Sustainability-Based Curricula:
Five models from the Educating Architects for a Sustainable Environment (EASE) Project (1993-1997)

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The Educating Architects for a Sustainable Environment (EASE) project (1993-1997), a multi-disciplinary research endeavor directed by Marv Rosenman at Ball State University involving experts' in various design and environmental fields and architecture students, sought to answer the question: can the design professions meet the enormous intellectual and ethical responsibility required to effectively respond to the challenge of sustainability, and if so, in what ways can either reaffirm or reform educational and professional practices? EASE reevaluated program content in U.S. architectural education in response to the demands of sustainable design principles, social equity and changing demographics, economic restructuring, available media and technologies, and the appropriateness of enabling architects and environmental designers to assume leadership positions in the world community. The project's syntheses-curriculum models— are built around a range of strategies from politically pragmatic to the institutionally idealistic. The models include: (1) Health, safety, welfare redefined model; (2) Design and build model; (3) Split program (liberal arts foundation) model; (4) Whole systems model; and *(5)* Knowledge-based model. Though each has a distinct character, all share common thinking on interdisciplinarity, multi-scale thinking, and the need to achieve broad consensus as a part of design.

HEALTH, SAFETY, AND WELFARE REDEFINED CURRICULUM MODEL

Legally, the architecture profession's raison d'Ωtre is to protect the public's health, safety, and welfare in acts of building. At the turn of the twentiethcentury, American cities were rife with urban ills-overcrowding, poor construction, uncheckedcombustible building material and assemblies that made risks of fire and catastrophic building failures palpable, poor sanitation and environmental quality that caused the spread of contagious disease, squalid, rodent infested living conditions, etc. In response, city governments, insurance companies, and entities involved in design and construction hammered out codes that attempted to remedy many of these ills in their localities. Licensing laws began to appear city by city and state by state to make buildings and cities safer to use.

Over the century, the definitions and requirements have been refined or revised to met the concurrent state of building. In most cases, the codes became statewide law with localities, particularly cities, able to increase the restrictivenes of what is allowable. Again, in most cases, the building codes have established a minimum threshold of acceptability but have significantly lagged behind the state of the art of building. There is little in either the Uniform Building Code (UBC) or the Building Officials Code (BOCA) to suggest that sustainability is crucial to the country/planet's health, safety, and welfare. This curriculum model suggests that the time to change that circumstance is at hand. To that end, this model asserts that in order to be an architect, one must be capable of designing to meet a new way of understanding health, safety, and welfare that is sustainability based (Figure 1). Protecting the public's health, for instance, expands beyond disease prevention and nuisance control to include: mental as well as physical health (the absence of equity may be seen to diminish mental health); the opportunity for self-realization; the creation of places that enable delight, hope, and enable vision and the realization of human potential; and protecting the ecological health of a place.

This curriculum model's educational components include: scales of design projects that range from the size of a room to the entire planet. At each scale particular health, safety, and welfare parameters are emphasized and courses from related knowledge areas (AKA departments) are taken. In addition, the state of the art of education research on learning styles and pedagogy is used as teaching and learning methods are structured appropriate to learning content and intended outcomes (Figure 2). The educational strategy is to assure that a rich multi-scale understanding of design is learned. Project contexts will require student to anticipate design consequences at many scales.

DESIGN AND BUILD-BASED CURRICULUM MODEL[2]

The model is predicated on the belief that providing students with real projects and hands-on experience promotes requisite self-confidence; develops commitment, accountability
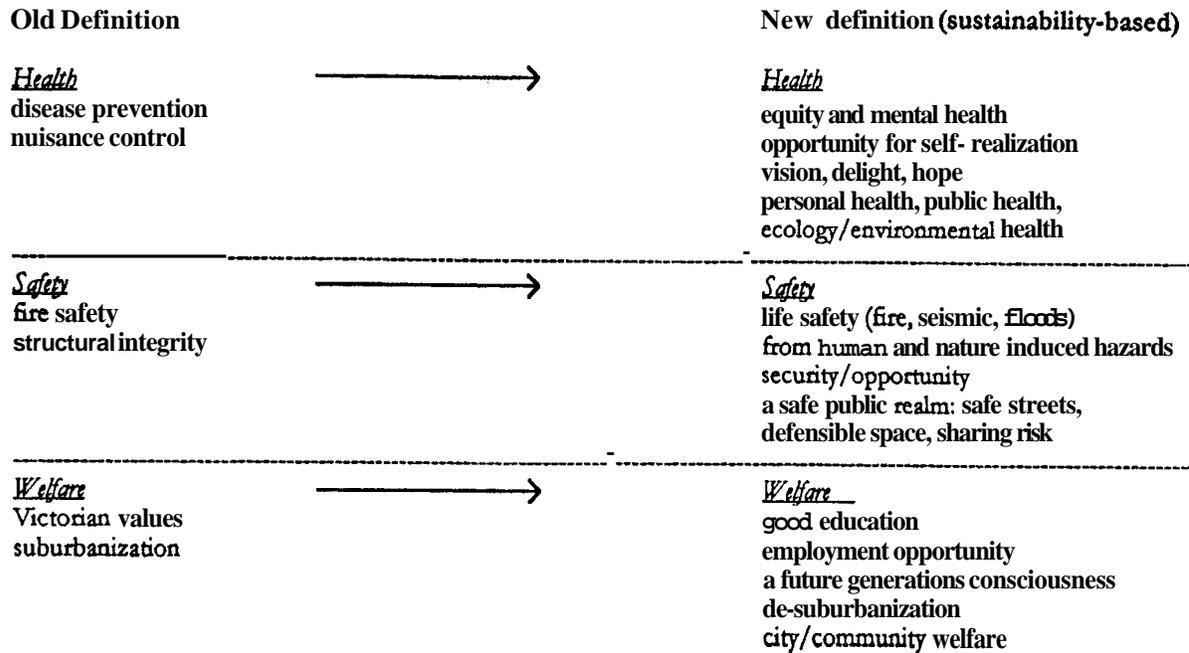
Old Definition		New definition (sustainability-based)
Health	⟶	_Health_
disease prevention		equity and mental health
nuisance control		opportunity for self- realization
		vision, delight, hope
		personal health, public health,
		ecology/environmental health
Safety	⟶	_Safety_
fire safety		life safety (fire, seismic, floods)
structural integrity		from human and nature induced hazards
		security/opportunity
		a safe public realm: safe streets,
		defensible space, sharing risk
Welfare	⟶	_Welfare_
Victorian values		good education
suburbanization		employment opportunity
		a future generations consciousness
		de-suburbanization
		city/community welfare

Fig. 1. Redefining health, safety and welfare.

and responsibility for building; and engenders respect for diverse viewpoints that come out of working with communities. This curriculum model aspires to instill sharing and collaborative values in students while teaching skills. Further, skills development, teamwork and problem solving are foundation to design education. Communication with laypersons is equally important. Critical reflection and experiential learning links the theoretical parts of design education to a real world with budget, client, using materials, resources, and tools. Existing community design centers are structured to support this curriculum.

The curriculum advocates longer studios that are two terms or more and allow students to work from design through construction. The curriculum fosters communication skills and group dynamics All participants engage in knowledge-based application in design. Students will be involved in curricular and syllabus content decisions throughout. The conventional vernacular and that which is commonly understood in building will be emphasized from the start. All projects seek community engagement and links with other disciplines. All studies have real sites and real clients (Figure 3). Starting at small scale, courses and activities focus on materials and making. Over time, the scale shifts from object to small building, community, and regional scale. First year begins with individual work and could involve real clients as an option. Ecology is a required liberal arts course everyone is introduced to ecology, visual literacy, sustainability in the first year. Second year is a design/build year with real client for a small building. Experts are brought in to provide information and consultations (more than as clients). Course work might include topics like developmental psychology. Faculty and consultants from second year forward include

ecology and landscape.

Third year is a community service apprenticeship including three semesters with travel and options in diverse office settings to foster a variety of career paths. Students work in the community, neighborhoods, and different countries. Projects become team-oriented continuing into the fourth Members of the team are community and client-based. In the fourth year, consultants come from increasingly disparate disciplines. Multi-disciplinary teams include ecologists, conservationists, and planners. The intention is to solve problems at the bioregional scale. In this last year, students reflect on their variety of experiences and determine career interests.

SPLIT PROGRAM (LIBERAL ARTS FOUNDATION) CURRICULUM MODEL

This curriculum model suggests that architectural education should begin with a liberal arts foundation. The professional years would occur at the graduate level followed by a collaborative school/practice internship. Thus, the proposal advocates a 4+ 2 program (or 4 +3+) and phasing out the 5 year Bachelor of Architecture program. Fifth year students might arrive with focuses in history, architecture, or environmental studies. First semester 5th year would initiate interdisciplinary studies and place early emphasis on biology as a design science. First semester sixth would shift to design empowerment of the consumer, client, and student. Enlarged emphasis would be placed on all forms of communication, knowing the regulatory context and the potential markets for architectural services specific to sustainability. Design focus would include process engineering and system thinking, object oriented methods, that is, taking case studies and integrating them into the design, as well as studying past trends and their

Scale of Projects	Redefined HSW Values	Knowledge Area	Related Disciplines	Pedagogy
Room Dwelling Street	Self-Actualize Social Justice Aesthetics Economic Viable · Environmental Sensitivity Social interaction	Natural Systems Structures Verbal Communication. Design Communications History Building Science	Personal Development Phenomenology Philosophy Psychology Anthropology Microeconomics	Interdisciplinary Teamwork Case Study Typology Studio Lectures
Neighborhood city	Productivity Community Public Realm Stewardship of Resources Decision/social consensus Tolerance Leadership	Workplace Public Space Commercial Infrastructure Civics/Government Morphology Community Transportation	Civil engineering Political Science Economics Sociology Art Biology	Community Based projects Charrettes Workshops Advocacy Interdisciplinary
Region Metropolitan Area	Bio-regionalism Civic Region Governance Land/Growth Management Diversity Opportunity	Biome Watershed Climatology Regional Infrastructure Urban Form Geographical Information System (GIS)	Commerce Demography Social equity Macroeconomics Trade Health Sciences Art	Case method Comparative Studies International travel Public speaking
Global	Equity re: global resources Justice	Cross-cultural communication	Languages Geography	International travel Internet Visiting professionals

Fig. 2. Educational components of the health, safety, and welfare curriculum model. The text of the first column suggests time but not an explicit scale of years. Its graphic indicates a non-linear pursuit of various scales of projects and study within the model and a fluidity of scale consideration in design to assure that a rich contextual understanding for design is appreciated. Each year, a student must work at all four scales. In addition, the model includes requisite values, knowledge areas, skills that need to be developed, and disciplines with which to relate. for example, the idea of dwelling has an individual basis. Issues in that row surround individual development. Pedagogy throughout tends to introduce individuals to working in groups and seeks to balance learning convention and invention.

outcomes as having implications for current trends. Studios aspire to be holistic and integrative, blending knowledge, skills, and abilities through application and synthesis of sound ecological design principles. (Figure 4). The split program curriculum model also seeks to place more responsibility on individual schools to shape distinct educational agendas particular to their environments. The model calls for the elimination of the registration exam and accreditation of architectural schools because they are too limiting, and transfers both responsibilities to the schools. Without accredited

degrees, the motivation of the schools would change and yield a responsiveness to the marketplace for sustainability-based design education. The model also anticipates that architecture in its conventional forms of practice is going to disappear. Beyond designing buildings, architects will be more research-oriented, generating new knowledge about human environments thereby increasing prospects for good design. The model fosters a range of career paths, outcomes, or options by advocating a non-prescriptive curriculum.

WHOLE SYSTEMS CURRICULAR MODEL

The beginning years provide a foundation in ecology, biology, systems theory, and environmental ethics (distinct from professional ethics, this is ethics as it applies to relationship between humans and the natural environment). The first year is offered in design but draws on faculty from many schools. (Figure 5, lower left).

In the middle years, there is a loose structure of options for students, however the courses are all interdisciplinary, with a large component of field work, research, and work with community. This is not just architectural school but a multidisciplinary design school. Building design will mix with regional planning studios. The design curriculum is fit into an educational framework with other disciplines. (Figure 5, lower center)

The final year will be spent on a piece of work that develops and demonstrates design maturity, preferably a collaborative project that is place-based, leads to a plan or design that incorporates everything learned, and requires working with an interdisciplinary team of faculty. (Figure 5, lower right).

Four themes follow through the educational sequence: (1) this is a "think and do tank"; (2) constant interaction of creative and analytical thinking occurs (you can do analysis creatively) (3) work happens at every scale possible from personal to global. Every effort incorporates three scales: the one you are working at with the next larger and the next smaller scale; (4) start working in systems terms from beginning, but in simple systems. By the end of these college years, students are dealing with complex systems.

The model is meant to be thought of as the beginning of education followed by practical experience. The first step in a lifelong process that brings design continuity into internship. In the Whole systems Curriculum model, both the physical and intellectual environments of the curriculum must be conveyed as a model of the world. The living laboratory of the whole systems model is analogous to the idea of classroom as pedagogy. Instead of linear progression, lack of horizontal coordination, and walls that divide us into segments, the whole systems model advocates that any knowledge domain be linked and related to a context. The progression of an education is marked by evidence that a student is capable of combining domains from the previous level. The design studio becomes the container for the rest of the curriculum, however appropriate methods remains an open, continually revisited question around which to construct the rest of the curriculum. Instead of increasing complexity additively, the whole systems model proposes cyclically reiterating an engagement with wholeness. As intensity increases, the sophistication of tools and methods that students use increases, and the curriculum shifts with increasing sophistication of tools.

Landscape design processes become the bases for understanding context. Students need to understand how places work from landscape perspective. Students work at multiple scales through three 3 phases: (1) observation, analysis and
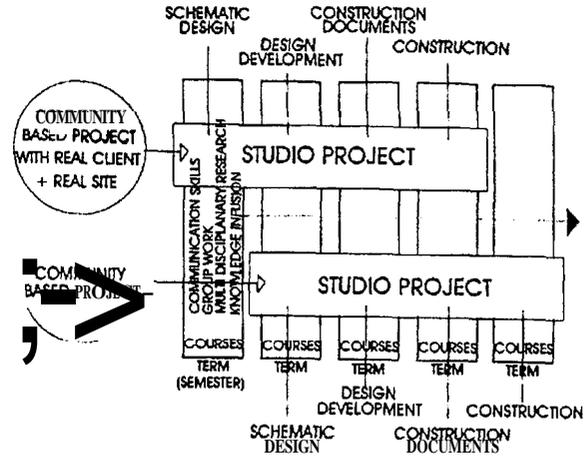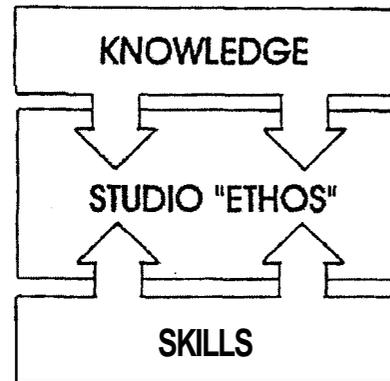
Fig. 3. Design and build curriculum.

HOLISTIC * INTEGRATED * RELEVANT

APPLICATION * PRAXIS * SYNTHESIS

Fig. 4. Split Program model. The figure diagrams the intention that a sustainability based studio ethos will combine emphasis of knowledge and skills through producing holistic solutions to environmental design-relevant problems.
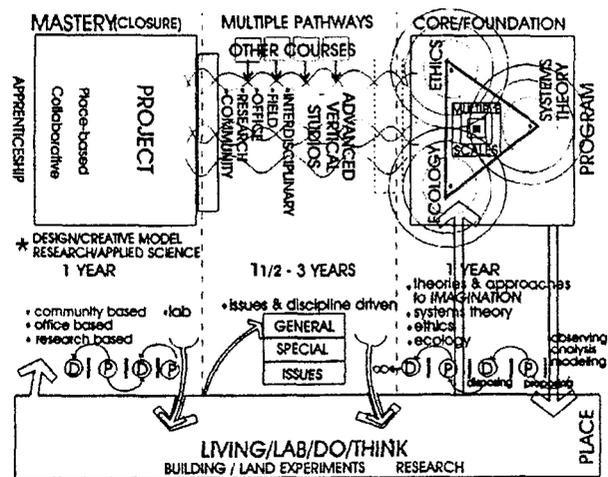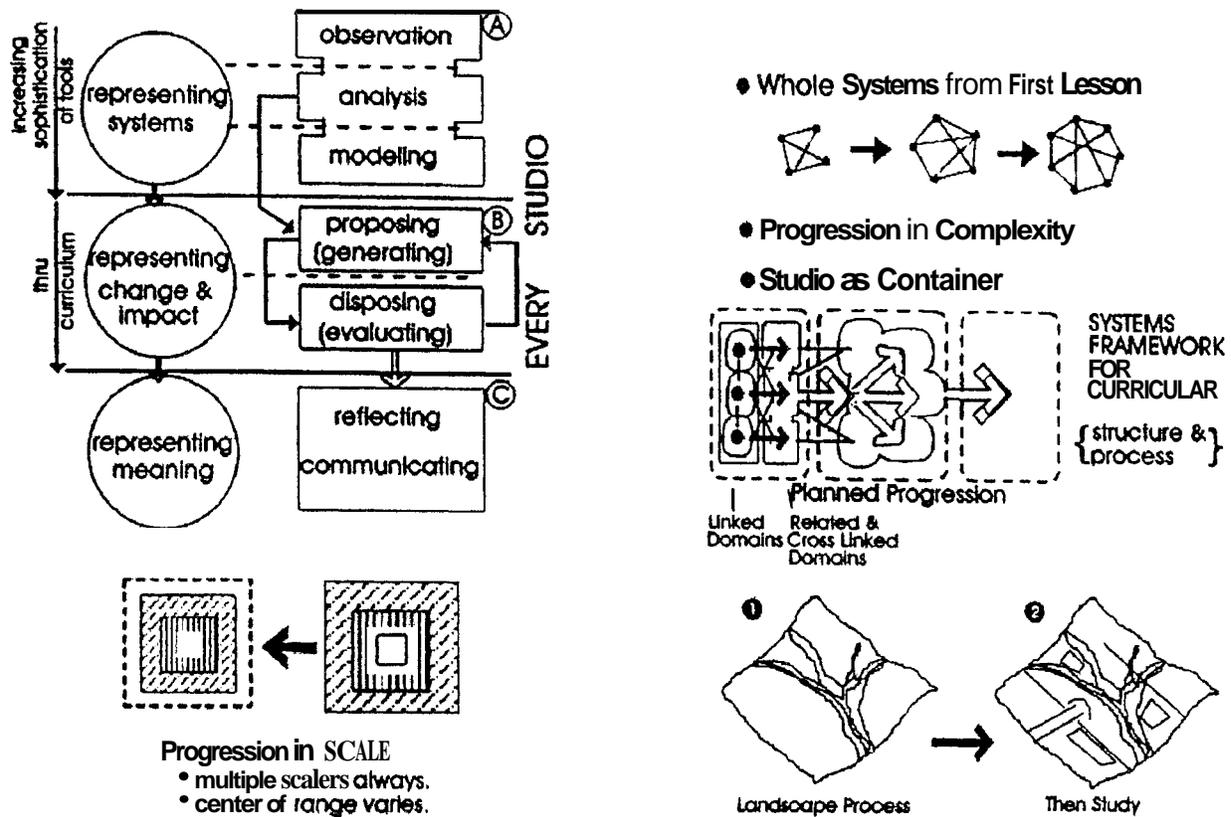
Fig. 5. Whole systems curriculum model.

Fig. 6. Whole systems curriculum model details.

modeling, which are the multiple, cognitive ways of experiencing and understanding the context of problems. Observation gives students direct contact and experience of bonding with the place and what different landscapes are about. Analysis uses more traditional methods. Modeling leads to understanding systems and the context of problems; (2) design proposing and disposing, and (3) reflection on the meaning, product communication and making results visible to the public.

KNOWLEDGE-BASED CURRICULUM MODEL

In the Knowledge-based Curriculum Model, studio-based education is driven by critical societal problems. Research is normally done in schools of architecture as discipline-driven (Figure 9, above the heavy line). Alternatively, in this model (Figure 9, below the line) research is developed through ascertaining critical problems in society leading to collaborative research projects. Some projects may come directly into studios, like case studies. They can link studios to communities, and enable faculty to be more efficient and be used more efficiently. Funding and time to do case studies are needed to start. At some institutions, 30% of faculty time is supposed to be devoted to research. That time could be most effectively used individually, on teams, or within institutes containing think tanks that are problem driven. Case studies are used in studios. Each faculty member's work provides

one module within a studio. Collaborative work provides individual pieces of larger whole. All collaborators are involved in creating a complete studio. (Figure 8)

The proposed model includes a 4 year Bachelor of Arts degree with a new kind of lower division that includes history courses, introduction to the built environment, and issues of health, safety and welfare, all taught from an ecological perspective. This represents 25% of first two years in a really liberal education. (Figure 9, left). This period is followed by one year of design and intensive introduction to the studio. In the first part, students learn analytical tools for particular situations that are site specific, have the land as a critical design component, and students visit. Projects have particular concern for settlement, dwelling, and neighborhood including a clear relationship to the bioregion. The education is ecologically and culturally based. Students learn how to evaluate multiple systems. Learning of skills becomes a design challenge itself. In the second half, students from a variety of design disciplines do synthesis exercises around common base, collaboratively. The fourth year offers two alternatives: (1) work at a professional level, or (2) exploratory individual project based on what you learned. A Bachelor of Arts degree is awarded at this point.

The graduate part of the program offers a variety of studios that tie back to multi-disciplinary teachers for each studio (Figure 9, right) . Each provides the opportunity to expand
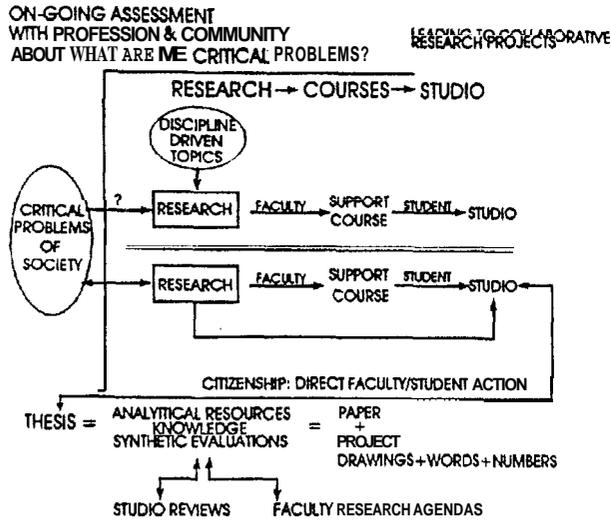
Fig. 7. Knowledge-based Curriculum Model. Differentiating the conventional way and an alternate model for undertaking research in schools of architecture.

Fig. 8. Knowledge-based Curriculum Model. How research is/can be done.

analysis and evaluation phases of studio in design. **At** the end of every quarter, to build community, the faculty presents to the entire college body what they taught and why they taught it. The presentation provides a venue for evaluating the studio as faculty research for faculty from all disciplines. Subsequently, results get published and shared with clients, community, professional advisory groups, and professional colleagues.

NOTES

[1] A complete list of participants is available on the EASE Project Website (see www.arch.ease.bsu.edu) Some of the participants: Sim van der Ryn, Harrison Fraker, Douglas Kelbaugh, Marvin Rosenman, G.Z. Brown, John Lyle, Mark DeKay, Ken Greenberg, Steve Badanes, Dave Sellars, Sharon Sutton, Leslie Kanes Weisman, Brian Sinclair, Pliny Fiske, and Susan Maxman.

[2] Design and build is used to avoid confusion with what the profession now calls design/build, that is, a way of designing and building in which there is singlesource responsibility and control of a building project.
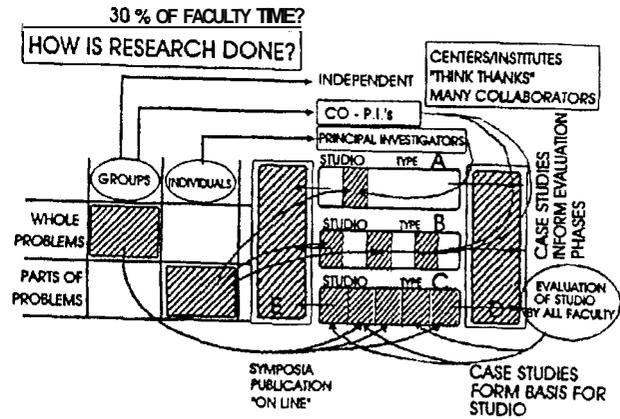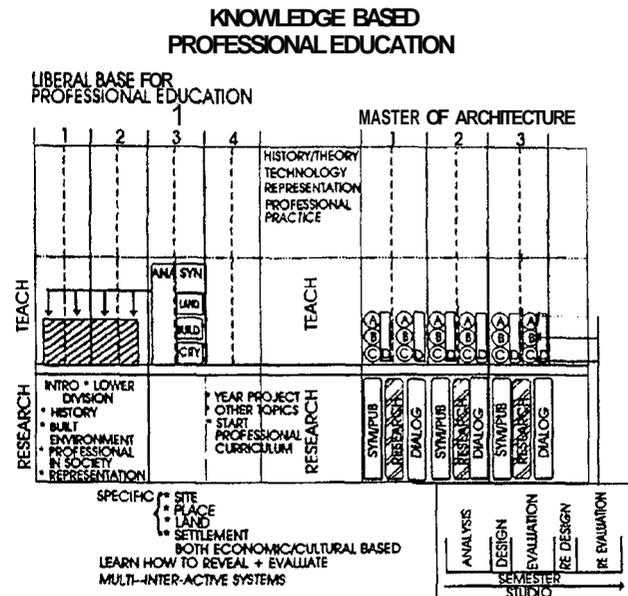

Fig. 9. Knowledge-based professional education. The diagram shows the intended fit between research and design studios in ways that gets around the problem of research being seen as different from design teaching.