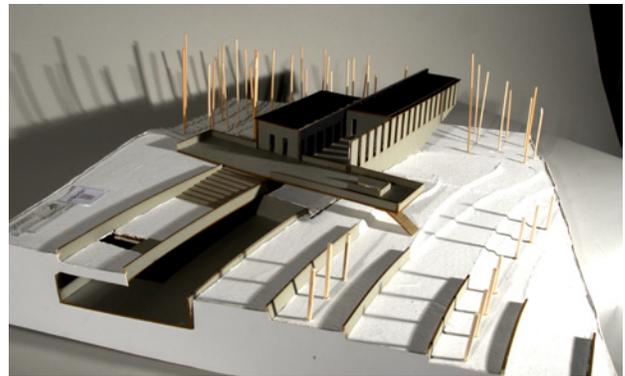


Figure 5. Hansen Prize Competition, Runner-up, Justin Oldenhaus and Kevin Wagner, 2007.

dio pedagogy (only the three authors of this paper have taught this studio all three semesters). In the first two semesters there was not full participation from all the architectural instructors, which created an undesirable gap in the educational experience for students. The current faculty all have hands-on collaborative practice experience supplemented by a broad base of research and academic expertise; these attributes seem to be key contributors toward teaching success in this manner.

Besides the administrative issues of assembling the right faculty to teach the studio level, there have been issues with finding the right facilities to keep the necessary proximity. There were additional organizational challenges in finding a sufficient number of reviewers and appropriately sized review space for the much larger consolidated group of 100 students. These reviews are often salon style, so the students receive a chance to present work multiple times to mixed groups of professionals and professors from both disciplines.

## CONCLUSION AND CONTINUATION

Altering a core pedagogical model of studio education was not without its complications and difficulties. There were unexpected difficulties that some students had not only with the collaborative team structure, but with the expanded complexities of skills inherent in a cross-disciplinary studio. We have found that the architectural students have higher respect for the skills and knowledge of their landscape counterparts (and vice versa) at the end of the semester and a greater respect for the collaborative process of design<sup>□</sup>. The following evaluation comments are representative of the nearly overwhelming support students perceived about the studio experience. Even in light of the difficulties previously discussed, many saw the benefits to the approach<sup>□</sup>:

"Final project was the most comprehensive design I have ever worked on. I feel as if I learned more in studio than I have ever learned previous, not only about landscape and architecture, but about working as a team, and integrating work without disagreement. Coming to an overall proposal that satisfied everyone was one of the hardest things I've ever had to do as a student. And that, I feel is a much harder lesson to learn than anything I can read in a book."

"This was an awesome studio. I really thought the collaborative project w/LA was both incredibly useful & practical. I liked having the perspective of

another discipline and would recommend that this collaboration be done in the future, especially since that's how it will be in the professional world."

"The collaboration w/the landscape this year was a great opportunity even though when it began none of us wanted to work together. (Arch w/land) After everything was over we had learned a lot and even more importantly learned to work as a group. It would be nice to be able to continue with landscape on a few projects."

Now that the class is relatively established in our curriculum, students look forward to the integrated studio as a critical portion of their studio education, and because of the high quality work and collaborative working relationships presented by the students, we now have greater upper administrative support for both programs. In the College of Design, there are several upper levels studios that are now also integrating with other disciplines both within and outside of the College in their design studios. The richness of the student's designs in terms of "sustainability" seems to have been enhanced by this integration, giving them a broader range of experience to benefit their work at Iowa State University and beyond.

## ENDNOTES

1. One author, Carl Rogers is trained as both an architect and landscape architect, Professor Paxson is an honorary member of the Landscape Architecture department and holds degrees in architecture and social sciences, and Rob Whitehead has 15 years of professional experience incorporating architecture within sustainable site designs.
2. Enrollment numbers vary from semester to semester, but typically there are between 60-70 architecture students (in 4-5 studios) and 30-40 landscape students (in 2 studios). In past semesters, not all studios in the third year level collaborated with landscape students, so some projects consisted of equal numbers of landscape and architecture students.
3. Modeling the "appropriate" behaviors did not always happen. Early on, some professors were uncomfortable with this approach and felt that the open structure of teaching could undermine their traditional teaching authority and thought that the emphasis on collaboration detracted from time the students could spend focusing on traditional architectural studies of creating buildings.
4. The College of Design has a shared "Core" program for all first year design students, and the competition to get into architecture programs is steep which at times unfairly creates an "elitist" attitude accepted architecture students mistakenly adopt.
5. These student evaluation comments from 2007 fall semester comments from one professor's class. Similar comments were repeated often in other studios in both disciplines for both 2007 and 2008.