Creating Learning Communities in Large-Enrollment Beginning Design Studios

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Introduction

Beginning undergraduate architecture students often acquire their first design experiences in large enrollment, multi-section studio courses. The pedagogical premise of this curriculum pattern centers on the idea that all students require a similar introduction to design methods before embarking on studios with a more particular focus. From an administrative perspective there are several advantages to multi-section courses. They can provide schools with a structured teaching setting that supports the development of new faculty. Their uniform, detailed curricula also make it possible to readily accommodate faculty assignments that must occur late in the academic calendar when course preparation time is limited. There are, however, some inherent problems with this format. A one-size-fits-all curriculum may not take full advantage of the strengths of individual faculty members or stimulate diverse thinking among student groups. A parallel but separate format can create unequal access to resources and sometimes breeds a competitive rather than collaborative atmosphere.

This paper explains how an experimental curriculum addressed these difficulties. Our objective was to enrich the education of beginning design students by linking sections of a design studio to create an active learning community. Six sections of a second year undergraduate design studio, involving close to 100 students, were connected using electronic information sources and group activities that crossed section boundaries. We involved all students in the acquisition and dissemination of information and skills that pertained to studio design projects.

When several instructors and groups of students participate in the same studio course, how can everyone gain access to everyone else's findings and expertise? Discoveries and perspectives that could enhance the learning of all students may not be readily accessible. We identified factors that impede information flow. At the University of Oregon the second year sections are physically separated, meeting in adjacent classrooms with no visual connection between them. Security provisions for the protection of student-owned computers necessitate that doors remain locked when class is not in session. There are few opportunities for the casual interactions that can occur in open studios and students are often unaware of the information obtained and conclusions drawn by their peers in other sections.

Faculty communication can promote information exchange, but faculty offices are dispersed and busy schedules preclude frequent meetings. The faculty team has included senior and junior faculty as well as adjuncts with varying degrees of teaching experience

and familiarity with the curriculum. This studio is often staffed with new faculty so there may be one or more instructors on the team who have not taught a design studio before. Although the team brings a wealth of different perspectives to learning and teaching and offers varied types of expertise, it is not possible for one instructor to assist all students. As a result most students see themselves as studying exclusively with the instructor assigned to them and learning about that instructor's particular approach to design. Although curricular objectives and design projects may be the same, differences between student groups and instructors in separated sections can have a significant impact on an individual student's learning.

Over three years we have developed strategies for managing information sources and communication that addressed these issues. Our goal was to smooth out the differences between sections by overcoming the barriers between them.

Managing Information Sources

Architectural practice takes place in a complex culture that includes participants with diverse perspectives, each with access to different types of information. Design professionals spend significant amounts of project time gathering and analyzing information. In contrast, the short duration of design studio courses, particularly those offered in schools with quarter based academic terms, limits the time faculty and students have to manage information. Studio instructors often compensate for this difficulty by pre-packaging edited versions of the most relevant data. Although effective as a shortcut to initiating design scheming, it deprives students of the opportunity to learn how to identify and obtain information themselves. Far less effective is the studio in which students are expected to design without access to essential information and asked to make assumptions based on their personal experience, individual preferences, or faculty pronouncements.

We attempted to facilitate a learning experience that begins to resemble the complexity of professional life by offering each student a unique, self-directed educational path with opportunities to interact with all of the members of their design studio community. Students spent the first two weeks of the term collaborating on an information quest that developed their ability to locate sources and interpret the information they assembled. Assignments were organized to reduce the redundancy of effort that can occur when many sections work independently on the same project.

We selected a project for which there were a large variety of accessible, robust information sources. Digital information sources were particularly effective due to their ease of access and transmissibility. For the past three years this studio has undertaken designs for a portion of an urban street in the historic business district of the City of Corvallis, Oregon.

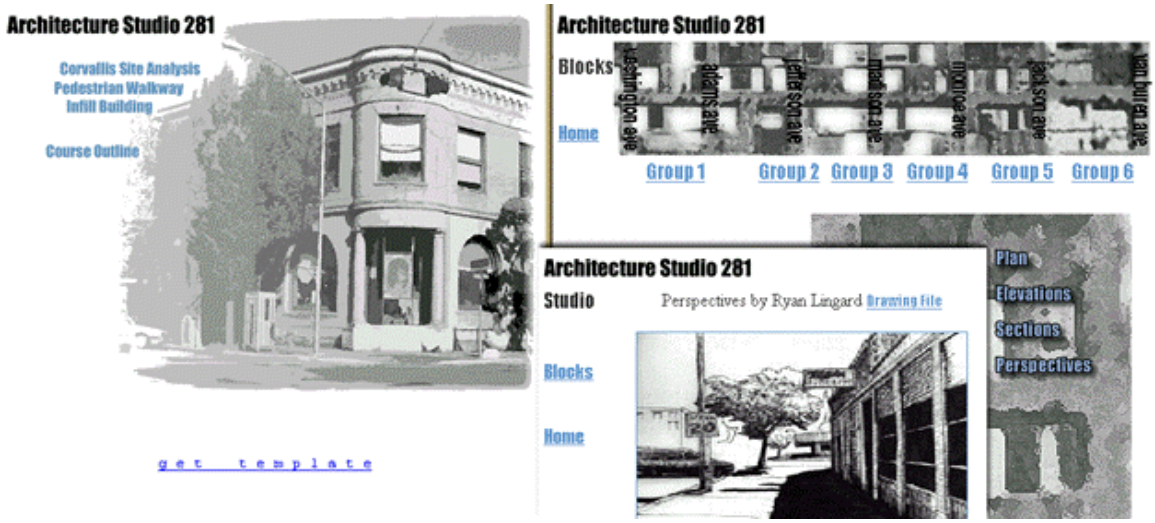


Figure 1. Project site as documented by students

Corvallis (population: 50,000) has been a useful learning laboratory because of the extent of its information sources as well as the generosity of community professionals who volunteer their time and expertise. Students explore the physical places and elements of the study area and consult with experts. Digital sources include a city website, a GIS database linked to recent aerial photographs, topographic maps and drawings of public works infrastructure. Planning documents, building codes and zoning ordinances are included in the information students must consider.

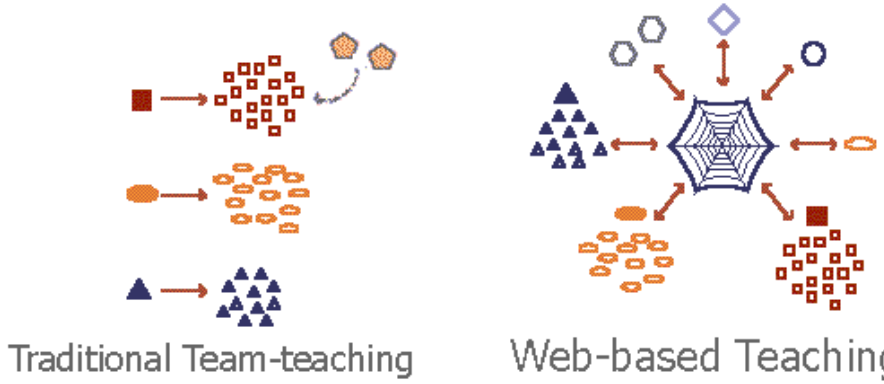


Figure 2. Web based teaching allows all sections to take advantage of special resources

While some information remains available only by visiting the site or repositories of information such as a library, digital information is easily accessible to all. The possibility of sharing authentic versions of primary sources among a wide number of students enriched studio activity. In addition to being able to share information generated by others, students were able to share their reactions and perceptions about the city through the class website. While we still relied on gathering remote site information and using the library for scarce documents, we used the studio website to multiply the utility of site visits. Each student concentrated on gathering specific information that combined to form a rich mosaic about the city.

The information sources can be classified according to two variables: type and location. Source types, shown as quadrants in the diagram below, include places, artifacts, people and documents. Source locations, shown as rings, can be identified as immediate (in the students' workspace), local (in the studio community), and remote (in the City of Corvallis.)

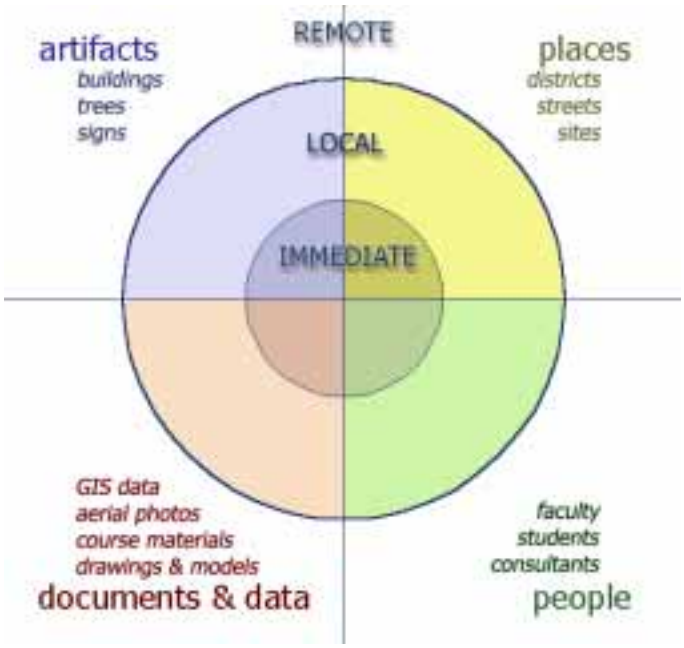


Fig. 3. Information source types

We assumed that course participants must become aware of and have access to relevant information about the physical and social processes of a site to be able to engage in responsive design. In the design studio two kinds of information access problems can occur. Student designers may limit their investigations to immediate sources. It is also common for individual studio sections to rely too heavily on biased perspectives due to over reliance on a narrow data set. To create an information-rich studio, we tried to foster links to local and remote sources. Sharing information across section boundaries made this possible. At the outset of the course, much of the instruction focused on understanding the types and locations of information sources, the need for information generation, and the roles that individuals can play as information specialists. The diagram below illustrates the initial information structure for the Corvallis streetscape documentation project.

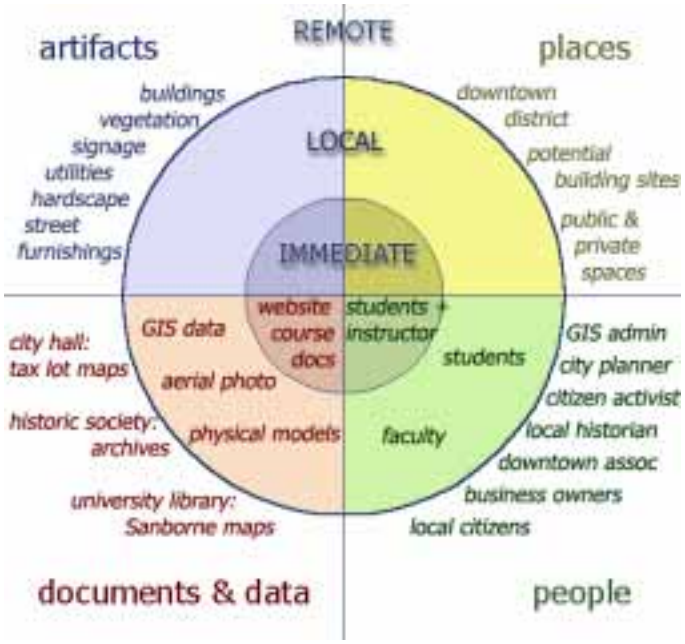


Figure 4. Sample studio project information

As the term progressed students could add new information and weave it into its context thereby connecting the immediate, local and remote sources.

Managing Information Communication

How did we attempt to bring these pieces together into a useful, coherent whole? We orchestrated the flow of information through different kinds of team grouping, controlling the size of teams, the mix and the supervision. In this way, we encouraged both the development of rapport and the deployment of intellectual resources. We designed teamwork to cross class boundaries and stimulate dialogue between large numbers of students. From the six classes taught by individual instructors, at opportune times, we drew out representatives for special training. Each instructor would take time away from his or her original class to provide training to the representatives in skills such as GIS, photography, drawing, model-building and Web authoring. The small size of the training groups allowed the representatives to make quick progress in a specialized area of interest through coached study. The representatives would return to their original classes able to assist classmates in a skill and relay guidelines pertaining to coordinated efforts. By using this strategy sequentially in time, with different training, we were able to create a large number of student specialists who could contribute distinct services. This strategy was also used to facilitate communication with the local professionals who served as expert consultants.

In the first project, all six sections collaborated on the detailed documentation and analysis of six blocks of a downtown street. Within each section, students were assigned to document one block (drawings or physical models to scale) and a develop a focus topic for the website that considered the street and its context as a whole. By working on both

at the same time, students had the focus topic to think about while completing the more mechanical tasks of documentation. These efforts served to represent remote information (such as the study site) to local and immediate locations (such as studio drawing files or the class web site). The specialized training for the representatives supported these class-based efforts. The students' needs for each other's skills stimulated interaction. In creating exercises that only can be solved by drawing information from other students, we built on findings from Virtual Design Studios that showed that communication between students is encouraged by making them dependent on each other for completing an exercise. (Dave and Danahy 1998, Cheng 2000)

In getting help from each other, students can also develop respect for specialized roles. There is evidence for this in Sonnenwald et. al. (1996) in which communication roles "supported knowledge exploration and integration, collaboration and task and project completion by filtering and providing information and negotiating differences across organizational, task, discipline and personal boundaries." We found that the special training and resulting heterogeneous groups encouraged the development of Sonnenwald's "stars" that operate in different levels of the group hierarchy as well as student leaders who acted as agents who negotiated between sections. For example, as the drawings developed, the students selected the best graphic examples of elements such as shading and entourage as standards for emulation. When differences in tree construction for the physical model were identified, the model-building leaders negotiated a compromise to redistribute trees so that different types were dispersed throughout the six-block model.

As in other studies of remote collaborations, we observed that participants earned authority through active participation and beneficial contribution rather than by rank or title. In the way that drawn documentation mediates the relationship of participants in the building process, giving an edge of control to those who draw (Robbins 1994), our specialized media requirements also reinforced a meritocracy. For example, in developing the website, the students with strong technical and graphic skills earned the respect of their peers, and found their contributions incorporated into the final version. Among the talented web designers, the one who was most influential was the one who also had strong verbal skills and put in the most hours helping peers. Verbal presentation skills were rewarded in poster session style reviews. These reviews also rewarded the successes of teams, a key variable in promoting group cohesiveness. (Michaelsen et.al. 1997) The give-and-take negotiations and the specialized contributions made the studio into a working community rather than an instructor-centered educational delivery.

Breaking down the large class into manageable sizes helped develop rapport. Sarah Harkness explained the size of The Architects Collaborative, as quoted by Middleton (1967):

> "If there is anything magic in the whole set-up, I believe a good deal of it may simply be a matter of numbers. The partnership is large enough so that it would be impossible for one person to dominate it. It is also large enough so that whatever idea one member may have, he will always find a willing ear to listen…However, the group is small enough so that the partnership can meet

round the conference table for informal discussions; small enough so that decisions do not have to be made by vote, but only by 'the sense of the meeting'. Our meetings have been likened to Quaker meetings in this respect"

We used a sort of progressive collaboration, in which individual efforts are first consolidated into small groups and only later into larger groups, allowing relationships to form gradually over time and special abilities to come to the fore. (Wing 1999)

Teachers encouraged interaction between classes in several ways.

1) Each group's plan, section, elevation drawings and block model were required to seamlessly join those of their neighbors.

2) At the completion of the site analysis project, the drawings and models were assembled and classes shared their topical reports in poster session fashion. For this exchange, students printed out their web pages or posted original material that was scanned for the web. Their peers completed evaluation forms commenting on the content and presentation of their efforts.

3) In the second project, students could use any of the six blocks to site a pedestrian amenity (bicycle parking structure, sheltered seating, magazine kiosk, or ATM). The site for their final project to design a commercial infill building was on a block drawn and modeled by students from another section.

Teachers also monitored the information exchange process during class and coordinated activities during weekly faculty meetings. These meetings were also a time when holes in the information communication structure could be identified and addressed.

As a result of all the specialized tasks, topics and training, each student had a different kind of experience. Rather than dictating a single mode of learning and a prescriptive knowledge base, we attempted to foster a learning environment. The faculty gave up some control of their own classes in return for a stimulating, if slightly chaotic, web of interaction. The students were entrusted to work independently as their instructors went off with representatives from other classes. In the absence of a studio instructor, students had to rely on each other's face-to-face help and the developing class website. Because they did not have a single authoritative information source, the learning process became more democratic.

Implementation Strategy

Separate parallel studios tend to diverge in information content over the course of the term in response to faculty and student expertise and interests. Because of the autonomy of the sections, the differences are typically not revealed until students view work produced by other sections during end of term reviews when there is little time to learn from the variations.

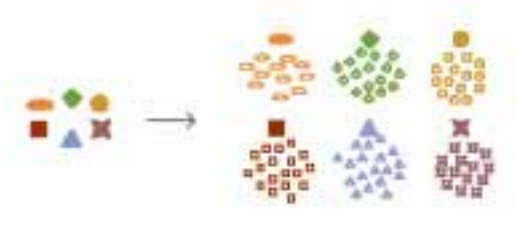
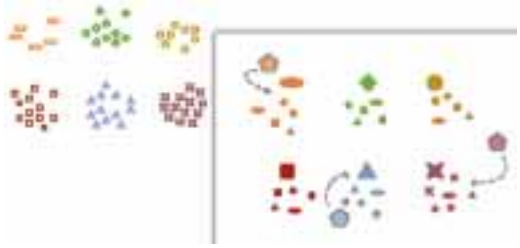
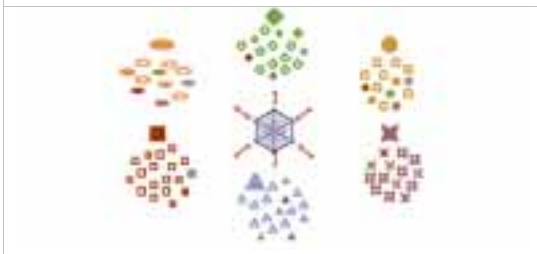
	***1. Faculty orchestrates information flow to parallel studios*** Connected studio sections create a need for interaction between faculty and students and allow each section to contribute specialized knowledge to the class
	***2. Faculty and experts train student representatives*** Layers of small group learning activities recombine participants to accomplish specific tasks and serve as information conduits.
	***3. Trained deputies organize and inform peers*** Students are encouraged into leadership roles.
	***4. Sections share resources, guidelines & work online*** Information obtained by small groups is placed on the class website. Most students elect to bring their personal computer to the studio where internet access and technical support is available.
	***5. Poster session encourages exchange*** Poster style review sessions involve all students in the project review process and encourage a more intimate conversational exchange between students and reviewers.
	***6. Whole team shares agenda and complementary skills*** Sharing of complementary skills is encouraged through the school's policy to evaluate studio performance on a pass/fail basis.

Figure 5. Dynamic teams stimulate connected learning

Questions and Tradeoffs

Our experiences teaching in this curriculum raised questions about how time in studio should be spent, what activities should be emphasized and what achievements rewarded. At its foundation is the belief that students learn as much, if not more, through teaching one another by talking, exchanging and demonstrating, than by "making" in the traditional sense of design studio production. The tradeoffs are complex.

	Benefits	***Trade-offs***
Special-ization	Specialized skills, not usually present at the introductory level, are developed within the class. Students have choices and can build upon their prior experience and learning styles.	No two students have exactly the same experience or instruction, some students will acquire selected skills not available to others; core curriculum becomes fuzzy.
Information	More comprehensive, better quality information made available to all students and faculty*;* students learn about information sources, develop better information retrieval skills.	The quantity and complexity of information introduced can overwhelm faculty and students, requiring considerable time and effort for interpretation. Design scheming is delayed as time is spent on information retrieval and analysis.
Faculty Teamwork	All students have access to all members of the faculty team. Team teaching contributes to faculty development. The uniformity of instructional quality between sections increases; competition between sections decreases.	Faculty experience less of a connection to individual students and loss of autonomy over the group of students assigned to them.
Learning Community	The experience helps to bond the class and allows students to assume leadership roles and develop more working relationships. All students have the opportunity (and obligation) to learn by teaching their peers.	Students produce fewer documents due to more time spent interacting with others. Comparative evaluations of student performance becomes more difficult.

Figure 6. Table of connected learning benefits and tradeoffs

Between the benefits and trade-offs there is a spectrum of possibilities that range from a free, dynamically expanding learning environment to one that is structured with fixed information. The advantage of the former is addressed in *Communities of Practice* in which Etienne Wenger (1998) outlines a framework for learning as a process of social participation. Architecture educators will recognize the following description of learning made by the author as being fundamental to most design studio pedagogies: "What they [participants] learn is not a static subject matter but the very process of being engaged in, and participating and developing an ongoing practice." But Wenger points out that, like learning, communities of practice cannot be designed. "Practice is the not the result of design but a response to it." We aimed to foster situations that facilitate rather than frustrate classroom communities of practice. The challenge was to create a context and project objectives complex enough to stimulate learners to design their own learning and open-ended enough to allow learners to take their own initiative and assume personal accountability.

In our enthusiasm we sometimes overwhelmed the students and ourselves with overlapping agendas. By not programming each student's learning experience along a set path, we intended to make space for different styles of learning. By admitting that no one person holds all the answers, we tried to open the door to new discoveries. While our teaching environment limits how we can verify our intuitive reading of the situation, each new class provides a new opportunity to find the sweet spot between a centrally structured curriculum and a rich chaotic web. Within the unpredictability, we see a lot of promise.

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