Curricular Weaving

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If architecture, by nature, weaves together various knowledges (of technology, culture, and history to name only a few), then architectural education, it could be argued, may be most successful when taking a similar approach. Even while individual courses have their own syllabi, objectives, and intent, their best value is found in moments of overlap, when the material of one course dovetails with that of another; particularly given the tendency of students to sequester knowledge gained in one course from that gained in another. In the second-year curriculum at Louisiana State University, three required courses-theory, drawing, and design studio-have been interwoven to overcome this compartmentalization and engage students in overlapping, discipline-specific knowledge and skills and a consistent habit of critical inquiry.

This paper presents the courses and coursework of this second-year curriculum and discusses its strategies for interweaving. These courses, specifically building analysis, rigorous free-hand drawing, and design studio (emphasizing spatial composition), have dissimilar course content and objectives, yet consistent themes and skills were developed to weave them together. These are, in brief, acute observation, drawing conclusions from observed evidence, explicit demonstration of thinking, working through a hierarchy of scales, and precise and accurate use of language and representation. These themes and skills are studied through academic research and writing, pure representation, and individual design. The relationship between unlike courses is made evident to students, facilitating recognition of a consistent methodology of inquiry.

Ultimately, this second-year curriculum compares itself as a model with others found currently in architectural education (such as the master-apprentice model) as a means to advocate for the weaving of courses in both inter-year and intra-year curricula. Benefits and drawbacks of weaving are considered-as well as the implication on notions of individual creativity and individual academic faculty interests-to provide, in the end, a more cohesive, consistent and productive educational model.

WEIGHING EDUCATIONAL MODELS

Curricular weaving is hardly new within architectural education. Traditional curricular structures from the Beaux Arts to the Bauhaus were founded on the notion of coordinated coursework that taught consistent themes and skills. This was also true for the most prominent modern American schools of architecture that followed, such as Harvard University and ITT, and more recently, Cornell University, Cooper Union, and Columbia University. Each of these schools had or has a unique set of shared (or perhaps, at times, imposed) principles, beliefs, or ideology around which the curricula was or is organized. Yet, these shared principles are increasingly difficult to identify. As Pierre von Miess describes in the introduction to his book, *Elements of Architecture*, this "great formal diversity" has placed architectural education in crisis. How, he asks, is architecture to be taught if it is no longer a product of shared beliefs, but rather of personal vocabularies? Today, schools seem to be left with one of two choices, each somewhat unpalatable: (1) hope for a benevolent dictator to impose a "shared" ideology, or (2) suffer the cacophony of educational diversity.

This current situation could be seen as the residue of the master/apprentice model of architectural education. In its archaic form, in which an apprentice worked under the direction of a single "master" for the duration of his training, the model offers some of the benefits of a woven curriculum, such as a consistent process, by virtue of the singular voice of the master. However, without that single voice or at least the single voice of a shared ideology, a cacophony or discord arises in the educational process; there are many masters still invested in the model, but they now have governance over the apprentice for only a semester or two. The student then faces successive semesters of uncoordinated indoctrination and must, with little or no previous architectural education, negotiate multiple-often conflicting-vocabularies. In this environment, faculty often claim that the student is enriched by the dialog of

divergent views and that the student learns by making an informed decision as to what to believe.

This view, however, is in contrast to several well-established educational theories. William Perry, in his seminal text *Forms of Intellectual and Ethical Development in the College Years*, writes that the typical student enters college in an intellectual position characterized by a dualistic view of knowledge-there is a clear right and wrong that is determined by some authority figure. In this view, knowledge is an absolute that exists "out there." and the teacher is the authority (or an agent of the authority) whose task is to transmit knowledge to the waiting receptive student. This intellectual position is similar to the "Banking Model" of education described by Paulo Freire in *The Pedagogy of the Oppressed*. Freire writes that much of education follows a model in which students are depositories into which teachers deposit knowledge. The student then, when called upon to do so, simply makes a "withdrawal" from what has been stored. Both of these descriptions present knowledge as a fixed object that is uncritically received by the student. Williams and Freire argue that this view is unproductive, if not detrimental. In each case, the student is told what to believe rather that how to think. No intellectual apparatus is provided for the student to critically evaluate received knowledge, and therefore, he or she has no means to soundly choose what to believe. The Master-Apprentice model has many similarities to the Banking Model and reinforces the intellectual dispositions of those with a dualistic view of knowledge.

This paper proposes a third option, one that, ideally, preserves aesthetic and ideological diversity while teaching consistent, overlapping processes for the construction, rather than deposit, of knowledge.

THE CONSTRUCTION PROCESS: FOUNDATION

The contention that knowledge is constructed provides a means for a curriculum to be woven. This contention encourages any intellectual project to follow the same basic, but flexible, process of development. It must begin with a solid foundation, develop in a logical manner with a verifiable process, and when completed, clearly express its intended result or conclusion. In this way, constructing an idea in studio follows the same "thinking" and "making" processes as constructing a drawing or constructing a paper. In the second-year curriculum at Louisiana State University, three courses, specifically building analysis, rigorous free-hand drawing, and design studio have dissimilar course content and objectives, yet consistent themes and skills were developed to weave them together. The skills of acute observation, drawing conclusions from observed evidence, explicit demonstration of thinking, working through a hierarchy of scales, and a precise and accurate use of language and representation are the building blocks of this process. As criteria, they become viable because they have credibility to an outside of world of educational theory and practice. Though not the only such criteria, they also fit within the specific demands and processes of the discipline of architecture.

In all three classes, officially called Architectural Topics, Architectural Techniques, and Design Studio, the creation of a solid foundation for an analysis, a drawing, or a project begins with a thorough understanding of the problem, the gathering of all possible data relevant to that problem, and the conceptualizing of a general outline that the solution to the problem should take, based on the data gathered. These steps are restated as "acute observation" and "drawing conclusions from observed evidence."

In Architectural Topics, students begin a building analysis. Analysis is the intellectual skill that facilitates one's ability to, among other things, break-down complex problems, identify relationships between parts of things, and understand how things work, or do not work, together. The process is begins simply by gathering all possible data about their subjects. The data comes in two forms: first, all written information that is purely factual, and second, all published graphic images, including both photographs and drawings. (It is important to note that only raw data is permissible; that is, texts or diagrams that are interpretations of the building by another author are not permitted.) This information is then gathered into an annotated bibliography, which provides both the sources and a brief description of the material to be found in each. By reviewing and formatting the information, students form a basic understanding or view of the object (building), which they will pursue in the next phase of the project.

In Architectural Techniques, the foundation consists of the critical initial lines on the paper. In this course, students are asked to construct freehand projection drawings (including orthographic, paraline, and perspective drawings) of machined objects, a combination which conditions the eye to see geometries present in industrial production and the hand to draw straight lines and mathematical (rather than organic) curves. They are asked to go beyond seeing what they know an object to be, in order to observe a common everyday object (such as a desk lamp or padlock) in terms of its component parts that together form the object. Since no tools other than a pencil are allowed, acute observation becomes critical to accuracy. First, the object's extents are determined by sighting with the pencil, and bounding boxes for the views to be drawn are placed on the page. Students must thus immediately consider two important facts: the object's scale (will the drawn representation of the object will be larger or smaller than the object itself?) and the space of the page (can it be used to present additional information about the object?) Next, the student must discover the underlying patterns, shapes, symmetries, and geometries in the object in order to describe it in the simplest terms possible. These primary organizing lines are then added within the boxes. After re-checking these initial constructions, the student can proceed to the body of the work.

confident in the accuracy and validity of the foundation that has been laid.

Simultaneously, in design studio, the students are asked to investigate the form of an object that is not so readily defined by descriptive geometry. Each student places a shoe (preferably one that shows wear) on a rectilinear base and in a way that privileges its three-dimensional qualities. The shoe is thus not oriented parallel with any plane of the base. Using a set of hand-made calipers, the students are then asked to draw-as accurately as possible-elevations and sections of the shoe parallel to the edges of the base. The drawings are to be projections of each other and must evidence their own construction; meaning that one must be able to trace the lineage of all points, lines, and planes from the drawing back to the object, so that the accuracy and precision of the drawings is proven in the drawing itself. As in the Techniques class, students begin the drawing by first constructing the box that bounds the shoe. Since they could accurately determine the confines of the shoe (the "box" around it) using the flat base as a guide, this became the foundation outline of their drawing. The general outline of the shoe (the "profile line") could also be calculated in this manner. However, after these initial lines, the problem of "proof" becomes more elusive.

THE CONSTRUCTION PROCESS: FORM

After the foundation is accurately set, the students in each class continue to develop their "argument," or evidenced solution to the problem, which forms the body of the work on the projects. In this stage of the process, working through a hierarchy of scales and an explicit demonstration of thinking are essential parts of the learning process.

In Topics, after reviewing all gathered facts and gaining an understanding of their buildings, students select which of the various blocks and fragments of information are pertinent to their interpretation of the object (building). Here, students must think critically: a value must be imposed on each piece of information, preserving what is in support of the meaning to be presented, and discarding everything irrelevant. The selected texts and graphics are then pieced together to form a coherent argument.

In Techniques, each drawing assignment was to be completed in four hours. The majority of this time is spent in construction lines. Confident that the initial primary lines defining the object are correct, the object can further be broken down into its component parts using dozens of construction lines that form, to continue the construction analogy, the structure or enclosure of the drawing. Drawing machined objects freehand requires concentration. Since straight edges as guides are not allowed, students must use full construction lines instead of relying on "tick" marks to place information on the page. Each line becomes a project unto itself. Working through the detail from large to small (long to short), the object is broken down into its

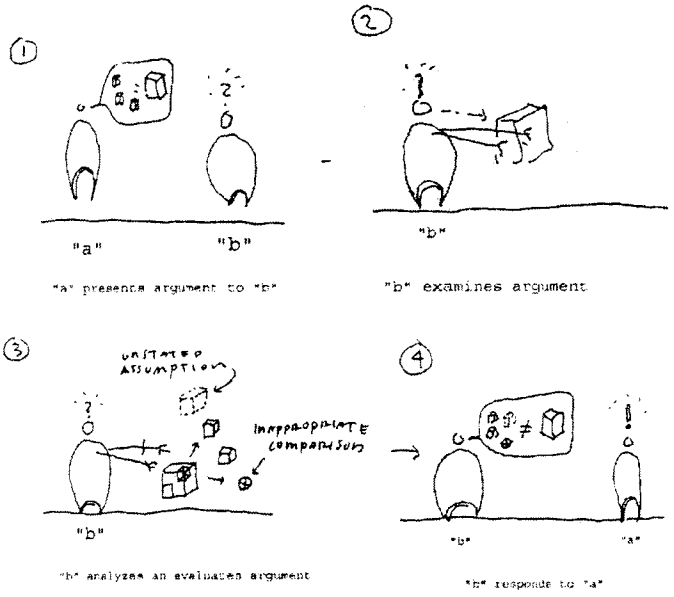

Fig. 1. Analysis diagrammed – argument and building.

constituent parts, beginning with the most elementary understanding of its proportion, size and shape. Construction lines, drawn lightly, are the most basic description of the object as it occupies space; while giving no definitive picture of the object, they give a general understanding of form, shape, and complexity. The pattern of construction lines stands as evidence of the process of thought.

Meanwhile, in Studio, students are faced with the problem of accurately drawing (hard-line) an irregular object occupying three-dimensional space. To do so, they need to question their own preconceptions of how to draw a

familiar object (the shoe), and begin to construct devices that would accurately and objectively find and measure points on the object's surface. In this way, points were plotted which allowed the representation to emerge from the page as a result of gathering data or evidence, often overriding the student's continuing preconceived visualization of how the shoe should look. Students learn to question their own assumptions and to trust the evidence gathered. As in Techniques, students work from outlining the most basic information about the shoe, such as the foot opening, to specific details such as cleats and varying layers of fabric. Again, proof of "correctness" is essential. Lightly marked points and construction lines are left on the drawing as evidence to support the accuracy of the object drawn. Given the limited amount of time available for the project, they must determine how many points, and which points, will be most valuable in the drawing process. Some areas have simple geometries and thus are more easily understood, requiring fewer points. Other areas are more detailed and specific; these areas must be constructed using more point information. Through this process, students both determine the appropriate amount of investigation needed to accurately

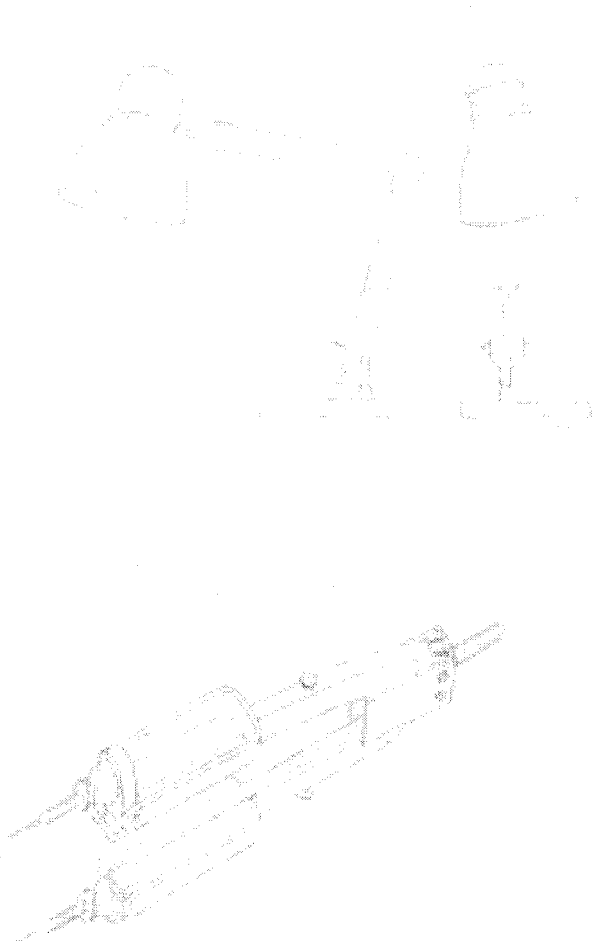

Fig. 2. Constructed freehand drawings (student work: J. Phillippi; C. Baichoo).

Fig. 3. Constructed hard-line drawings (student work: L. Saab; C. Sanders).

express varying areas of the shoe (work through a hierarchy of scales) and leave the points as a marker of the decisions made (explicit demonstration of thinking).

THE CONSTRUCTION PROCESS: FINISHES

When the body of the work is complete, making the conclusion clearly readable and/or understandable to the outside viewer completes the construction process. The criteria used to evaluate the work calls for a precise and accurate use of language and representation.

In Topics, this is a completed document revealing, through both text and images, the argument presented in a coherent form. In contrast to the often overly complex language used in the profession, ideas here are presented in basic terms that reveal a true understanding of the material. The craft of the document itself is also important. Thoughtfully placed text and graphics allow the author's intent to be more clearly understood.

In Techniques, this manifests itself in those skills that are elementary to anyone beyond the entry stages of the profession-line type, line quality, and line weight. To students in the beginning of a design program, however, this language is often a difficult one to master. The ability to "read" drawings is not fully developed, and they must very consciously select and evaluate the different effects of finished lines in the same manner as choosing words carefully for a paper. With each line characteristic selected and added to the page, students develop the ability to use each seemingly simple architectural notation to its greatest potential. In class, students evaluate both their own work and that of their classmates, in order to test the readability of their drawings. Here, they learn that no matter how accurate the construction lines may be, only by a careful and accurate use of finished lines is the information presented in the drawings understandable.

In Studio, the relatively organic-looking shoe drawings are finally ready to hard-line. This is done in intentional contrast to the Techniques course, where machined objects are drawn freehand. French and ship's curves become essential tools as students now must form a coherent line from the array of points. Interpolation often becomes necessary, revealing to the student that despite the care taken in projecting points, inconsistencies are still present and must be accounted for. (Note that this exercise leads into a later project on the exploration of landscape: the plotting of points on an irregular surface.)

While the examples shown here for the Techniques and Design Studio courses are given in the first few weeks of the semester (the Topics building analysis has a longer duration), the same process is used for the more complex abstract and building projects throughout the year. By using the same process in three distinct but interrelated courses, the process of construction-whether written analysis, drawing, or design project-becomes more firmly embedded knowledge. Architectural study, in all forms, is taught through a related thought process, and by doing so, the interrelationship between various forms of knowledge is presented in a way to better understand the whole. Curricular weaving recognizes knowledge as truly gained through these long infusions of learning overarching themes, skills, and habits of thought; and that this, in the end, provides a more cohesive, consistent and productive educational model.

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