A.0 EL ATELIER INVERTIDO: CASO DE ESTUDIO

Los proyectos siguientes son ejemplos del Atelier Invertido (3.3), una oportunidad pedagógica en la cual los estudiantes trabajan en el diseño y construcción de un proyecto real. En ambos casos las ambiciones de diseño eran mucho mayores de lo que los presupuestos de los clientes podían afrontar. La estrategia fue, consecuentemente tomar contratistas para construir la parte gruesa de la obra, reservando los componentes inusuales y complicados para el equipo de diseño y construcción. En ambos casos la actividad pedagógica amplió significativamente el trabajo y el nivel de diseño.

A.1 ESTUDIO FOTOGRÁFICO TEAGUE, DECATUR, GEORGIA

Cuatro estudiantes de tres universidades trabajaron en este proyecto en diferentes roles; todos habían estudiado previamente conmigo. El proyecto consistía en transformar una vieja oficina postal en un estudio de fotografía. Nuestro esquema ubicaba un edificio dentro de otro, posicionando el objeto nuevo e interior de modo de facilitar usos entre éste y la cáscara original. Los estudiantes construyeron un volumen considerable de la obra de este proyecto.

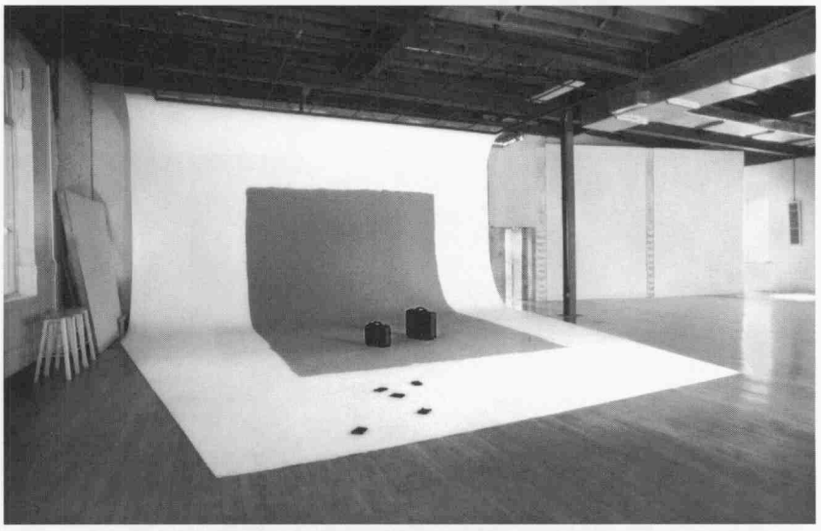


Fig. 25-26- Los estudiantes construyeron la bóveda para fotografías de 32'x18', un sólido y complejo emprendimiento. La compleja curva de la bóveda fue desarrollada en CAD, desde la cual se plotearon las plantillas y finalmente fueron materializadas en grandes marcos. Estos marcos fueron levantados en el lugar y unidos entre sí por cientos de costillas de madera lo cual resulto ser tan hermoso que se dejó el lado posterior expuesto en la escalera. Se atornillaron placas de terciado a las costillas y la superficie terminada con capas de yeso, todo hecho por los estudiantes.

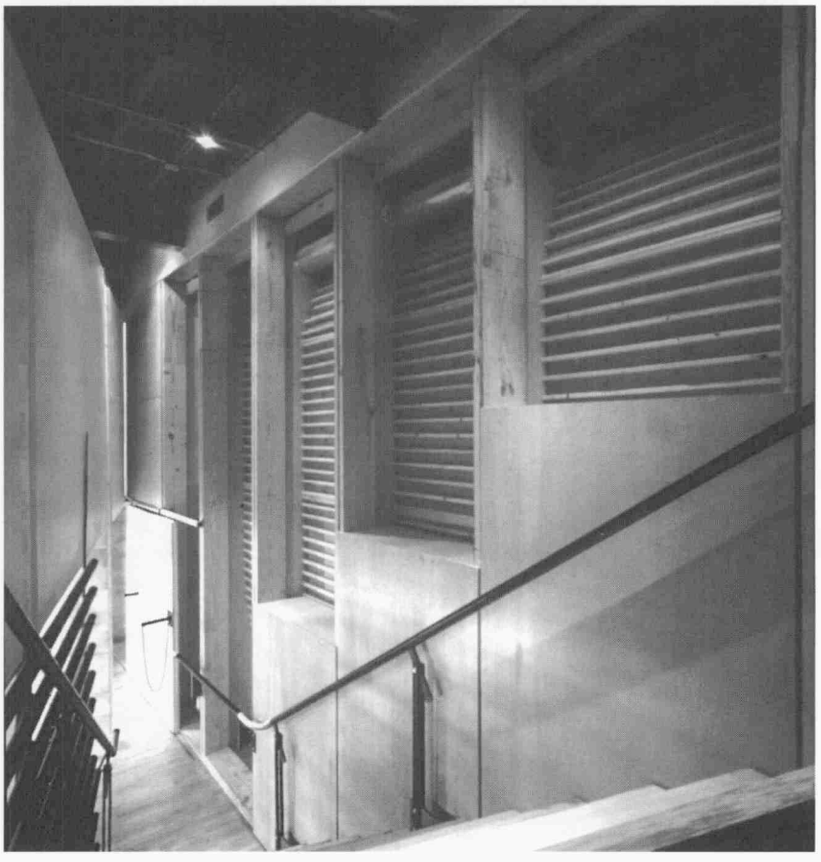
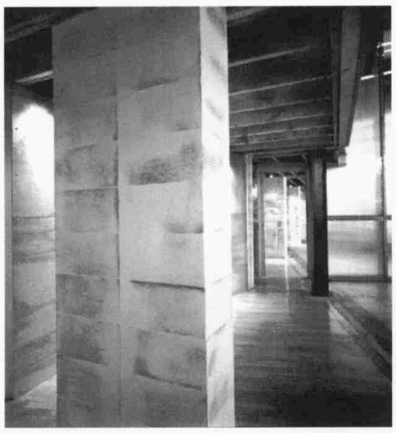


Fig. 27— No había suficiente dinero para contratar la construcción de los pilares. Consecuentemente un alumno pasó el verano entero construyendo los pilares fuera del bloque. Dado que no tenía habilidad con la mampostería, se montaron los bloques en seco y se llenaron las celdas con concreto y acero. Las irregularidades de los bloques, usualmente compensadas con el mortero, requirieron que se desarrollara una terminación en yeso que resaltara poéticamente estas imperfecciones. La terminación estuvo a cargo de otro estudiante. Pensamos en la superficie exterior del pilar como el concepto ideal de pilar: la terminación veteada indica la discrepancia con la realidad.

Fig. 28/30— Nuestro sistema de barandas se inspiró en el de Alvar Aalto para el Centro Cultural de Wolfsburg en Alemania (A). El sistema de Aalto no es solo un ensayo sobre las propiedades del material (bronce en las curvas, madera en los tramos rectos) sino una advertencia sensible para el usuario de los movimientos de la baranda. Nuestra versión gastado-elegante empleaba acero y manguera de radiador. Dado que no podíamos gastar en otros metales usamos varios niveles de oxidación del acero para expandir nuestro vocabulario de materiales.



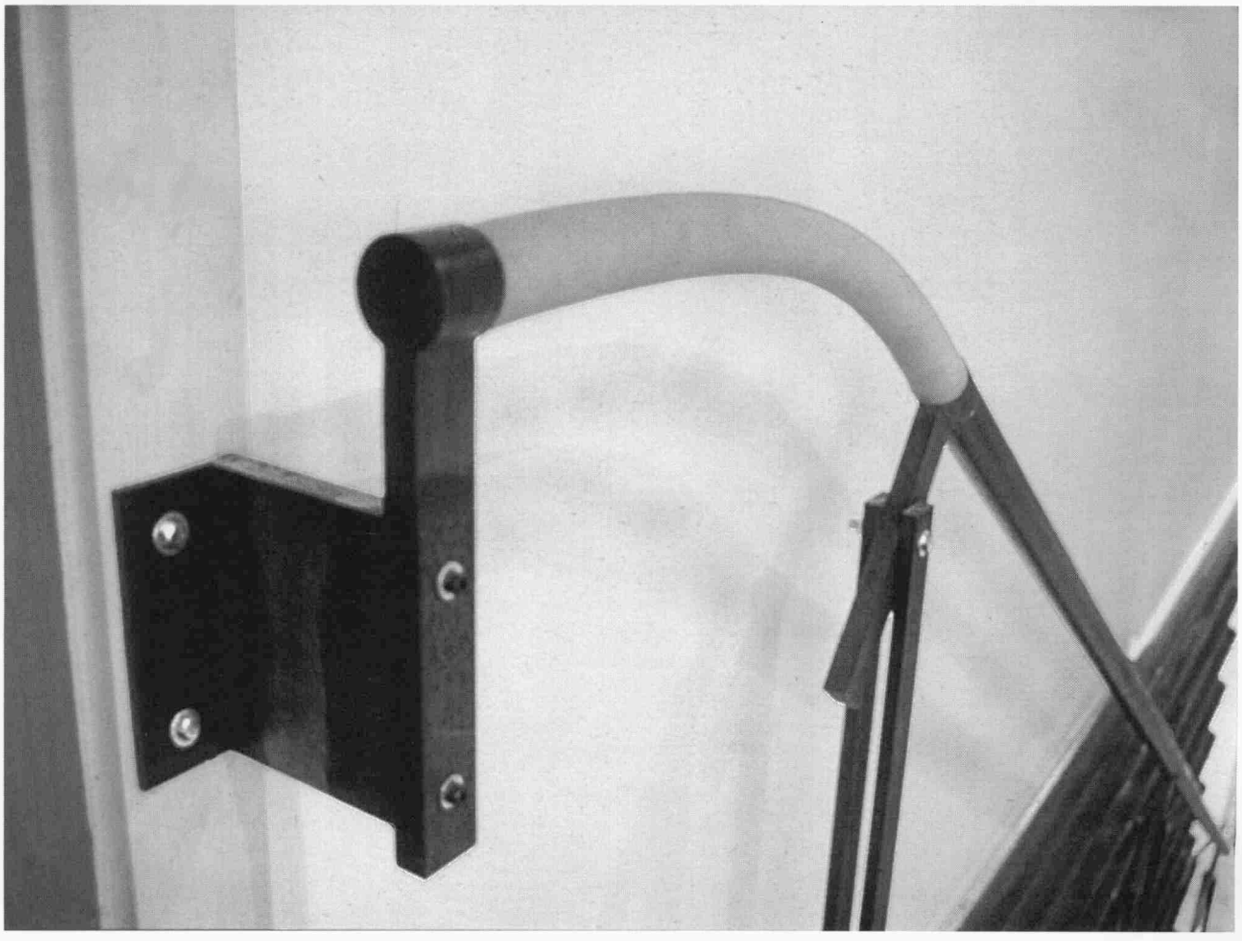
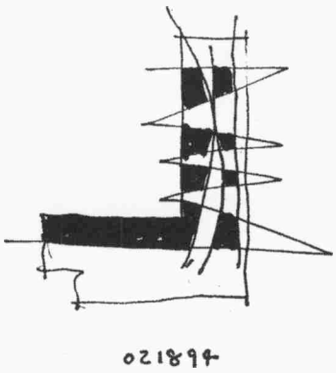
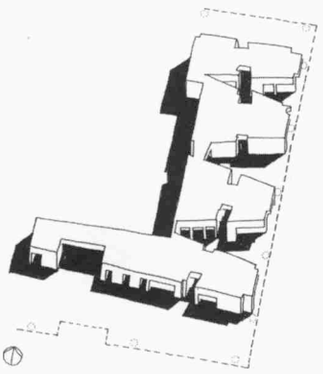


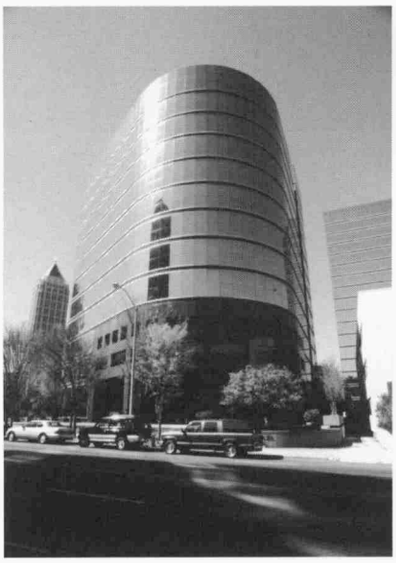
Fig. 31/32— Dentro de un edificio de oficinas curvo, el CWI alquiló un espacio en forma de L. Se construyeron, dentro de este espacio, cuatro discretos dedos conteniendo salones de reunión, oficinas privadas y máquinas. Entre ellas había oficinas abiertas.
Dentro de cada dedo había una cavidad espacial continua. En algunos casos se podía ver a través de seis o más espacios dentro de esa cavidad. Nuestras lámparas empotradas en el piso proyectaban grandes discos de luz sobre el cielorraso inclinado de las cavidades.

A.2 INSTITUTO DE BIENESTAR INFANTIL (CWI), ATLANTA, GEORGIA

La sede de una corporación privada dedicada a los niños en riesgo, la CWI, no era para niños, sino para un equipo y clientes que trabajaban con programas para niños. Ubicado en el noveno piso de un edificio de oficinas comercial, este proyecto examina dos temas: los valores involucrados en un desarrollo especulativo y nuestra noción cultural sobre los niños.
Muchos estudiantes trabajaron en este proyecto, en variados roles. Un estudiante desarrolló y construyó más de 50 juegos de patas para mesas; un par de estudiantes fabricaron sillas especiales; un equipo diseñó, construyó e instaló un complicado mecanismo de mensajería; otros construyeron artefactos de iluminación y muebles. En suma, desarrollamos el proyecto con un sistema de gremios, con estudiantes ocupados en pequeños proyectos bajo supervisión, según se lo permitían sus habilidades. El escultor David Detrich colaboró en muchos aspectos del proyecto.







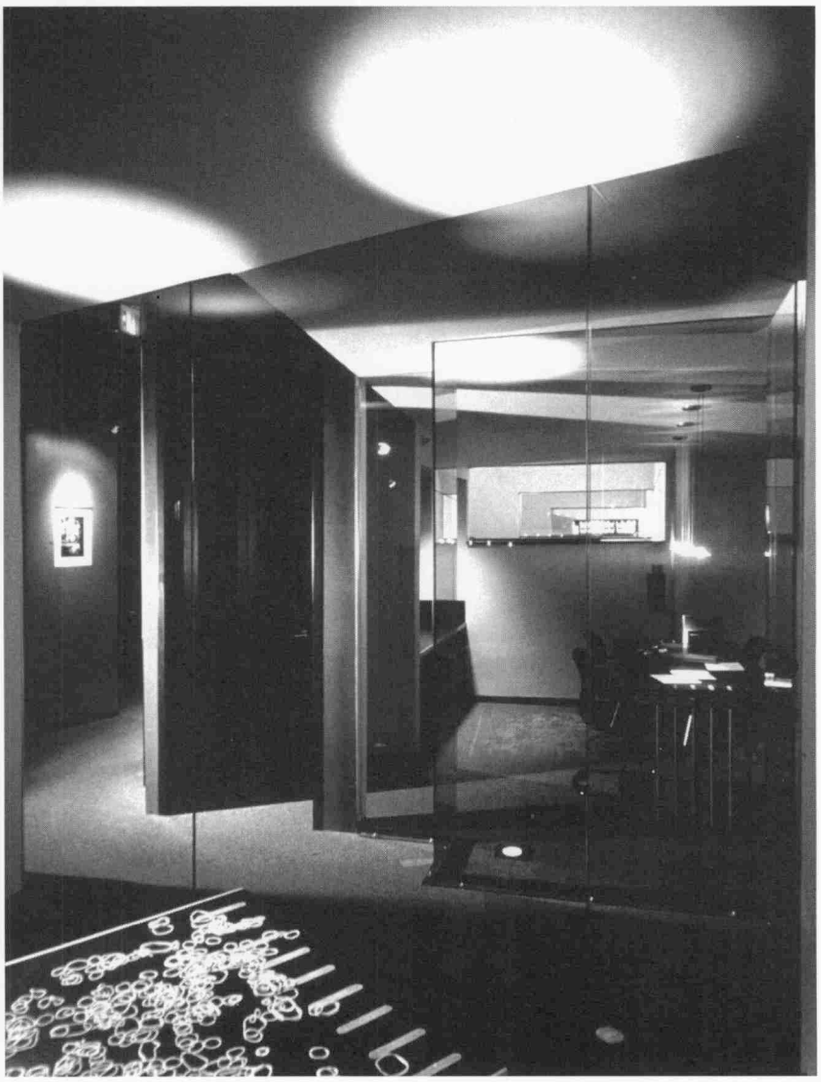
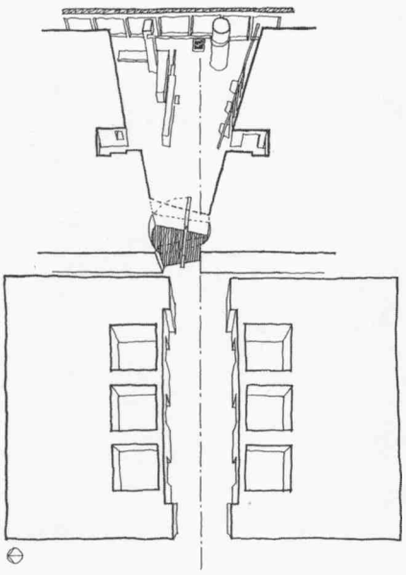
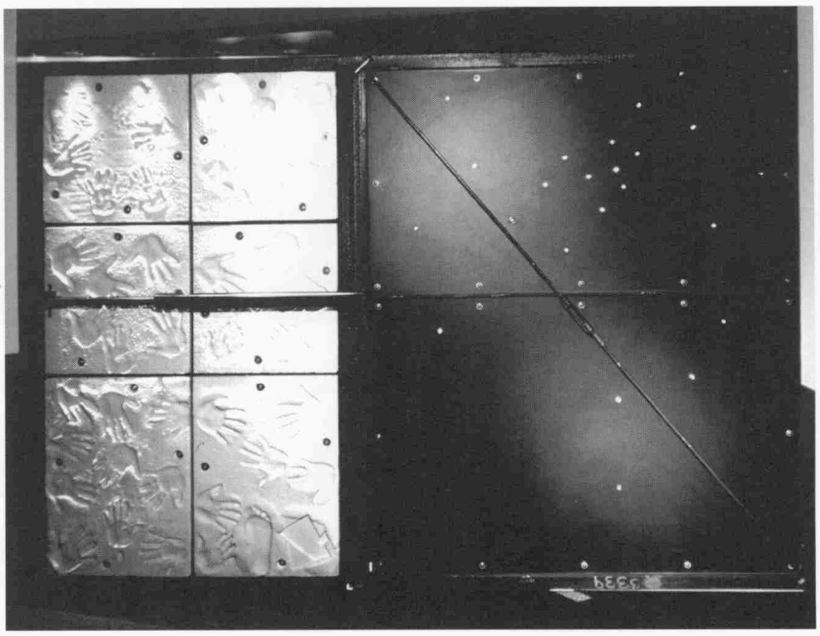
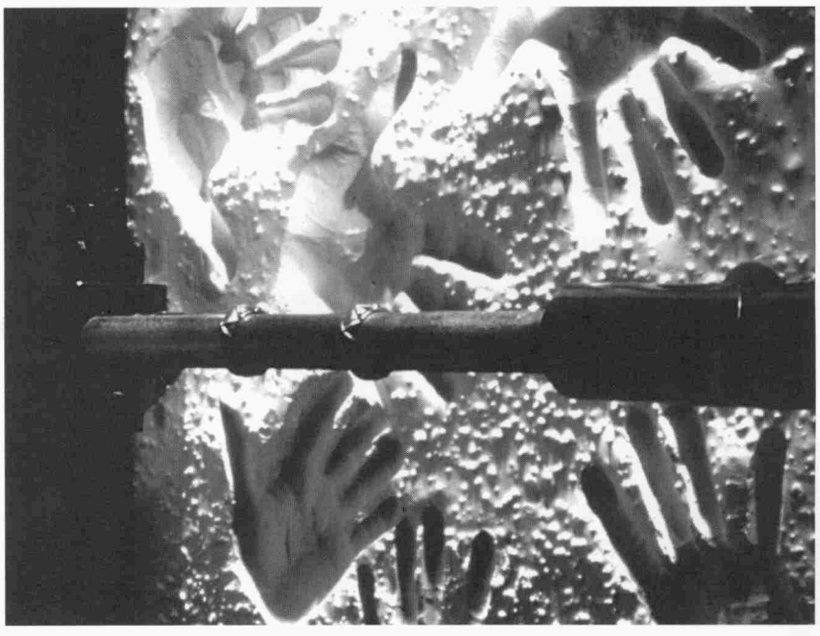
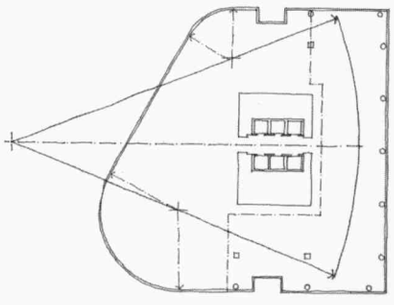


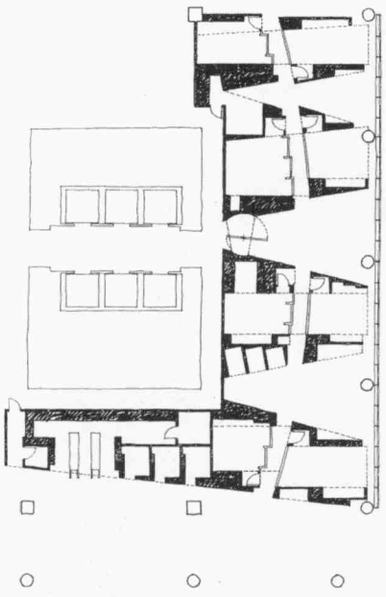
Fig. 33/36— La entrada al CWI revisaba las tácitas (pero incuestionables) reglas del desarrollo de los edificios de oficinas especulativas. Nuestra puerta pivotante era una clave en esta revisión. Tachonadas de mirillas, invitaba a espiar a individuos de distintas alturas, impidiendo pero permitiendo mirar. El artista Detrich realizó nuestras manijas; los estudiantes modelaron los paneles de yeso aplicando las manos de los contratistas y plantel de empleados. Las manos saludan a la salida.











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CRÉDITOS FOTOGRÁFICOS Y DE DISEÑOS

FIGURA 1: Brentwood Jolley. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1992.
FIGURA 2: Sean Taylor. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1996.
FIGURA 3: Mark Dullae. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1991.
FIGURA 4-5: Dan Launstein, Eleana Soto, Sean Taylor. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1996.
FIGURA 6-9: Robert Lipka, Matthew Davis, Brentwood Jolley, Douglas Leckband, Wade Squires, Matt Parker. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1992.
FIGURA 10-11: Catherine Smith. Taller de Grado 1, Prof. Robert Miller, CAF Daniel Center; Génova, Italia. 1998.
FIGURA 12-13: David Pastre, Louis Markovic, Michael Osman, Bradley Brown, Amy Clement, Kelly Gordon. Estudio de Tesis, Prof. Robert Miller, Clemson University. 2001.
FIGURA 14: Ernest Joyner. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1995.
FIGURA 15: Matthew Post. Talleres 3° y 4°, Profesores Kenneth Huggins y Robert Miller, Clemson Architecture Centro de Charleston. 2003.
FIGURA 16-17: Stephen Denton. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1993.
FIGURA 18-19: Robert Lipka. Estudio de Tesis, Prof. Robert Miller, Clemson University. 1992.
FIGURA 20-22: Estudiantes: Gregory Huddy, Lindsey Georges, Michelle Bellon, Peter Szczelina, Amy Finley, Bryan Atwood, Po Tin, Alicia Reed, Joel Wenzel, Emily Cox, Bridget Gilles, Sallie Hambright, Justin Smith. Ciudad de Charleston: Tim Keane, Director de Planeamiento y Vecindarios; Michael Maher, Director, Centro Cívico de Diseño. Profesores Ray Huff y Robert Miller, Clemson Architecture Centro de Charleston. 2001.
FIGURA 23-24: Estudiantes: William Gray, Matthew Post, Adam Shoolbred, Jason Underwood. Curador: Mary Jane Jacob (Chicago).

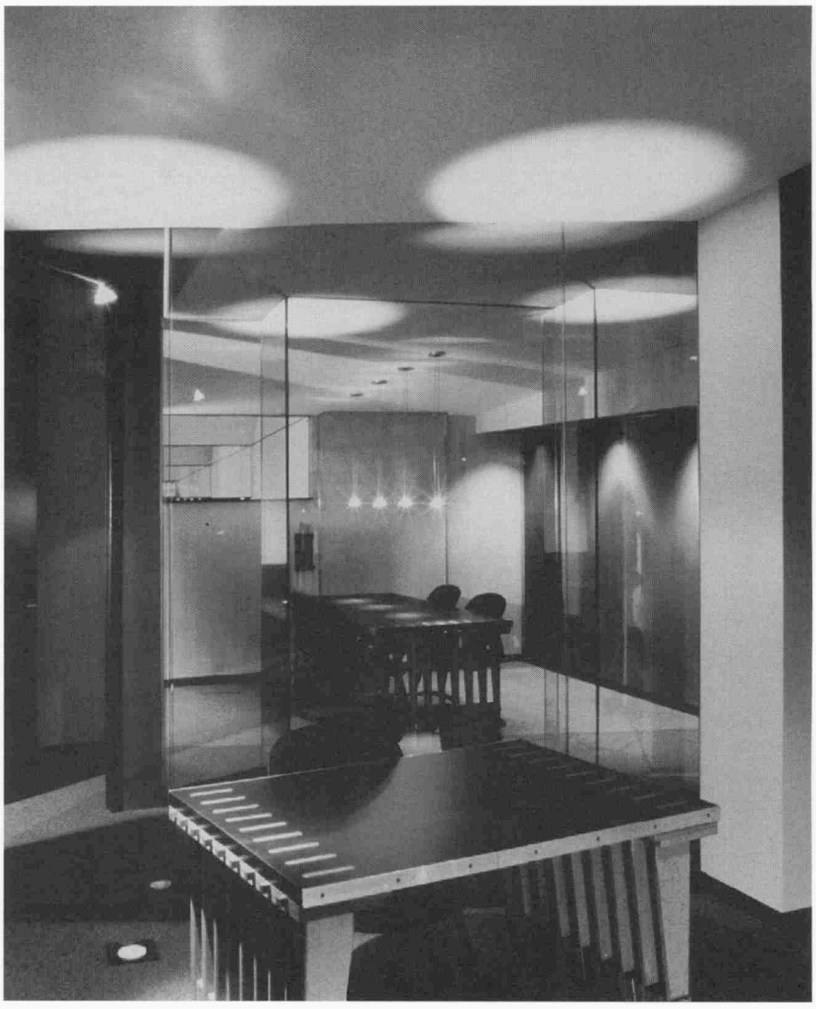


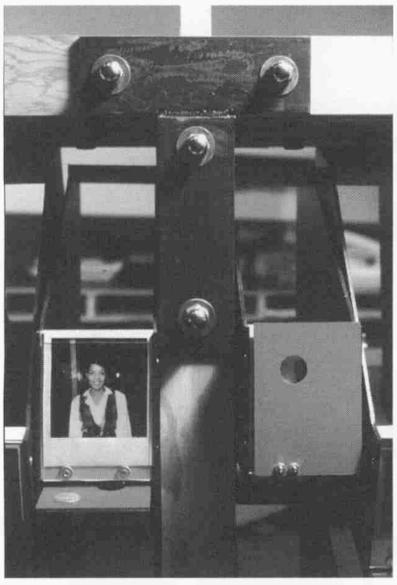
Fig. 37/40— Las curvas del edificio de oficinas eran un componente crucial en su identidad y valor de mercado. El soporte geométrico de estas curvas fue usado para generar un hall de paso arqueado dentro de las oficinas de CWI : una calle principal interna. Se generaron, dentro de este hall, efectos reflectores similares a los externos.
La mesa de reunión fue diseñada y construía por los estudiantes.

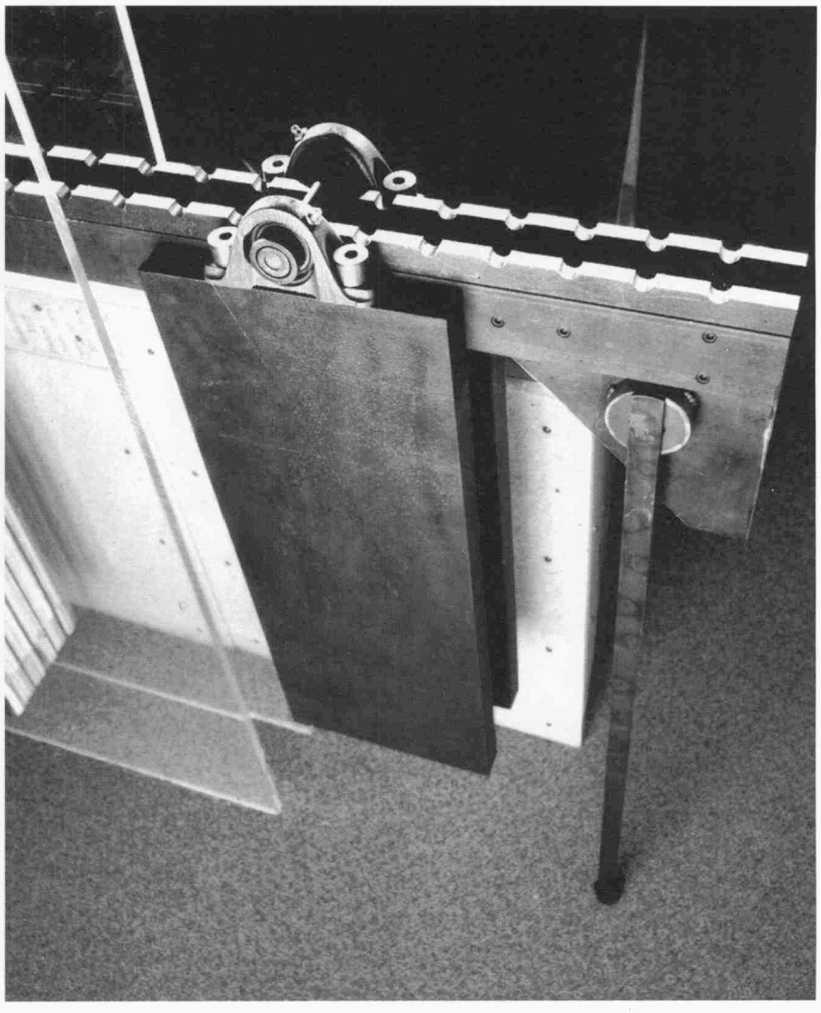
Artistas: Suzanne Lacy (Los Angeles); Rick Lowe (Houston). Profesores Kenneth Huggins y Robert Miller, Clemson Architecture Centro de Charleston. 2003.
FIGURA 25-30: Cliente: Terri Teague. Estudiantes: David Jones y Sidney Mullins, Clemson University; Joshua Frankel, Emory University; Lori Brown, Georgia Institute of Technology. Sistemas de pasamanos en colaboración con David Detrich, Artista. Robert Miller, Arquitecto. 1994-95. Fotografía: Daniel Overturf y Robert Miller.
FIGURA 31-45: Cliente: Child Welfare Institute. Estudiantes: Ken Huggins, Sidney Mullins, David Jones, Jeff Pollert, Rudi Ellert, Lori Brown, Chris Anderson. Componentes del hall e iluminación en colaboración con David Detrich, Artista. Robert Miller, Arquitecto. 1994-95. Fotografía: Daniel Overturf y Robert Miller.

NOTAS FINALES

Estoy en deuda con Pablo Esteban Marcelo Szelagowski por su interés y apoyo en este artículo. Gracias a María Elisa Sagüés y Patricio del Real por la traducción.
Gracias también a los muchos clientes que apoyaron este experimento, y a los muchos estudiantes y profesionales colaboradores cuyos esfuerzos fueron esenciales para su realización, especialmente David Detrich y Kenneth Huggins. Finalmente gracias a Clemson University por apoyar y admitir experimentaciones pedagógicas.
Partes de este artículo fueron previamente publicadas en: «*The Analogue and The Real: two paradigms for architectural education*»; Learning by Building: Design and Construction in Architectural Education, capítulo 8 de William Carpenter (NY: Van Nostrand Reinhold,1977); «*Cunundrum*», CRIT 53 (primavera 2002):20-21. Gracias a Sara Abrams y Mary Martin Walker por la asistencia en la investigación.

1- Todd May, Our Practices Our Selves: or, what it means to be human (University Park, PA: Pennsylvania State University Press, 2001) 46.
2- Podemos definir práctica como «*una regularidad (o regularidades) de comportamiento, usualmente orientadas hacia un objetivo, que está regulada normativamente en la sociedad*» (p.8).
3- Los cambios en la profesión en la última parte del siglo XX se debieron a muchos factores interrelacionados, incluyendo la computarización, un dictamen dela Suprema Corte que negó los arquitectos a regular sus honorarios (posibilitando a los clientes a elegir arquitectos en base a costos) y la responsabilidad sobre la práctica y los presupuestos.
4- Carl Sapers: «*Toward Architectural Practice en the 21st Century: the demise (and rebirth?) of professionalism*», Harvard Design Magazine 19, 82
5- Basados en un estudio por internet, e-mail y teléfono hecho en 2004, los siguientes Estados aceptan un aprendizaje en lugar de un grado universitario para conseguir la matrícula: Arizona, California, Colorado, Georgia, Hawai, Idaho, Illinois, Maine, Maryland, New





Fig, 41/45— El equipo de diseño y construcción de estudiantes y profesores construyó la puerta pivotante, tres sillas altas y dos banquetas, un centro de mensajes oscilante, más de cincuenta juegos de patas para mesas. dos carros de archivo, numerosas luminarias y otros equipamientos para estas oficinas.

Hampshire, New York, Vermont, Washington, Wisconsin, Wyoming.

6- ACSA NEWS, marzo 2003,32, reportó que durante los años académicos de 1999-2000, enseñaron en sus escuelas miembro 2062 arquitectos matriculados, para el período 2002-2003 ese número había caído a 1048. Lo que es más, el rol del arquitecto profesional en las escuelas de arquitectura ha disminuido significativamente desde los '70, cuando era común para los practicantes de medio tiempo ser miembros ordinarios de las facultades de arquitectura, lo cual hoy es raro.

7- No es posible en este artículo relatar las variadas iniciativas de la última mitad del siglo XX para reestructurar el grado de Arquitecto en EUA. Estas se han sumado a bien intencionados intentos para mejorar el arte liberal de la educación de estudiantes, disminuyendo o posponiendo la promoción de profesionales especializados. El resultado ha sido mixto. En la mayoría de los casos hemos debilitado significativamente la cultura arquitectónica con un ganancia apreciable de la educación liberal.

8- Estoy sinceramente agradecido por el apoyo y aliento de la Administración y Facultad de Clemson University, donde estos trabajos han tenido lugar.

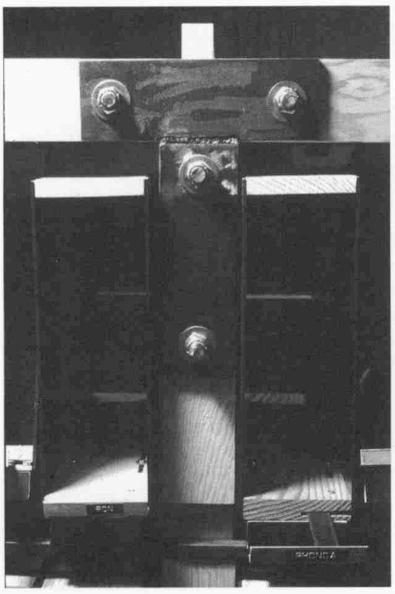
9- Siguiendo un paradigma demasiado largo para describir aquí, querría discutir que la arquitectura es en esencia una construcción no-física sino una absolutamente ligada a su manifestación material. Consecuentemente la condición física de la arquitectura es el único portal a sus otros dominios y esto involucra una parte crítica de las habilidades de un arquitecto. La cultura mediática y del consumo, incluida la complicidad académica con ellas, están erosionando la proeza material tanto de sus ciudadanos como de sus arquitectos, y la arquitectura está sufriendo en consecuencia.

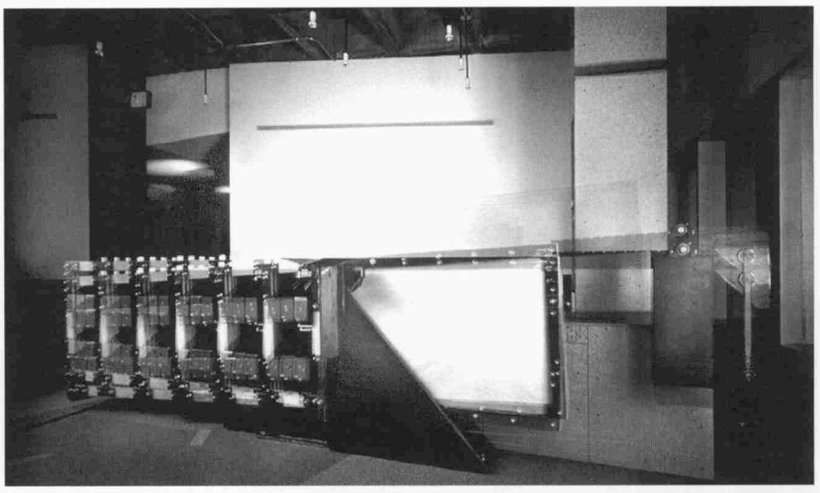
10- El campo de acción de los aspirantes a arquitectos es crítico para sus logros. Como un músico, una bailarina o un escritor, los jóvenes arquitectos están habilitados o no, según puedan solventarse a ellos mismos en ese campo mayormente estructurado por la cultura de la escuela y las actitudes de los maestros.

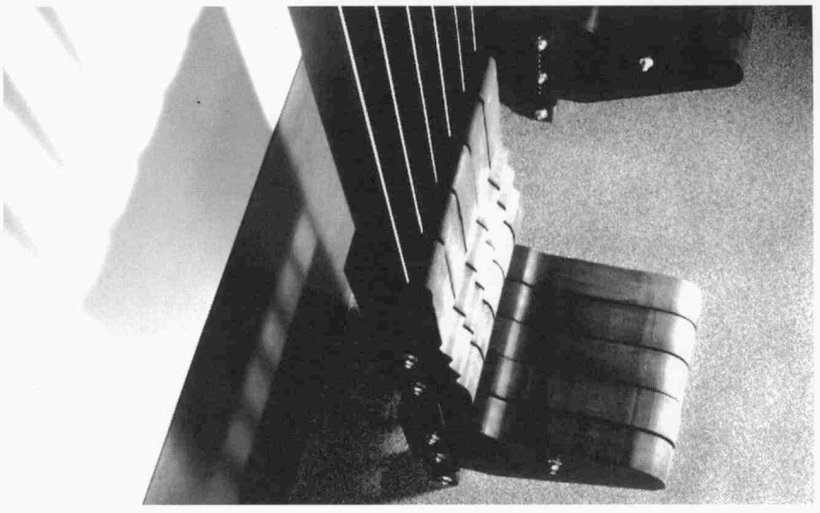
11- Cuando aparecen excepciones en la oferta de materiales para modelos, éstas son invariablemente imitaciones literales y poco convincentes e materiales reales (cobre por cobre, alambre por cable, celuloide por vidrio). Estas casi nunca funcionan por la misma razón que las analogías literales son siempre deficientes: las diferenciasen las condiciones de entidades análogas(escala, luz, montaje) requieren diferencias en los referentes de modo de mantener verdadera la analogía misma.

12- Un código retórico considerado, consciente o inconscientemente, sobrecodificado dirá al lector cómo será tomada una expresión (sea textual o no). Como instruido por el código, el lector entonces inserta la necesaria competencia (tanto como su capacidad lo permita) y el tropo es reconocido como tropo , evitando así una interpretación denotativa ingenua. Por ejemplo /Había una vez.../es una expresión sobrecodificada que establece: (I)que los eventos tienen lugar en una época histórica no definida;(II) que los eventos relatados no son reales y (III) que el relator quiere contar una historia de ficción. Umberto Eco: The Role of the Reader: explorations in the semiotics of texts (Bloomington: Indiana University Press, 1984) 19.

13- ¡En realidad no quiero decir esto! En tanto la construcción se ha industrializado, las oficinas computarizado y la cultura comercializado, la relación de la profesión con los materiales y los detalles se ha vuelto esencialmente la misma que en un shopping. Como regla el arquitecto ya no diseña, en el sentido corriente, sino más bien selecciona un conjunto prediseñado de productos preparados y mercantilizados para ellos desde los catálogos. Creo que un investigación valiosa podría resultar del uso de suministros estándares para criticar sus condiciones,







la estrategia pedagógica propuesta es entonces, una crítica a ambas, académica y práctica corriente.

14- En tanto los alumnos no refinen suficientemente los materiales crudos en el mismo sentido en el que la industria lo hace, están trabajando en un estado de pre-modelo que es análogo al de la industria de la construcción: deben seleccionar, adquirir y refinar materiales en orden a usarlos y deben deducir cuánto contribuye cada material al complejo construcción-ensamble. Esto es un estado análogo crudo.

15- No me estoy refiriendo aquí a un mero artesanato, el grado de cuidado ejercido en la construcción de un modelo convencional. Más bien estoy cuestionando la práctica de engomar láminas sin considerar a los materiales así unidos o a la situación de construcción a la cual se supone el ensamblaje es análogo.

16- La palabra invención conjuga varias connotaciones intencionadas a este tipo de proyecto. El verbo inventar indica planificar, maquinar, maniobrar con habilidad y atención. En la forma de sustantivo una invención es una representación de esas cualidades: un dispositivo mecánico que muestra una adaptación especial a un contexto o necesidad determinada.

17- La ética de esta situación es obviamente crítica. En los proyectos terminados hasta hoy, he dado créditos de estudio o he pagado a los estudiantes, dependiendo de las circunstancias. El mayor interés de esta estrategia es que los estudiantes están a la vez aprendiendo y contribuyendo en el proceso, no utilizados como simple mano de obra barata. Quisiera agradecer a Clemson University, otra vez, por su apoyo en un intento que involucra obligación y ambigüedad ética.

18- Si bien la experiencia en una oficina normal puede ser valiosa, esta estrategia no es para enseñar métodos de oficina , es un estudio de diseño aplicado a un proyecto real con propósito de enseñar a los alumnos cómo los materiales y las condiciones de ensamblaje influyen en el diseño.

19- En mi experiencia esta estrategia es demasiado intensa como para no seleccionar la participación de los alumnos, a menos que exista un interés significativo, conocido y avalado por el profesor, por parte del alumno. Debido a que lleva a los estudiantes fuera de la práctica académica normal, la estrategia es potencialmente conflictiva si algo saliera mal, desde accidentes en la construcción hasta expectativas no satisfechas de los alumnos (otra razón para solicitar el pre-requisito de la experiencia).

20- Para evitar una competencia directa con otros arquitectos, limitamos nuestro trabajo a grupos sin recursos y gubernamentales, específicamente a proyectos para los cuales haya escasos recursos para honorarios profesionales. Hemos hecho nuestro trabajo sin compensación por la tarea y en la mayoría de los casos hemos solicitado donaciones para el costo de los materiales.

21- Los estudiantes no pueden competir con los profesionales en calidad y velocidad de producción. Consecuentemente los proyectos de esta estrategia necesitan resolverse con productos que los profesionales no puedan o no quieran producir ya sea debido a sus propias limitaciones o a las de sus clientes (como por ejemplo una importante falta de fondos).

22- Cuando la práctica comunitaria es conducida sin la intención de un resultado ejecutable, se cae inevitablemente en un «estudio hipotético», perdiendo la eficacia deseada.

23- Para ser honesto, las estrategias 3 y 4 han producido a la fecha innovaciones conceptuales pero con cualidades físicas mediocres. Mientras esto se debe en parte a mis propias limitaciones como artesano, también lo es debido a la prioridad dada a la innovación y el aprendizaje del alumno.

PRACTICE AS [PEDAGOGY AS PRACTICE]

by Robert Miller

«Who we are is significantly, and perhaps centrally... a matter of our practices.»-Todd May, Our Practices Our Selves[1]

Institutions are constantly, if slowly, in flux. In what amounts to a cultural version of continental drift, unnoticeable day-to-day changes lead to, not only a reconfigured globe, but a transformed worldview. Such is the case with architectural practice and education in the United States. In this article and the two accompanying projects, I will offer an overview of the drifting continents of architectural education and practice in the United States, and illustrate a hybrid approach to practice as pedagogy, and pedagogy as practice.

1.0 The premise: practices construct the individual

Practices significantly construct the nature of the individuals who take part in them, including not only behavior, but also values, attitudes, perceptions, and experiences. By practices, I mean all culturally determined purposeful activities, the structured actions into which we are born and within which we conduct our lives-everything from marriage, to baseball, to democracy-but we need only consider here architectural education and professional practice.[2] *In particular, I mean to focus on the struggle between who we are as a product of our (inherited) practices and the degree to which it may be possible to push back and reform them.*

To make this less abstract, consider that architecture schools, taken as a group, produce students with characteristics that differ significantly from university students in general (they develop a habit of working at night, speak their own peculiar nomenclature, see the world as principally aesthetic, conceptualize spatially, express themselves graphically, and so on). Furthermore, architecture schools themselves generate in their graduates specific values, attitudes, and traits particular to any given time, as a comparison of Cranbrook under Saarinen versus Libeskind would show. While some of the differences between these groups are a product of conscious and intentional pedagogy, most is not. It's not that individual students consciously learn the complex of values and attitudes that come with their degree, nor even that individual professors could possibly program this architectural world into their lessons, but rather that the practices to which we, students and teachers, submit ourselves significantly structure who we are. Being a professor and an architect calls me into being and constructs to a significant degree who I am as a person. While this may seem obvious, the implications may not.

First, that practices (and the attributes they imbue in their constituents) are constantly, (though imperceptibly, changing. What it is to be an architect has dramatically changed over the last century.[3] *It consequently behooves us to become aware of the values and standards we inherit from our practices and to develop an historical perspective of them so as to monitor the continental drift of which we are a part.*

Second, that given the power of practices, teachers (and professionals) would do well to consciously design, not just the content of their courses, but the context in which that content is delivered. The way the syllabus is written, the style in which it is produced, the manner in which students and professors interact, the degree of latitude afforded in assignments, the attention to detail in the projects, even the arrangement of the classroom-anything that conditions the interaction of the participants or intersects the execution of the practice is already within the composition of the practice, and therefore a) should be consciously examined, and b) is potentially useful in supporting or reconfiguring the practice.

Lastly, we should account for values and cultural perspectives which are ingrained in the built environment, it being a product of our practices. If you will concede that a person who dwells in a sixteenth century Italian villa will become fundamentally different from one who lives in Trump Tower, then you will appreciate the power of the built environment to be formative in the perception and sensibility of individuals. We should also note the lack of awareness (much less conscious design prowess) that architects bring to this issue.

This premise raises three issues that underlie the content of this essay:

How do our practices call us into being as architects?

How do we construct students through educational practices?

How can architecture illuminate the values with which it is ingrained?

2.0 The case: drift in american architectural education and practice

To demonstrate the continual cultural drift of which we are a part and to illuminate a few issues upon which the third part of this essay is built, let us take a brief overview of the American context. Architectural education and practice in America are only a century old and amount to an amalgam of influences borrowed from Europe and grafted, rather uncomfortably, onto the American frontier. Our notion of professionalism, including that of the architect as an author of design, did not arise in America until after the early nineteenth century, a period in which Jacksonian democracy disdained the idea of a professional elite. The prevailing view of those years held that any citizen could, and should, have the right to administer medical aid, represent someone in court, or design buildings (the latter being a pragmatic, rather than artistic or cultural, enterprise). In 1860, for example, Richard Morris Hunt had to go to court to recover a fee for design services that, his client and contractor argued, were not used and were actually unnecessary to the erected building.[4]

The establishment of architectural education ran parallel. Until 1865, there were no schools of architecture in this country; by 1898, there were nine with an enrollment of only 384 students. In the 1860s, anyone could call himself an architect, regardless of training or experience. That schools of architecture were founded at all occurred only at the alarm of this country's few European-trained architects, and this because of the complete lack of standards and professionalism in the extensive post-Civil War building boom. These architects generated the political mandate and the institutional support that led to the state licensing of professionals (starting with the State of Illinois in 1897) and the addition of architectural training in America's emerging institutions of higher education.

When American architects created schools of architecture, they naturally turned to the reigning architectural school of the time, the École des Beaux-Arts (founded in 1819, which, having descended from the Academie Royale d'Architecture of 1671, amounted to the first Western school of architecture). For our purposes, what was salient about the École was its quasi-institutional nature: the program was only administered by the government-sponsored École, while the instruction and production were generated in the professionally-based ateliers.

Under this system, the École sponsored and evaluated all projects, managed the matriculation process, and awarded degrees; it admitted students and designated faculty; it prescribed a design approach, and, later, maintained a library, drawings, and a collection of artifacts-but the École, itself, was strictly limited to administration.

The ateliers were the site of actual training. The vast majority of atelier masters, called patrons, were architects in practice who attended to their students only in the evening, after the business day. Accordingly, the patron did not spend a considerable amount of time actually teaching (although his mere presence would have been significant), and direct contact with his students, of which there might have been as many as fifty, would have been brief and critique-oriented. It was, moreover, the professional context of the atelier, and the practices attendant to it, in which the student learned to learn for himself the practice of architecture.

The atelier culture was student-driven, the junior students executing the lesser-skilled and labor-intensive aspects of projects for their seniors. The advanced students, in turn, taught and critiqued the novices. Within this collaborative setting, the students themselves decided which and how many of the projects offered by the École they would enter, and when. In the separation between Atelier and École was vested the opposing functions of evaluation and production. Projects were arranged by difficulty, and matriculation was based solely on results: students won points in competition, amassing a requisite quantity in order to advance to successive

levels. The system clearly bred student initiative, a results-based sense of merit, and dedication. Its educational mode directly mimicked that of professional practice-and, vice versa. It might be added that acceptance into the program was, itself, a significant feat, with Americans often spending months in Paris in order to gain acceptance, not only honing their architectural skills but learning the language. Students had to be motivated and skilled just to be admitted.

When the École system was emulated in America, it changed from a hybrid institutional-professional system to a wholly academic one. The engine of the program was no longer student-initiative, but the nine-month agri-academic calendar. The qualitative standards of Paris, where the individual student advanced solely on personal performance, became a time-based system in which classes of students moved en mass. The individually driven, institutionally monitored European system transformed into a time-structured mass-production system, imbued with the values of the industrial revolution that preceded it and the agricultural economy that supported an emerging stock of rural, land-grant colleges. Perhaps most significant (for both academia and practice) was the elimination in America of the professional atelier as the seat of learning. Without recounting the subsequent but unrelenting drift across the twentieth century, from the hybrid academic-professional system of the École to our current one, we find ourselves in the twenty-first century with an almost wholly academic educational system, divorced from the community of practitioners. Not only has academia become the only gate to the profession in 70% of the states (the possibility of being licensed solely through intern experience having been disallowed during the 1980s and 90s),[5] but professionals are disappearing from classrooms. The National Architectural Accrediting Board reports a 50% drop in the number of licensed architects teaching in its member schools between the 2000-2003 academic years.[6]

Seen in perspective, the history of architectural education reveals that, not only have American schools never convincingly reconciled their relationship to practice, but we have dismantled a system in which practice and education were mutually constitutive. To be sure, academia has its own mission that is well beyond the scope of practice: a university is not a trade school. At the same time, architecture schools-until the 1990s, largely autonomous programs located physically as well as culturally on the fringe of their universities-have been subsumed into academic culture. As a consequence, their practices are increasingly academic, and not professional, ones.

3.0 The inquiry: pedagogy as practice; practice as pedagogy

In this section, I will outline some experiments in architectural pedagogy that have addressed many of the issues raised above. Although I have come to believe that a radical reformulation of architectural education would serve the best interests of the discipline, such an overhaul would require a change in licensing requirements as well as the restructuring of architecture schools relative to their universities-if universities should even remain the principal sponsors of professional education.[7] More immediate concerns are how professional values can be reinstated in the academy, and the degree to which the academy's practices can be reformulated to suite professional, vs. academic, values.

The strategies that follow are limited to re-thinking (and stretching) the academy as we know it.[8] In overview, these strategies bring qualities of professional practice into the academy and, in some cases, export the academy into practice. Three of the primary issues include:

HYPOTHETICAL vs. ACTUAL: The academy's reality is hypothetical. We assign imaginary projects and ask students to pretend that they are real: a make-believe project for a made-up client on an imaginary site to be built by others at some point in the future. A complete diet of such simulation is, not only foreign to the essence of practice, but misses a domain of design that can only be derived from actual, concrete constraints. At their best, the following strategies build a philosophy and supporting methodology out of the grist of the actual.

CONCEPT vs. CONSTRUCTION: The academy works principally in the domain of concept, which is not the home of architecture.[9] We ask students to think about architecture; they learn how to make nothing that is not an analogue for something else. Although students occasionally study actual buildings and construction, this contact is inevitably mediated via books, slides, the internet, CAD, or, if a building is actually experienced in person, through the lens of a camera. Consequently, students come to take architecture for a conceptual medium. At their best, the following strategies present architecture, not only theoretically, but as a domain grounded in materiality and construction.

STUDENT vs. ARCHITECT: Lastly, the academy produces students of architecture in lieu of architects-in a philosophical, rather than legal, sense. To the degree that student work is regarded as something inferior, as a kind of rehearsal or exercise, we withhold from students the opportunity to learn about accountability, the accountability for placing something tangible in the world that will stand on its own and with which many people will have to live. At some point during the educational process, students need to stop being students, and start being architects.[10] The best of the following strategies ask students to produce a piece of work that is its own ultimate end.

3.1. Strategy 1: model-as-architecture

Working within the standard practices of the academy, the architectural model comes closest to being an autonomous work. That physical models are disappearing from schools, as well as office practice, only heightens its importance in this context. Because the established practice of modeling mimics the greater academic-professional divide, it is instructive to examine, and then re-postulate, the unspoken paradigms on which the architectural model is built.

3.1.1. Paradigm 1-non-materiality:

«Models should be built from a material pallet of chipboard, corrugated cardboard, and balsa or bass wood.»

As a rule, there is no correlation between the materiality of the architectural model and that of the building-although there should be.[11] In other words, model supplies are not materials in the same sense we reserve for building materials. While there is nothing inherently wrong with standard model materials, the degree to which they are pervasively and unthinkingly used renders them pedagogically mute.

STRATEGY 1A-THE RAW MATERIAL RULE: Do not use model supplies for architectural models.

Disallow sheet goods, prefabricated sticks, tiny I-beams, glass-like Plexiglas, scale trees and cars-all of it. Allow only materials that have not been prefabricated to model scale and that refrain from presenting themselves as «model material.» Borrowing a concept from Umberto Eco, we might call this ingrained complex of value and information overcoding.[12] When faced with such (relatively) raw materials, students are forced to deal with materiality as both a theoretical issue and a physical fact-and this condition is analogous to practice.[13] Materials must thus be taken from a «raw» state, refined or processed by the student, and integrated in a construction assembly.[14] Such materials thwart conventional thinking and habitual model assembly, and upset the paradigms governing architectural models.

3.1.2. Paradigm 2-anti-assembly:

«Model assembly is inconsequential; construction techniques and the process of assembly are trivial to the model's purpose.»

Models always reflect the mind-set of their makers. With early students, we usually see models that are predominantly floor-plans from which two-dimensional walls (both interior and exterior) have been extruded. With more developed students, models may evince a three-dimensional conception-but still, just a conception.

In a conventional architectural model, no significant attention is given to the process of construction, the logic of joints and details, or the design of attachment (which inevitably and unthinkingly devolves to glue).[15] Consequently, many construction issues to which models are analogous, and which could be brought into the realm of design concern, are lost.

STRATEGY 1B-THE RULE OF DOUBLE-DESIGN: Design the design of the model. Design the model itself, including the method of construction-not just the project to which the model refers. Design the joints and attachments, investigate the properties of potential materials, build alternative mock-ups; then, develop a system of construction. By converting the model situation into an actual construction project, students are

forced to confront physical and material constraints, not just «the look» of the project. How do materials turn corners? How might one material be joined to another so as to bring out its poetic content? What are the reference points and data around which the model is built and to which all assemblies must be measured? Almost all issues of building construction can be found (if you look) in the design and construction of physical (but not computer) models.

3.1.3. Paradigm 3-it's the look that counts:
«Models should look like their referent.»
The conventional architectural model exists for its looks. Whether overcoded in realism (i.e., the model asks to be taken for the «real world») or simply mimicking the shape, form, scale, texture, or color of the proposed building, the purpose of the standard architectural model is to look like its full-sized counterpart. Such models give preference to visual similarity (usually an «exterior view») over other forms of analogy with architecture.
STRATEGY 1C-THE RULE OF EQUIVALENT PERFORMANCE: Models should perform (rather than look like) their referent.
Architecture performs in many domains: function, acoustics, mood, light manipulation, structure, reference, contextual fit-many of which either exceed, or work on another plain, than the visual. By asking for performative characteristics of the architecture to be manifest in a model, and not necessarily literally, the model works in a way that is directly akin to the architecture it represents.

3.1.4. Summary: model-as-architecture
The model-as-architecture strategy makes one simple reversal on modeling conventions: it treats the model, itself, as a piece of architecture. By removing the referral and deferral that occurs in the hypothetical model, students stop pretending, practicing, and preparing for something that might happen later, and start making (very small) architecture, now.

3.2. Strategy 2: contrivance-as-architecture
Working inside the academy but outside its conventional practices, non-analogical projects can teach students to make architecture directly-not making models of buildings, but realizing architectural fragments. While this could include small pieces of buildings or mockups, I have in mind a less literal type of partial architecture: contrivances that simulate or embody the properties of architecture without being literal building construction.[16] If one of the shortcomings of university education concerns its reliance on hypothetical, conceptually-based projects, then a project-type that is, not a referent for something else and that is its own ultimate end, will circumnavigate these limitations.
STRATEGY 2A-the Tool Project:
A tool is a device that extends human potential. While tools developed as extensions of the physical body (such as a shovel or crutches), modern devices that amplify or intensify human ability also fall within this designation (such as binoculars, hearing aids, or computers). Tools are analogous to architecture. They perform functions, involve ergonomics and aesthetics, and they mediate between humans and the world. Without the same complexities as architecture, they embody a subset of the same concerns (and may be more complex in other ways).
The Tool Project asks for a device that mediates between human and environment, that comes with a particular worldview, and that performs some kind of task (though not necessarily a physical one).
STRATEGY 2B-the Machine Project:
Essentially a more complex version of the Tool Project, the Machine Project asks for an autonomous contrivance, one that works or operates on its own in the performance of some kind of task. It, too, is to embody a worldview or manifest a philosophical position.
The benefit of the Machine over the Tool lies in both its complexity and autonomy: the student is divorced from the operation and interpretation of the work. The Machine, like a building, operates, is used, and is interpreted by others without the instruction or apology of the maker.

3.2.1. Summary: contrivance-as-architecture
The contrivance-as-architecture strategy moves closer to the world or practice than Strategy 1 by dropping completely the analogue status of the product: these contrivances are their own ultimate end. Proportional to their complexity, they require the student to learn about tolerance, systems of construction, material properties, production schedules, and budget-and, as a product of these interrelated factors, they either work or they don't. They also provide a platform for theory, which must come into being in an actual world and therefore immediately betrays contrivance and literalism.

3.3. Strategy 3: the inverted-atelier
In the atelier system of the École, students executed their own projects within the studio and under the guidance of a Patron; under the Inverted-Atelier strategy, students have worked in school as collaborators on my professional projects.[17] This strategy is pedagogically

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Endnotes

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1 Todd May, Our Practices Our Selves: or, what it means to be human (University Park, PA: Pennsylvania State University Press, 2001) 46.
2 May defines a practice as «a regularity (or regularities) of behavior, usually goal-oriented, that is socially normatively governed» (p. 8).
3 Changes in the profession in the latter part of the twentieth century are due to many interrelated factors, including computerization, a ruling by the Supreme Court that denied architects from standardizing fees (prompting clients to select professionals on the basis of cost), and liability practices and costs.
4 Carl Sapers, «Toward Architectural Practice in the 21st Century: the demise (and rebirth?) of professionalism,» Harvard Design Magazine 19, 82.
5 Based on an internet/email/telephone survey made in 2004, the following states still accept apprenticeship in lieu of a university degree for licensure: Arizona, California, Colorado, Georgia, Hawaii, Idaho, Illinois, Maine, Maryland, New Hampshire, New York, Vermont, Washington, Wisconsin, Wyoming.
6 ACSA NEWS, March 2003, 32, reported that, during the 1999-2000 academic year, 2062 licensed architects taught in its member schools; by the 2002-03 academic year, that number had dropped to 1048. Furthermore, the role of professional architects in schools of architecture has significantly diminished since the 1970s, at which time it was common for part-time practitioners to be tenured members of architecture faculty-which today is rare.
7 It was not possible in this article to trace the various initiatives in the latter half of the twentieth century that restructured the American architectural degree. These have amounted to well-intentioned attempts to improve the liberal arts education of students by lessening or postponing the delivery of professional expertise. The results have been mixed. In most cases, we have significantly weakened architecture culture with little appreciable gain in liberal education.
8 For the support and encouragement of the administration and faculty at Clemson University, where this work has taken place since 1990, I am sincerely grateful.
9 Following a paradigm too lengthy to outline here, I would argue that architecture is in essence a non-physical construct-but one utterly tied to its material manifestation. Consequently, the physicality of architecture is the only portal to its other domains and thus involves a critical part of the skill of an architect. Media and consumer culture, including the academy's complicity with it, is eroding the material prowess of its citizens as well as its architects, and architecture is suffering accordingly.
10 The ground of being of aspiring architects is critical to their achievement. Akin to a musician, a ballerina, or a writer, young architects are empowered, or disempowered, by how they hold themselves, and that ground is largely structured by the culture of the school and the attitudes of the teachers.
11 When exceptions to the standard model material pallet appear, they are invariably literal and unconvincing applications of actual materials (copper-for-copper, wire-for-cable, Plexiglas for glass). These almost never work for the same reasons that literal analogies are always faulty: differences in the conditions of analogous entities (such as scale, light, and setting) require differences in the referents in order to remain true to the analogy itself.
12 A rhetorical code picked up, consciously or subliminally, overcoding tells the reader how an expression (whether textual or otherwise) is to be taken. As instructed by the code, the reader then inserts the necessary competence (as his background allows), and the trope is recognized as a trope, thus avoiding a naive

effective in direct proportion to four factors:
ARCHITECTURAL RESEARCH: the degree to which the project sponsors exploration and innovation, as opposed to standard practice.[18]
DESIGN/BUILD: the degree to which students participate in the development and transformation of the design as a result of discoveries and problems encountered in the construction process.
CLIENT/SCHEDULE: the degree to which the client will support the educational objectives by allowing set-backs in the schedule and imperfections in the work.
STUDENT RELATIONSHIP: the degree to which the students and professor have an established and effective working relationship.[19]
To date, I have executed three projects under this strategy. Two of them follow in sub-articles, so further development will not be provided here. Summary insights are included in the next strategy.

3.4. Strategy 4: community-practice

The final strategy is an institutional version of the Inverted-Atelier: the execution of professional projects, by a school acting as a practice, for the benefit of the community.[20] *This strategy is pedagogically effective according to the same criteria as Strategy 3 (excepting Design/Build), and in direct proportion to:*
NON-STANDARD PRODUCT: the degree to which there is desire (or at least an acceptance) by the client for non-standard results.[21]
PROFESSIONAL PRODUCT: the degree to which the project is required to be actually viable and realized.[22]
All of the studios in the Clemson Architecture Center in Charleston, which I direct, are based on this Strategy. Our work to date has been limited to urban design and design/build projects, and have had varying degrees of success.

3.4.1. Summary: inverted-atelier + community-practice

Because Community-Practice is essentially an institutional version of the Inverted-Atelier, it has similar characteristics and problems. Both ask of the academy something for which it was not designed (i.e., delivering a professional product while providing educational experience); and, both transform practice into a form of design research (which is utterly against its design function: to limit liability and generate profit, by efficiently working within established methods to generated time-tested results). These problems contain the conundrum of professional education. Professional activity, by definition, begets a product that meets high design and performance standards; educational activity, on the other hand, yields just a by-product of its primary purpose, which is learning-and we often learn best by making mistakes. These incommensurate goals, excellence in product vs. optimal learning, turn around the product/experience dilemma. When product takes precedence, as it must when delivering actual projects, the educational experience must perforce be secondary; but without production-based learning, a curriculum is not rooted in professionalism! Professional practice gives priority to product at the expense of individual experience, while the academy gives precedence to experience over product. Although an architecture school should have both, a program that leaves the campus to deliver professional product will have to default to product-over-experience, or it will fail its pedagogical premise and soon find itself without professionally-based pedagogical opportunities. On the surface, we have a true dilemma. Students produce junk in the name of educational experience; practice requires of its participants a submissiveness antithetical to significant learning. But there is at least one way of merging, if not reconciling, both worlds; a way of delivering professional product while making plenty of mistakes, and that resolution is inspired by product design.
To a greater degree than does architecture, product design deals in innovation and excellence of physical product, which it arrives at through prototyping: by building mock-up after mock-up after mock-up, informing and re-forming the design to work out a critical mass of defects before going to market. By building the design/teaching method around prototyping in Strategies 3-4, many iterations of physical product are produced, during which students can make the mistakes requisite to significant learning.[23]
While this system is highly effective, it runs counter to the skills and expectations built into the current generation of students by contemporary academic practices. Students do not have a taste for re-doing and perfecting their own work; they do not come with the necessary attention span to design and deliver a relatively small project over a relatively long time; and, they do not own as educational an activity over which they do not exert primary authorship. (Teamwork is not taken to be their work, which begets a resistance to investing fully in the process.) Consequently, more than teaching (as we usually think of it) is required to do this kind of work and make it pedagogically rewarding to the students. We cannot radically depart from the student's worldview unless we rebuild their expectations in the process. Since the academy and the profession have antithetical worldviews, the time has come to re-develop institutions that will support the merger of architectural and educational practices ■

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denotative interpretation. For example, /Once upon a time/ is an overcoded expression establishing (I) that the events take place in an indefinite non-historical epoch, (II) that the reported events are not real, and (III) that the speaker wants to tell a fictional story. Umberto Eco, The Role of the Reader: explorations in the semiotics of texts (Bloomington: Indiana University Press, 1984) 19.
13 I don't really mean this! As construction has become industrialized, offices computerized, and culture commercialized, the profession's relation to material and detail has become essentially the same as shopping. As a rule, architects no longer design, in any customized sense, but rather select and assemble pre-designed products prepared and marketed to them from catalogues. I suppose a worthy investigation could result from using model supplies to critique this condition; the proposed pedagogical strategy is, therefore, a critique of both academia and current practice.
14 While students are not necessarily refining raw materials in the same way that industry does, they are working from a pre-model state that is analogous to the construction industry: they must select, acquire, and refine materials in order to use them, and they must figure out what each material contributes to the construction/assembly complex. This is an analogous raw state.
15 I am not referring here to mere craftsmanship-the degree of care exercised in conventional model building. Rather, I am questioning the practice of gluing sheets of material together, with no consideration given to the materials thus joined or to construction situation to which the assembly is supposed to be analogous.
16 The word contrivance brings together several intended connotations for this project type. The verb, contrive, indicates scheming, plotting, maneuvering, or inventing with skill and thoughtfulness. In the noun form, a contrivance is the embodiment of these qualities; a mechanical device showing special adaptation to a particular need or context.
17 The ethics of this situation are obviously critical. In the projects completed to date, I have variously given course credit or pay to students, depending on the circumstances. The single greatest concern with this Strategy is that students are both learning and contributing to the process, not simply used for cheap labor. I would like to thank Clemson University, again, for its support in an endeavor that involves liability and ethical ambiguity.
18 While experience in standard office practice can be valuable, this Strategy is not for teaching office methods; it is a design studio applied to an actual project for purposes of teaching students how material and assembly conditions influence design.
19 In my experience, this Strategy is too intense for untested student participation, unless there is a significant involvement by students known to, and trusted by, the professor. Because it takes students outside standard academic practice, the Strategy is potentially litigious should anything go wrong, from construction accidents to unmet student expectation-another reason to require prerequisite experience.
20 To avoid direct competition with practicing architects, we have limited our work to date to projects for non-profit groups and government, specifically to projects for which there would have been little or no resources for professional service fees. We have done our work without compensation for labor and in most cases have solicited donations or raised money for the materials.
21 Students cannot compete with professionals in quality or speed of production. Consequently, projects under this Strategy need to result in product that professionals either wouldn't, or couldn't, produce, either due to their own limitations or those of the client (such as severe lack of funds).
22 When Community-Practice is conducted without the intention for an executed result, it inevitably devolves into a «hypothetical study,» loosing the desired efficacy.
23 To be honest, Strategies 3-4 have, to date, actually produced conceptual innovation but mediocre physical quality. While this is partly due to my own limitations as an artisan, it is also due to the priority given to innovation and student learning.